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[<i>-] Treatise on the Genera and the Modes of Music by Giovan Battista Doni

[<1>-] To the greater glory of God.

Treatise on the Genera and the Modes Of Music

Book one

Chapter one

What is Harmony: [[and what part of Music it is]] [Hermosmenon Melos, Melody and Melopoeia add.supra lin.]

What has happened to this word Harmony has also happened to an infinite number of other words, which, because of the corruption of language, have lost their proper and ancient meaning completely, and they have changed it to another, which is similar and close to it. In fact, there is no doubt that this word meant something to the ancients, and especially those who practise the art of Music, and it means something else nowadays. If you ask anybody who is even slightly familiar with musical matter what is understood as Harmony and in what it consists, he will laugh at you because of that question, as useless and empty, since he believes, as does the ignorant populace and with the common opinion of writers that Harmony is nothing but that mix of high and low sounds [(and they believe that that word used by Greek writers translates into Latin as *concentus*) in marg.] which consists of many voices which sing together with many notes and many instruments. The truth, however, is a different one. In fact, [<2>-] this word Harmony indicates one thing, in the writings of the good and ancient Writers [at least those who deal with music *ex professo*, which contains different varieties, such as *synodia*, which is the specific combination of human voices, *synaulia*, the combination of wind instruments, *synchordia*, the combination of stringed instruments add. in marg.]; the word *Concentus*, which in Greek corresponds to *Symphonia*, means something else. Therefore, leaving aside the meaning of the latter one, which is clear to everybody, I will explain the true meaning of the first words on the basis of the authorities. As it is the basis of my entire discourse, it is necessary that it should be understood well, so that one will be able to understand also why Harmony is the first and main basis of the music to which dealing with the Genera and the Modes belongs. *Harmonia* [*harmonia*], (whose prime is [*haro*], an unusual word) derives from the verb [*harozein*], which means to accommodate, to adapt and similar things. Therefore, the word Harmony was taken in a wider sense for any proportionate and well-ordered combination of things, [hence, Saint Augustine says in his book *De Trinitate*, chapter 2: I had the thought that this thought which the Greeks call [*harmonian*] add. in marg.] for instance, of the parts of the body. Hence, in an old glossary one reads [*harmonia melon anthropou*] (proportion of the parts of the human body) translated into Latin as *compago*. However, ancient musicians (from whom I do not want to diverge because they were great observers of the individual

features of the words) call Harmony, in a more specific and usual meaning, that correspondence and combination of high and low that one hears in a vocal or instrumental composition. I said correspondence and union rather than combination to avoid being taken literally, because I am not talking about the agreement [-<3>-] of several voices together, but of one in its several parts or in its progress. In fact, since in every song there is a variety of more and less high and low and since those differences which they have between each other (which are called in Greek [diastemata]) they are not uncertain, irrational and indeterminate, but rational, determinate and commensurable between them, as we mean to say, for instance at the distance of a tone, a semitone and of compound intervals, Harmony is called and it is with every reason that orderly progress of any sort of voice through those sounds and intervals, if there is no accompaniment of consonances. For greater clarity and brevity I will show what I mean to say with a very well known example which is very suited to our purpose. If we presume that any quantity can be divided into infinite parts, as the Nature shows (leaving aside if Sound is a quality or a quantity, [(on which you can refer to Augustine and to what Zarlino derives in the Supplementi) I say that in marg.] if we lay out a string and we rub it with a bow while at the same time we press a finger on it while we move it little by little upwards or downwards, one will hear the sound become higher and lower in the same way as it proceeds upwards or downwards, without the possibility of hearing any interval of tone or semitone or any other distinctly. Conversely, if on the keyboard of a tuned harpsichord one touches with a finger a note after the other moving always through adjacent keys or touching this or that key here or there orderly and [-<4>-] in a way that an melody is created, or in a way which is really confused and disorderly, so that no melody can be heard, I say, that some Harmony is shown in any of these three ways, even in the last one, but not in that continuous rising or lowering of the sound which one hears in a string touched by the Bow. In that case it might happen in potency, but in actuality, because that division and separations of sounds and intervals which is found in the strings of a tuned harpsichord in essence and actuality is almost hidden by a kind of Chaos in that continued sound of a single string, where the seeds and primal matter of the consonances and of the other dissonant intervals and distinct and singable sounds are contained rather than the sounds themselves or the intervals in actuality. Equally, we will understand that there is no Harmony at all in the sounds of an instrument completely out of tune, which are played in the same way, and from this it is clear that Harmony is not born of a single sound (the Greeks call it [isotona] because it maintains always the same sound) like the sound of an organ pipe or someone lengthening the same note, nor from a sound which rises and lowers itself continuously, nor from several sound added together disorderly. The word [hermosmenon] comes from the same verb [harmozo] which in our language translates as 'tuned up' and indicates the series of several sounds harmonically disjointed as in the natural or man-made instrument, which can be used to sing or play some Genus or Mode, as we will see here beneath. Therefore, Harmony is nothing but a order and sequence of sounds disposed in such a way as to produce an aria or a melody, if they are made to be heard in succession and with the due order, or they will be a concerto and a Sinfonia, if they will be produced in such a way as to be heard at the same time and with the due combination. Hence, one can gather reasonably accurately in what sense the word Harmony must have been used in the beginning. Now, since we hear that there is some confusion around the meaning of the word Harmony, it is necessary to understand what Melos [melos] is.[-<5>-] Therefore, I say that [melos] in the earliest times was taken to mean a limb of an animal, for instance

the head, or the arm of a man, and, since the arts and the sciences often use translated words because they lack words of their own, ancient musicians used this word as to mean any song, or part of a song, which we call an Aria in Italian, although the narrowest meaning is that of Melos, since, if one speaks more correctly, the Aria is born from the union of Melos and Rhythm. Hence, since the ancient Greeks and Romans did not have a word which corresponded entirely to this one, sometimes they use of one of the two, sometimes of the other, as we have said, to denote what we call Aria, namely [melos], which the Romans called Modi, and [rhythmos], which in Latin is called Numeri. The Aria or the Song, therefore, is composed of two elements, sound and timing, or, better, of the orderly sequence of sounds and of the orderly sequence of timings. The first was called Melos by the Greeks and this Rhythm, with very appropriate names. I leave aside the Rhythm, which does not concern us and I say that the melos is like the effect of Harmony, because, since it impossible to touch more notes of a tuned Instrument in the way that I mentioned, without some Aria being created, thus, we cannot understand that Melos is if first we did not provide some information as to the true meaning of Harmony. I will demonstrate briefly that Harmony does not denote the cadences or ideas of the notes specifically (to avoid being needlessly prolix) [-<6>-] with the authority of some ancient writer with few but very interesting accounts. The word Melody derives from melos, in the same way as a work man-made is born out of a material, for instance as a statue is made out of a piece of marble. Therefore, Melody, besides its meaning of 'act of singing', means the song itself, especially the human voice, just as it is understood to refer specifically to the human voice, while Melos is left to have a wider meaning, as it refers not only to the human song, but to the one of an Instrument, like that of a Recorder. Melopoeia, then, is nothing but the Art itself of producing a song, or an aria, and also the operation and the artistry of the song. If we want to be precise (as we have always strived to be, and we intend to proceed similarly in this Treatise) the meaning of this term does not cover the art of composing for several voices, or to write consonances, which nowadays is called Counterpoint, and which we believe that the ancients called [Symphoniurgeia]. About this latter one not only we do not have any book which would provide the instructions, but the term which signifies it is barely known. On the contrary (and this is one of the more notable sign of the variation of human matters), nowadays we believe that music consists in barely anything else but [<7>-] the art of composing, which is only a small part of the musical profession. [[As evidence of this see the many books of modern Authors.]] [[This is demonstrated very well by the large number of so many modern authors who have devoted every effort and energy to the study of the consonances.]] Instead, almost every energy and effort is devoted to this without perfecting much the art of creating the Melos and the Rhythm, namely of composing arie which are suited to the proposed theme and to provide them with appropriate movements, although, to tell the truth, through the constant practice and imitation of so many melodies, partly left to us by the ancient Church composers, and partly invented afterwards, or rather thanks to nature or human intervention, this art is becoming so refined that the most wonderful arise are written every day by modern composers without so many rules and restrictions (which the ancient writers who wrote about Melopoeia and Rhythmpoeia must have dealt with) with the habit of singing and the natural vein. However, going back to my proposed topic, I say that it would be very surprising if, since the ancients must have practised the use of consonances necessarily, since they had, as we know, Instruments with forty strings and instrumental performance of flutes and organs both operated by water and by bellows, they had not left us [-<8>-] any books on this branch of music, had come

down to our times a good portion of those which were composed in antiquity in a very large number on the parts or specialities of it, since it was very well regarded in those days not less than it is now. But, on the contrary, among all those so noble writers who wrote works on music [(one has to say this in order to be impartial)] a very small part has survived after so many destructions and fires that destroyed entire cities and provinces for many centuries. An even smaller part has managed to survive beyond dark and uncivilised that followed the destruction of the Roman Empire and to reach our age. But, since this is not overly our concern, I say that the most important and fundamental part of music, as Aristoxenus explains at the beginning of his Harmonics, is that is called Harmonic, on which we have only three books (albeit incomplete) of the Harmonic Elements of Aristoxenus, who is the prince, in my opinion, of all the musicians that have been and ever will be. However, also the three most erudite and subtle Harmonics by Ptolemy with Porphyry's most learned and ample commentary which is in the Vatican Library and in others, and, besides, the Latin work of Boethius and some [9] other Greek Writers who (from Aristides Quintilianus onwards, who deals equally of Rhythm and Meter) do not deal with the other parts very widely, but discuss on Harmonics succinctly, but with good order and solid doctrine derived from earlier authors who dealt with musical matters more extensively. But, since these books are buried in libraries for the most part, as it is the case of Aristides and Porphyry, or since they have been translated very badly, as it has happened to the Harmonics of Aristoxenus and Ptolemy, hence has happened that the doctrine of the Genera and the Modes has not been understood fully until now.

[10] What is the Harmonic part of Music and which elements it contains with particular reference to the Systems

Chapter Two

From what has been said so-far, one can easily gather [what we were saying in particular, and, consequently, that, among the parts which constitute Music a very important one, or rather, the most important of them all is the one which is called Harmonics, as it deals with Harmony, which is so important in this field] that Harmonics are the most important part of Music, [despite the fact that I said little about what it is and its whole content, it being almost the fundamental and almost the content of all of it] or rather it is absolutely the first and most important, just as the subject [on which its] itself is which it deals with, considering it with all its properties and relative features. One has to know that Aristoxenus (who weaved his doctrine with wonderful order and method following in the steps of Aristotle, who was once his Teacher) at the beginning of the second book divides it into seven parts. After him Aristides and the others who wrote after him did the same. The first part deals with the Genera, the second part deals with the intervals, the third one with the sounds, namely the notes that can be sung, the fourth with the Systems, the fifth with the Tones, the sixth with the Mutations and, finally, the seventh with the Melopoeia or art to create [11] a song. Now, it is necessary to say something about what is not understood usually in this Division, as a form of respect towards persons who are less expert in this. In Music the distances that are between a note and another one which differ as to high and low pitch are called Intervals. Some of these are consonant, as the interval of two tones, which is called Ditone, the one of one Tone and a half, which is called Semiditone, the one of three Tones and a half, which is called Diapente, and so forth. Other intervals are dissonant, such as a semitone, a Tone, a

quarter of a Tone, which the ancients call enharmonic Diesis, and so forth. System is understood to be the union of more than two adjacent notes which are different as to pitch and of more than an interval, namely of at least of two intervals and three notes, as in example provided here:

[Doni, On the Genera and the Modes, 11].

The content of these three notes ut, re, mi is the smallest System, which contains two tones. This other one, re, mi, fa, also contains two intervals but the first one is a tone and the second is a semitone. Therefore, if one considers the extreme notes in these systems without the middle one, the first one will span the interval of a Ditone, and the second the interval of a Semiditone, and they will not be system. However, if one takes into account the middle note as well, one will be a system of two adjacent intervals of one Tone [[since the intervals have the first unit]] since the notes interspersed in the systems are one more than the number [-<12>-] of the intervals [Boethius widens further the boundaries of a system, because it calls it constitution, with a Latin word. He says: “A constitution is like a body full of music which consists of the union of consonances, such as the Diapason, the Diatessaron or the Disdiapason. Ptolemy also as a body composed of consonances, as the system is like a consonance of consonances in marg.] Now, the number and variety of the Systems is indeterminate and infinite, since one can imagine and create very long ones and comprising varied intervals and of notes which are more or less close to each other. However, since what is uncertain and infinite is not a matter for the arts, ancient musicians have limited themselves to [[a small number]] base their theories around the large System of fifteen notes, which spans two octaves, being content with this because they have observed with their long experience that human voice, whichever it may be, exceeds that span only rarely, or, if it does so, it does it with such discomfort and difficulty that the extreme notes in the high and low register sound forced and unpleasant. Conversely, there are few singers who can seek to produce those notes without the highest sounding screeching and the lowest ones empty and badly formed. [This also happens in the recorder and in other similar instruments which we comprehend under the name of [aulos] in marg.] It is true that many were of the opinion that the human voice was able to reach nineteen notes, and thus they wanted to introduce the system of two octaves and a fifth, which was called by the ancients Bisdiapason [[diapente]], as it contains that number of notes. But this opinion was not accepted universally, and for this reason one does find that no more than the fifteen notes which cover that span were given an individual names [[and titles]] which were given to each of these in the most appropriate way and without which it was uncomfortable to talk about them. I find that the Systems most commonly used by the most ancient musicians were the one of seven notes made of two conjoined tetrachords, then the one of twelve, which they call perfect, and then the one of eleven, namely of a Diapason Diatessaron [Diapente, as Ptolemy, book 2, chapter 9, namely of a Diapason Diapente in marg.] which was called perfect, as Ptolemy says at book 6 chapter 6, and also the Disdiapason (which lasted for very many centuries) in the most florid times, or the Disdiapason Diapente. Nevertheless, Plato

[-<14>-] On the large System of the ancients of fifteen notes [and on the one of Guido add. supra lin.] chapter

Although it is not our intention to deal with the principles of music and reiterate things said and repeated many times by the authors, which, apart from the fact that this is unnecessary to our aim, we have never liked to copy others' doctrine as many do to thicken their volumes, if not in as much as it is necessary to understand what follows, nevertheless it will be necessary to say something on the System which the ancient called large or perfect and of its features and terminology, since one will be hardly able to understand what follows without any knowledge of these. The most ancient of the Greeks, who were fathers and inventors of music, did not know but the seven notes [their lyre had four strings in marg.] which made up the System of two fourths or diatessaron, namely, of a seventh, to which then, to complete the [[octave D]] Diapason Terpander added the eighth string or note. This man, just as the Florentine painter Giotto did, improved and enhanced considerably his profession, which was not refined and very simple, [-<15>-] and reduced to a state of rather greater perfection. But leaving aside [Albeit Plato in the Timaeus appears to have enlarged his System to cover four octaves and a sixth, making the number 27 as one of its extremities, nevertheless, as Aristoxenus quoted by Proclus states, he did not consider practice in this, but only nature; and, although theorists more modern than Aristoxenus proposed the Diagram of three octaves and a tone, reaching a total of 23 voices, one cannot say that it was a single System or Diagram, but fifteen, as many as their tones were in marg.] aside such early starts, and the question of whether the lyre had four or seven strings in the beginning and such other matters which one can learn as well from Plutarch, from Nichomachus' fragments, from Boethius and others, and from Gallileo, who deals with this inquisitively among modern writers, I will move on to discuss the complete and perfect system which was used in those most lucky times of ancient Greece when this art was treated with such diligence and exquisite taste that it seems to me that I am able to state that, if in any other professions the Greeks have surpassed all the nations of the world, in this one they have surpassed themselves, in a certain sense. Therefore, I say that the system of fifteen notes was considered and called perfect with good reason, because all the perfection and variety of music is contained within it, and albeit someone might think together with the Pythagoreans (who were happy with the proportion of the number six contained in it, and which constitutes the first of all the simple and uncompounded consonances) that the system of eight notes would be sufficient and perfect, nevertheless, [[because if that interval is not sufficient from the action of that interval one finds the consonances]] we do not want to become embroiled in this dispute, nor do we want to abandon the doctrine and [-<16>-] fundamental beliefs of those who have written about this profession better than others in those times when all the arts and the sciences had already reached their highest point. Someone might be surprised perhaps, that I do not propose the System of Guido of 21 or 20 notes, namely from [Gamma] ut to e e la, which is received and practice commonly nowadays, believing perhaps that, because it is longer and ample it contains a greater level of perfection and is of greater use in music. However, the brevity and ease of use which the ancient System carries with itself, the better order which it contains, and the observation that more modern musicians have added other notes to Guido's System, both above and below it, or that it is redundant, as it appears to be in the compositions in a single part, or lacking, as in many compositions for several voices and in those for instruments, make it such that, leaving aside for now its foundations, I will stick to the most ancient ones. I will do that all the more willingly since Boethius himself, from whom Guido has derived all his doctrine, as Boethius was the only author read in those very uncultured ancient times [moreover, as Gallilei maintains the number itself of its 21

notes in marg.] he does not deviate at all from the Greeks. In fact, if Guido believed to make music easier with this, I will leave it to others to decide how successful he has been, since it seems to me that the addition that he made to the ancient system provided more confusion than usefulness. [-<17>-] As to his boasting that music has been rendered so much easier with the aid of this and with the invention of those syllables, so that one [[where one did not learn in two years]] might learn more in six months now than he used to do in two years, this can be forgiven because he happened to be born truly in [[such barbaric a time]] a century so uncivilised and ignorant that one can say that music, at least in Potency, was extinct almost completely. So, albeit the Greeks had other notes which were easier and better organised that [[the six]] his (which [[we have rediscovered finally]] we will show a little further) it is not surprising that he did not know them, because not even the Greeks of his time used them, and although one should have found at that time a greater number of Greek authors that have been preserved later one, nevertheless, because of the absence of printing and the small number of exchanges occurring between Latin and Greeks and the ignorance which ruled [[in Italy]] then to a supreme degree especially in Italy, they turned out to be completely useless. I say this not in order to diminish the reputation of that man to whom this profession is indebted undoubtedly; [[since]] since without him [[there]] it would have been resurrected perhaps much later on, but so that those who are not experts may not convince themselves (as those who have no knowledge of history) that following those who came before Guido is akin to look for acorns [[and disregard]] instead of bread.

[-<18>-] [[Explanation of the perfect System and of its notes and Tetrachords, chapter.]]

But before we move on, it will be a good thing to explain the nature and property of the large or perfect System and of its parts and terminology, because all the doctrine of the Genera and of the modes, or rather, the whole of Harmonics is based on it, and because the Diatonic System is the most ancient and most natural and the notes of the other two, albeit they are others, do not differ as to their name. We will explain this before anything else.

Explanation of the Perfect System, of the seven notes and of the Tetrachords, chapter

[[It is such a great natural thing in the progress of a composition and in the continuation]] [[It happens naturally]] If we presume as absolutely certain that Music had originated from the natural singing of man, and that the Instruments have been built in imitation of this, it was observed with reason that any song proceeds by tone and Semitones in such a way that, if one lays out the notes which are sung in their order according to high and low, after the Semitone there follow two tones and then another semitone, [-<19>-] and consequently another tree tones. The octave is contained in this span, and after it one starts again, just as after the number ten one goes back to the number one, with this difference though, namely, that the eighth note is akin to the repetition of the first one, but in the numbers not the tenth but the eleventh is the repetition of the first one and this happens because the numbers are related to the notes than to the intervals, which are one smaller in number by one. To avoid that anybody may be left perplexed bu this natural and definite interposition of the semitones between the tones, one should know that, in the same way that painting cannot be consist in a single colour, because at least two are needed in the

chiaroscuro, as it is called, which is the same as calling it light and shadow, in the same way one cannot create a melody without this combination of intervals large and small which in the Diatonic and natural genus are the tones and the Semitones. This simile is so appropriate to express this propriety of music that the ancient painters, as Pliny teaches us, used this word of tone to denote that part of the colour which is [[that]] midway between light and dark. And one sees that it is established by nature with admirable order (which it is found in excellence in every part of music) that just as the first division of the octave is made into a fifth and a fourth (which almost as a perfect union of male and female form the matrimony of Harmony which contains everything, namely the eighth Diapason, to which [[is given this]] [-<20>-] one of the meanings of the word Harmony corresponds, thus also the progress of any song and melody is created with the same components of fourth and fifths placed in alternation. Because [[the octave]] the Diapente spans a whole Diatessaron and a tone (always intending, unless stated otherwise the sesquottavo and larger which was the only one know in the most ancient times) and, consequently, the Diapente embraces two Diatessara and a Tone, it was rightly called the tone of the disjunction or division to distinguish it from the others which are put as integral parts of the two Diatessara. This was done because it separates at the same time the same fourths [[albeit it unites]] and unites them within the consonance of an octave. Now, we understand that this separation occurs when an intervals is interposed between two others, which do not have a common term, but each one has its own, as from one can see in these examples

[Doni, On the Genera and the Modes, 20]

In the first of them the note a la mi re unites two fourths, since it is a common term between both of them, so that the two extreme sound a seventh. In the second then the tone which intervenes between a la mi re and [sqb] mi separates and divides the two fourths, namely, the lower one E A, and the higher one [sqb] e, so that their highest and lowest notes answer each other [-<21>-] at the distance of an octave. Therefore, it follows that, since the ancients found this order perfectly, one sees in any kind of melody that nature abhors to continue for more than three tones because of the great harshness that they would create and the juxtaposition of two Semitones. This in nature does not happen, because, equally nature refuses that subtle tenderness which they caused. The ancient established their large Diatonic System on two octaves [[and]] and, consequently, on two fifths and two fourths, and they gave the same name [names ante corr.] to [[the notes]] each note which has the note that sounds that sound. Therefore one must imagine that this system is nothing else but a disposition of fifteen strings in an instrument which would have been so disposed according to the adjacent intervals which are sung in the Diatonic. Therefore, they divided all the large System into four Tetrachords (namely four smaller systems of four strings or notes each) and two Tones which are used for the mention Disjunction and for the creation of the fifths and the completion of the octaves. However, one must note already that, albeit [[in their authors what sort]] the modern authors commonly maintain that [[Salinas Zarlino in the second part of the Institutioni musicali chapter 50 in marg.]] our Scale or perfect System is divided in hexachords because of the choice of those six notes Ut Re mi fa sol la and then they contrast and compare those hexachords with the ancient Tetrachords [-<22>-] as Salinas does apart from Zarlino

[second part of the Institutioni chapter 50 in marg.], a most learned Spanish theorist and possibly the most accurate and judicious of all modern Theorists, nevertheless I do not believe that Guidone created them for himself and that nowadays they can create nothing but confusion and waste of time, because nothing can be added easily to the disposition of the Tetrachords (although a subtle innovation can be added to the middle one), nor those can be laid out, as the others, in a way that they do not overlap and have a note in common, and, if they are laid out separately, they will be of different span, because, if the first one spans from Gamma ut to D sol re, it is a larger hexachord; from D sol re to [sqb] mi, there is also a larger hexachord, while from [sqb] mi to g sol re ut there follows a smaller one which is smaller by a semitone [besides, as the above mentioned Maillard notes, it seems that Guido himself divided his Scale into tetrachords because on every fourth he starts again with [Gamma] ut the deduction of the fourth Ut, re, mi, fa in marg.]. Besides, the addition of the seventh syllable bi added to the six by Signor Ericio Puteano, a most learner humanist and expert of musical matters, as it has been embraced by many [or the syllable si, which is used in many parts of Germany in marg.] in order that every letter should have its note and one might avoid the difficulty of the mutations which is so troublesome for the beginners and produces such a waste of time. I say that, if that addition were accepted, [or, in imitation of the Northern Europeans [[were introduced]] other seven were introduced, as Keplero writes in marg.] or if the syllables of the Greeks were reinstated which followed the sequence of the tetrachords, these poor hexachords [[would vanish completely]] would have no place to exist. Thus, [-<23>-] I want us to leave them aside as useless.

[chapter On the names and words of the Tetrachords and of their notes in marg.]

However, the names of the four tetrachords are these. The first one, namely the lowest one is called Hypaton, namely of the highest. It says 'of the highest, not in relation to the natural order, since the highest is the high, and the lowest is low, but as to the position of the strings on the lyre, as Glareanus and others tells, so that the lowest, when they were played were found at the top, as in our lutes and in other similar Instruments. However, in the cithara (I am talking about the ancient one which is completely different from our own) and also in the harp the thinner and higher were found at the top and the lowest were found below. Therefore, it is the expressions Hypaton Tetrachord (with the Greek term), Hypatum Tetrachord, or more properly in Latin quadrichordum Supremum are equivalent. The second one is called Meson Tetrachord, namely Middle one [of the middle ones in marg.] from its position. The third one is called Diezeugmenon Tetrachord, or Disiunctum [of the disjointed in marg.] and it was called in this way because the tone of the disjunction or of the division was found between this one and the previous one. Finally, the fourth and last one is called Hyperboleon Tetrachord [[or most excellent]] which sounds Excellentissimum excedentium in Latin because it is exceedingly high and lays above the others. One has to note, however, that since that the fifth and the fourth are interchangeable in the lower part of the tetrachord, and if this or that one, or the other way round, are put in the deduction of the songs [-<24>-] and in this case two tetrachords that were separated by the one sound become united on a note which is in common, as it happens when one moves from the b flat to the [sqb] square, hence it follows that they put another four beyond the mentioned four, but apart from their succession, namely to one side. This one is called Synemmenon Tetrachord, or coniunctarum (of the conjunct ones) because it is united and it joins the tetrachord of

the middle ones. If this is agreed, said Tetrachord becomes interposed between the one of the middle ones with the one of the disjointed ones, or, if this is excluded, the one of the disjointed ones takes its place. We must imagine that it proceeds in the first way when the system is widened up to the nineteenth note, filling five tetrachords and those two tones besides, and in the second way when it is removed and the System stays in its length of 15 notes and two octaves and it moves through the [sqb] square instead of the b round or flat: these are the two ways of the melodies [[remaining idle and]] because the one which they call 'according to nature' is nothing but a useless invention of [[of those]] people who with [[little week]] little or no foundation on sciences or liberal arts and with very little method dealt with music at the time of our great-grandfathers. The most ancient of these Tetrachords, namely, [-<25>-] those that we must imagine that were used in the ancient lyre of seven or eight strings, are the two middle ones, which correspond to the tenor voice and of the ideal man. The third in the sequence is the Hypaton and the last one the Hyperboleon. However, coming to the name of the notes, the first in order and last one in time is the one which is called Proslambanomenos by the ancients, which was also called [prosmelodos] by the Greeks. It was put into use so that the note Nete, which is the a la mi re might have a note corresponding to itself an octave lower, as it has one above, which is the aa la mi re [[said]]. Now, the reason why it is called in this way is clear and the authors reveal it to us, namely, because it is taken from outside to supplement and complete the consonances. Hence, said name means nothing else but sound or note which is taken as an extra addition over and above the rest. Therefore, although the ancient Romans called it Assumpta, [[and wrongly so,]] it does not translate precisely, because it cannot be expressed with a Latin word, just as the word 'Addition' cannot express it, and much less the word 'Acquired' which Zarlino uses between the two tetrachords. The low notes have these names. The first one is called Hypate Hypaton, namely The infima infimorum (since it seems more accurate to name them in this way according to their natural sequence which progresses from the low to the high register [-<26>-] than from the artificial one of the Instruments) and it is called in Italian the lowest of the low ones. The second is called Parhypate Hypaton, which means peninfima infimarum (the almost lowest of the low ones), the third one is called Lichanos Hypaton, or Index infimarum, and is called in this way from the index finger which was called [likhanos] by the Greeks, because it touched mostly that string in the ancient Lyre. The fourth one, which is also the first one of the second tetrachord, is called Hypate Meson, or Infima mediarum (lowest of the middle ones), the second one si called Parhypate Meson, or Peninfima mediarum (the almost lowest of the middle ones), the third one is called lichanos Meson or Index mediarum (index of the middle ones) and the fourth one simply Mese, or Mediana or middle one. Going forward, the first of the Diezeugmenon Tetrachord is called Parames, which means [[next to]] close to the middle one, and in Latin is called Penemedia, while in Italian we can also call it in this way to avoid saying almost middle one. The second one is called Trite diezeugmenon, or Tertia disiunctiarum (third of the disjointed ones) thus called because the Greeks started from the high register downwards. The third Paranete Diezeugmenon or Penultima Disiunctiarum (penultimate of the disjointed). The fourth one is called nete diezeugmenon or Ultima disiunctiarum (last of the disjointed). Now, the third Tetrachord proceeds with the same names [-<27>-] because the first from the bottom [[is called]] is the same Nete diezeugmenon, since this tetrachord is united with the other one. The second one is called Trite Hyperboleon, which I call Tertia ultimarum (third of the last ones); the third one is called Paranete Hyperboleon or Penultima Ultimarum (penultimate of the

last ones); the fourth and last of the System is called Nete Hyperboleon or Ultima ultimarum (last of the last ones). The Synemmenon Tetrachord uses the same names. The first one is called Trite Synemmenon or tertia coniunctorum (third of the conjunct ones); the second one Paranete Synemmenon or Penultima coniunctorum (penultimate of the conjunct ones) and the fourth one was called, naturally, Nete Synemmenon or Ultima coniunctorum (last one of the conjunct ones). But, since somebody might doubt which tetrachord had been in use first, the one of the lowest ones or the one of the disjointed ones ([[because]]) since there is no doubt at all that this one of the middle ones is the most ancient) from the observation that that one rather than this one has the same names in common with the tetrachord of the middle ones (namely, Hypate, Parhypate and lichanos) while this one of the disjointed ones uses the names of Trite, Paramese and Nete just as the one of elami does, he should know that, just as the poets came before the writers of Poetics, thus the singer and players of music <came before those> who invented more subtle and precise terms than those who dedicated themselves uniquely to the practice of singing and playing found, since they were not looking for them; and, since in those days [-<28>-] they did not know any other System than the one made of eight notes, both in their practical playing of the lyre as of the other instruments they used only eight notes, which they called Hypate Parhypate, Lichanos, Mese, Paramese, Trite, Paranete and Nete. Hence, one should know that the shared names between the tetrachord of the Lowest and the one of the Middle ones denotes nothing else but that the former originated from the latter, just as the tetrachord of the last ones originated from the tetrachord of the disjointed ones. One must notice also that since the Tetrachord of the conjoined notes is placed to the side of the one of the disjointed ones, as one is used to arbitrarily, and the penultimate of the conjoined ones at the top of it corresponds (or it is in unison) with the last one of the disjointed ones, and equally, the last one of the conjoined ones with the penultimate of the disjointed ones. However, the penemedia and the third of the disjointed ones, which nowadays are commonly placed in the same note and are separated one from the other by a semitone, do not correspond to any other notes, as can be seen in every detail from the following table, which we have placed here appropriately for greater clarity and as an aid to memory.

[-<29>-] Sistema perfetto de gli Antichi.

[Doni, On the Genera and the Modes, 29; text: Nete Hyperboleon. Vltima [[ultimarum]] [delle estreme add. supra lin.] aa la, mi, re Paranete Hyperboleon. Penultima, g, sol, ut, Trite, Terza, delle [[Vltima]] Tono, g sol re ut, f, fa, ut, Nete Diezeugmenon. Vtima, disgiunte Semitono, e la mi]

[-<30>-] On the three main Musical Schools, namely, he one of Pythagoras, of Aristoxenus and of Ptolemy.

Since I have said sufficiently and succinctly what pertains to the Systems and notes or sounds (since they explained in detail by the notes itself of the large System) and having omitted to talk about of the intervals and consonances, because the most common ones, such as the Diatessaron and the Diapente are commonly known, and the others will be described briefly more comfortably further on and other three divisions will be explained orderly, namely, the Genera in this first book, the Modes

in the second, and something of the Melopoeia in the third one (as this is not the place to talk about it fully). However, since it will be often necessary to mention the basic rules and foundations of the ancient theorists, namely, Pythagoras, Aristoxenus and Ptolemy, it will not be inappropriate to say something about their schools and opinions before we move on, and then to carry on with the rest. Since the art and science of music had been dealt with by so many different minds and with great subtlety, it has happened in it what has happened in the other main professions, such as Philosophy, Medicine, and (in Roman times) Law, namely, it has spawned many and very different schools, each one of which had many followers and produced various published works, which have been consumed and annihilated completed by time which devours everything, so that we have a record of them only in Porphyry's commentary on Ptolemy. [-<31>-] The most important and universally known of these were two. One was the Pythagoreans' one, who were mainly philosophers and were very dedicated to the musical speculation, but hardly at all to the practice, and since they introduced and practised the Canon or Harmonic rule very often, exercising themselves all the time in the numbers and in their proportions, they were also called Canons. [It is also true that Ptolemis of Cyrene, as Porphyry states, who wrote an Introduction to Pythagorean music, wanted that they derived the name of Canons not from the Instrument called Canon, but from the straightness of the line which they considered in abstract in their musical speculation. in marg.] Their first Teacher was the famous Pythagoras, very esteemed and honoured by the ancients. The other School was the one of the followers of Aristoxenus, otherwise called Harmonics, because they based their speculation on the simple Harmony without any concern for the numbers. [They were also called simply Musicians, as Ptolemis herself says add. supra lin.] Their first founder was not Aristoxenus, since there were some before him who wrote about music, some of whom he mentions in his Harmonic Elements, but he was the most authoritative instead [so much so that Saint Jerome, naming many Greek authors who wrote lives of illustrious men, states that Aristoxenus was the most learned among them in marg.] and the most lauded writer as he wrote a large number of books on music, apart from other works that he wrote about philosophy and other subjects. Moreover, from what one gathers from the authors who came after him, he explained and ennobled all the parts of music with his writings. Aristoxenus was emulated and competed with Theophrastus, [and, just as he was add. supra lin.] he was a student and a pupil of Aristotle's. They lived both at the same time, which was during the century of Alexander the Great. The main difference that one notices between these two sects consists [-<32>-] in the judgment of the intervals and of the sounds, because the Pythagoreans, who in their practice took into account the sense of hearing as they were completely intent on it judged that the numbers alone and their proportions provided the rule to the musical intervals and they did not admit any other consonances than those which are contained in the number six and which have a multiple or superparticular proportion, rejecting all the superpartient proportions and the Diapason Diatessaron. This opinion was then completely refuted by Ptolemy. Therefore, their authority was very important either because of the antiquity and reputation of Pythagoras, or because they were the first to speculate around music. As far as we know, their fundamental concepts have been universally embraced, such as the fact that they do not recognise any other consonances than the Diapason, the Diapente, the Diatessaron and their compound consonances. In fact, the fact Aristoxenus himself and his other followers, like Aristides, do not mention themselves any other consonances is derived more likely from what I have said, namely, that in many matters they followed the Pythagoras' doctrine and principles,

rather than because the ancients did not practice them. [Ponto of Tiard, Bishop of Macon, thought the same in his second Solitary, where he says expressively that “The thirds and the sixths were known to the ancients, albeit they were less practised.” in marg.] Moreover, I believe firmly, as also Salinas maintains at chapter of the book, that they used them in their group performances, as we do, albeit they did not name them as such. One must be certain that this must have been done at least after Didymus' times, who, as it seems, was the first one to build [-<33>-] the Syntonic Diatonic [consisting of two unequal Tones add. supra lin.] as it was accepted by Ptolemy as well, albeit with a rather different distribution, as we will see further on. What convinces me of this is the fact that one finds in this kind of music major and minor thirds, and consequently also consonant sixths, hence one cannot believe that such a beautiful kind and distribution of tetrachords (which is also the most versatile to the two genera, chromatic and Enharmonic) was established by theorists and was not discovered and practised in the vocal and Instrumental compositions. Moreover, the large number of strings which the Epigonion, the Simico, mentioned by Athenaeus, as well as the Psaltery and other instruments which the Greek called [organa polychorda] had, would have been redundant. [[But this is not proven by Ptolemy's saying where he calls the most attractive of the Dissonant Intervals]] On the contrary it seems that Aristoxenus himself [[says that there is a greater number]] where he says, having spoken about the number of the consonances which were thought of as such, and adds these words [tauta men oun legomen ha para ton emprosthen pareilephamen; peri de ton loipon autois dioristeon], which translate: “But these things which we say, we have learned them from our ancestors, because, as to the rest, we will have to establish everything else.” But this is not proven by Ptolemy's words. [-<34>-] Let this suffice for now on the subject of the consonances of the ancients. The other School, of which Aristoxenus is the leader, treaded a very different path, since, giving little consideration, if any at all, to the numbers and proportions, he focused mainly on the sense of hearing and, secondly on reason, not being true in other respects what nowadays is understood commonly, namely that Aristoxenus rejected reason completely and that as a simple practical musician he was interested only in the judgment of the senses, and therefore his doctrine has been considered unrefined and practical, as Signor Ercole Bottrigare says, who is in other ways a gentleman of sound judgment and doctrine. This is very wrong, since one will never find in trustworthy authors that his doctrine was such. In fact, if he disregarded numbers (of which he was a great expert, having been a pupil of the Pythagorean Zenophilus in mathematics) this was either to experience other people's views, or because he realised that the Pythagoreans, who founded almost all of their doctrine on this, had committed many mistakes, or because musical practice derives little use from it, knowing that Singers and Instrumentalists, who were otherwise most excellent, were able to find and reduce into practice all the singable intervals despite not knowing what is a dupla or a sesquiottava. [For this reason the peripathetic Adrastus quoted in Proclus comment on the Timaeus, who, as it seems, was not particularly close to Aristoxenus, does not say that he refused reason but only this [he put the ears before the mind]. This also is supported by Didymus quoted by Porphyry, who states that the Instrumental players and the Phonaschi, or the simple singing teachers, made sing in his time in marg.] Therefore, their progress was this one. If one asked them [-<35>-] what the sound was, they did not answer, as the Pythagoreans did, that it was an interval of sesquiottava proportion, but that it was that interval by which the Diapente exceeds the diatessaron. These, equally, introduced the use of the words Semitone and of the Enharmonic Diesis as a quarter of a tone, while the

Pythagoreans, knowing that no interval or proportion can be divided numerically into two [[other]] equal intervals or proportions (albeit this can be done geometrically with a median line over two measured strings) were very careful not to use this word Semitone, and they used the limma instead of it, which is a rather smaller interval intervening between the numbers, which even in Glareanus' time (since no authors other than Boethius, who follows the Pythagoreans and especially Nicomachus, were read) was believed to be the same interval as our mi fa, which is really the larger semitone of sesquiquintadecima proportion, as Zarlino demonstrates very well. From this method Aristoxenus of dividing the Tone into two, four and other number of equal parts (which he uses to build his five species of music) modern theorists have become convinced that he was the first to divide the tone into two parts in the musical instruments [-<36>-] and to make the same sounds equal with each other. Thus, they called the division of the neck of the Lute and of the viol which proceeds by equal Semitones 'according to Aristoxenus', albeit, if one has to tell the truth, expert musicians recoil as much as they can from that equality, as one can see from the third fret, which it is usually larger. Therefore, I believe that they are mistaken for sure because, if this kind of instrument and division was used at that time (which is something that is not easy to establish) it is not believable that he was the inventor of it, and, if [[he]] the ancients had a system which was more perfect than ours, as I believe and I hope to prove elsewhere, this can be stated even much less, and it is not incoherent with this the adoption of equal semitones and dieses, as I will show in the following chapter. Mid-way between these two schools there was another one established by Archestratus (as we learn from Porphyry) which was renewed later on by Ptolemy, a very great mathematician and very subtle writer, and in every respect a most diligent music theorist, as his three books of Harmonics demonstrate, as they contain very sound doctrine and very useful speculations within few words. Therefore, if someone were to compare on one side this work and on the other the very large volumes of some modern writers, I believe that his work would be proved to be much more substantial. [-<37>-] This man lived in the mature age of the Roman Empire and was Egyptian by birth, as one gathers from his writings. He was a man tireless in his efforts, of very fine judgement and of the widest erudition, and, because he is concise and brief in his style, it is not very easy to understand him in his own language, but with some study one would be able to understand him, if one found his book in print. [[This being then]] While then the Pythagorean School (both because of its antiquity, as well as because it was little concerned with practice) was almost completely extinct, the other two schools of Aristoxenus and Ptolemy flourished for a long time, [[because]] albeit, to tell the truth, that one had been more widely received than this one by musicians. Some modern writers who are more keen on Aristoxenus [like Valgulio and Galilei add. supra lin.] [[and perhaps little wisely]] that [[he reprehended with many]] Ptolemy reprehended in so many things, as if he did so because of envy, ill-feeling or emulation, rather than for the love of truth, as the ancient philosophers did, who did not spare one another without much pride or animosity when they discovered some notable errors in the writings of the older ones. Therefore, these men should not blame Ptolemy because of this, since they see that Aristoxenus himself takes a similar liberty [[with Pythagoras]] against Pythagoras and others who wrote before him. Therefore, it seems to me redundant the defence that Valgulius (a learned man and a scientist who wrote a music treatise on Plutarch) took upon himself [-<38>-] to make of Aristoxenus' doctrine. I do not think that it is just redundant, but lacking, because, as Zarlino observes well in the fourth book of the Supplementi at chapter seventeen, Valgulio showed himself to be [[very]] not much

of a good mathematician if, in order to defend the division of the Tone in equal parts attributed to Aristoxenus, he believed that it is the same thing to divide the interval of the tone into two parts and the string that produces that interval, being something very useful that, when the string comprised between two frets on the neck of a lute [which spans a tone, add. supra lin.] is divided into two equal parts, the higher part will be less than a semitone and the one below more than one. Because this has been demonstrated sufficiently by Zarlino, and because I believe that the defence of Aristoxenus against Ptolemy is useless in another aspect, because I do not believe that he ever wanted to introduce this equality rather more abhorred than liked by musicians, let us leave that Zarlino and Galilei, who used the approval of Valgulio, to fight it out among themselves, in order to see how it is possible to understand the division of the intervals of Aristoxenus from which the varied distribution which he makes of the five colours or species, one Platonic, two Chromatic and two Diatonic.

[<39>] That not only Aristoxenus, but even scholars more ancient than him established a common [interval] measurement for all the musical intervals with good reason. chapter

Albeit Ptolemy, together with the Pythagoreans, demonstrates that no musical interval [of proportion not] except those of multiplex proportion greater than the dupla, such as the Disdiapason, can be divided into two or more equal intervals, and that, consequently, those intervals cannot even be added, as [perhaps add. supra lin.] [those] some modern theorists have believed, who have imagined I do not know what music of the spheres, nevertheless, it seems to me that the ancients introduced a minimal interval common to all the others, commonly called Diesis or enharmonic Diesis from the verb [diemi] which means to cut through and divide, with [excellent] very well founded reason. Aristotle then in the tenth book of Metaphysics [said] [and in the first of the Analytica Posteriora add. supra lin.] has left written [incidentally] that the Diesis is the common measure of all the consonances, just as the number one is the common measure of all the numbers. This interval was set as the smallest and indivisible, not because they did not know that it could be divided physically into much smaller parts, but because it is [the smallest interval] the smallest and audible singable interval. The reason is not just that a smaller one cannot be sung, as the Enharmonic Diesis was, but that it can be barely discerned by the sense of hearing. Nor what others say, namely, that the Comma, which is much smaller, is the smallest and first audible interval, goes against this, [<40>] because, beyond the fact that that note was used by the Canonics [as] of the Pythagorean School, rather than by the simple Harmonics, one has to understand as a comma the smallest interval that one can distinguish with one's hearing when a string rises or descends so that it lowers the sound sensibly, while the Diesis is that interval which [not only one discerns] one discerns more clearly with the hearing and can be also produced [in practice add. supra lin.] (as it was produced in antiquity) with the human voice. Therefore, one can say with reason that the Diesis is the smallest singable interval and the comma the smallest audible one. [But] What will we say about the schisma, which is what we call half of the comma, namely of proportion 161.60 or 162.161? As to myself, I would say that [this is similar to intervals such as the Diaschisma, or half of the smaller semitone is] this interval was used by the Canonics (who used it as they used the Diaschisma or half of a smaller semitone) as a measure and completion of the smallest and irrational intervals that can derive from the merging and conjunction of more species of tetrachords which we will describe

further on. I leave aside the Prisma, stenoprisma and ectome, which are even smaller intervals introduced by Mondoreo, a most erudite philosopher and great imitator [-<41>-] of the ancients, because I do not know what use one might derive of it. [[But]] I cannot pass under silence the mistake that Glareanus, a man very erudite for his time, committed when he wanted that one should count two Diaschisma in the [[Tetrachord]] Enharmonic genus, rather than two Dieses. However one should forgive him because, having [[little familiarity with the ancient Greek musicians]] known almost only Boethius among the ancient musical writers, he understood as diesis, as the Pythagoreans [, especially the most ancient,] [Chalcidius in the Commentary on Plato's Timaeus in marg.] did, the smaller Semitone and more readily the limma [(as it was called theoretically) in marg.] which, together with two larger tones, constitutes the Diatessaron. I am much more surprised about Salinas [second book, chapter 13 in marg.], who is much more speculative than Glareanus, since he dared to reprehend Ptolemy, as if he believed that the comma was indistinguishable, when he says that it mattered little (talking about the practice of the instrumental ensembles of his time, rather than of Theory) to put two larger Tones or a larger and a smaller one. In fact, Ptolemy was not so dim [[that not]] that he considered the comma as an indistinguishable interval, but only wanted that whether the citharoedes tune the tetrachord in the Syntonic species [[or]] which [[can]] [contains corr. supra lin.] two larger tones, one larger and one smaller and a larger semitone, and in the diatonic species two larger tones and a limma, makes little difference in practice. [-<42>-] It does not seem right to me that Zarlino should reprehend Aristotle because he said that the Diesis is a common measure of the interval or consonances, as if he intended instead that the consonances derive from the union of small intervals, rather than these are derived from the subdivision of those, as Zarlino maintains with reason, since one thing is to say that the Diesis is a common measure of the intervals, and something else that they are composed by it, in the same way that it would not follow that the palm is composed of the measures of a finger from saying that the finger or ounce is the common measure of the palm, the foot and the step, since it is possible that the measure of the palm is older than the one of the finger. [Nevertheless add. supra lin.], nothing, which is older is composed [composing ante corr.]or is born [being born ante corr.] from a more recent one. It is also not credible that Aristotle learned this doctrine and Axiom from Aristoxenus who was a pupil of his (as [[maintains the same]] it seems to Zarlino himself), but, rather, that he learned this from older theorists. However, do let us see how they understood this participation [or conjunction add. supra lin.] of the Diesis in all the Intervals. Premised that they did not ignore that property of the proportions and consonances not to be able to be divided by the repeated octaves [-<43>-] into equal parts, I say nevertheless that they introduced with reason this common measurement [[firstly]] because they could see easily a line proportionately as a string of a lute is divided into six Tones, twelve semitones and twenty-four diesis, which, if they were equal as to the sound, and not to the string, as Valgulio thought too naively, the consonances are so little changed from their being that one can hardly noticed, but, with the help of the Canon the frets are located in the true and proper places which create unequal intervals and the right proportions, they vary in position so little that [[also diffic]] not for this one has to deem useless this common measurement, since it can be useful in many things, and, among others, to [[thus]] refine, so to speak, the tuning allowing the good ear of the musician to provide them with that completeness which they receive, as we see in the viol, whose strings, like those of the lute, are mostly in fourths, like those of the lute. These are normally tuned perfectly, so that the fourths which are side by side are

heard as being consonant, but not these that have one of the two extremities or both on the fretted strings. Moreover, to use a very suitable comparison, if we premise that the distance between Rome and Florence is 130 miles exactly, and that [the forty miles which one counts add. supra lin.] from Rome to [-<44>-] Viterbo and the 30 which separate Florence from Siena are accurate, meaning that, although the post station are at different distances, nevertheless the mileage is correct, and the same from Rome to Viterbo, and from Viterbo to Rome and from Siena to Florence, and, although the locations of the post stations are not [[so completely]] exactly in the centre of Viterbo and Siena, but at a slight distance nearer or further, [[anyway]] [nevertheless add. supra lin.] one could say that from Rome to Florence there are a certain number of post stations, just as from one extremity of the diapason to the other one there must be so many tones. Also, just as the divisible and determinate space which we suppose that exists between the extremes of these four town does not prevent to count so many post stations at so many miles in the distance from Rome to Florence, thus the fact that a fifth and a fourth or two fourths and a tone span a precise and determined part of the [diapason and of the in marg.] interval [represented by the dupla [proportion add. supra lin.] will not prevent that so many tones and semitones and dieses or quarters of a tone are contained in the same interval, and that this is not the smallest measurement, just as we use the mile in this distance. That in this way and not in any other the ancients with Aristoxenus understood that the enharmonic diesis was the common measurement of all the intervals, [-<45>-] it will be known also more clearly once we have proven, as we hope to do, that the ancients sang and played the consonances in their exact intervals which were not in a participated way, as they are considered and used in practised commonly nowadays [[especially the followers of Aristoxenus]] [[because Aristides]] [[for now what Aristides Quintilianus follower of Aristoxenus <says> will be enough]] without mistake; and, because in the practice of singing these diesis were not really equal and all of a quarter of a tone, for this reason many writers added to it the word 'about' [or 'almost' add. supra lin.], as Proclus does in the third book of his commentary on the Timaeus, where he says [esti de kai ti diesis to hoion tetarton tou tonou. Ouk on cath'aletheian tetarton hosper oude to leimma hemi tonion akribes], which “means but the Diesis is almost a quarter of a Tone, but it is not exactly a fourth of it, just the limma is not an exact semitone.”

[-<46>-] What the Genera [[of the]] are in Music, and on their number, chapter

Since it is natural to complete the progress of the songs, or the orderly sequence of notes which are played or sung, as I said above, with the intervals and extreme notes of the fourths and of the fifths, it flows from here that the [[variety]] difference kinds of melodies which is reduced to the three genera, Diatonic, Chromatic and Enharmonic, could not be found and based within intervals larger or smaller than the fourths, since all the other ones are, in a way, not essential to the song, [[and such]] and separable, just as the arms and the legs can be removed from a man, while the head and the body are not separable, but essential. In fact, just as what does not have this distinction of essential and non essential body parts would not have the form or the essence of an animal, thus what is not contained within the terms of the octave divided into fourth and fifths, and, consequently, into two fourths and a tone, could not be called song or melody. Our ancients, who invented the chromatic and enharmonic genus (since nature invented the Diatonic) observed this, they distributed the variety of the genera in the different dispositions of the tetrachord, and, since they observed that in the diatonic melodies [-<47>-] eight notes are sung within the

interval of the Diapason, five in the one of the Diapente and four in the one of the diatessaron (this is indicated by their names), and wanting that art should imitate nature, as it was reasonable, they used the tetrachords in these two man-made genera. However, Ptolemy, in the [[book]] twelfth chapter of the first book of his Harmonics defined [[that]] the Genus of Harmony as nothing but a certain [[proportion]] [position corr. supra lin.] which the notes which constitute the Diatessaron have with each other. Cleonides, in his Introduction (wrongly attributed in some texts to Euclid) [Aristides Quintilianus and, equally, Proclus in his Commentary on the Timaeus and Pappus in his Introduction (which is almost the same as Cleonides') in marg.] say more succinctly that the Genus is a certain and specific division of the Tetrachord. [This is the real reason why the ancients constituted the variety and difference of the genera within the Diatessaron, rather than because they considered it the first and last of the consonances as Salinas maintains in the first chapter of the third book in marg.] They were called genera with reason, because they contain many species within themselves, although the Enharmonic has only one, which does not matter, because it is not necessary, as the logics know well, that every genus should contain within itself many species. Thus, we see that there are two genera of animals, the Rational and the Irrational, the first one has no other specie than man, while the second has almost an infinite number. Now, it is not difficult to conjecture why the enharmonic is [monoeides] or of just one species, it is possible that this derived from the fact that they wanted to keep it more well regarded and in higher reputation [-<48>-] by keeping it simpler and uniform, or because, given its subtlety and minuteness of intervals, was hardly capable of other divisions. [However, these genera proceed just as all the ancient say, namely, Aristoxenus, Ptolemy, Nicomachus, Aristides Quintilianus, Pappus, Cleonides, Proclus [Bacchius add. supra lin.] on Plato's Timaeus. [[Now]] The Diatonic proceeds in his four voices of the Tetrachord in this way: first there is a semitone and then two tones one after the other going from the low register to the high register as one has always to proceed. The Chromatic moves through two Semitones or half tones and a semiditone (minor third), which was called trihemitone by the ancients, namely made of three uncompounded semitones. The word uncompounded refers to an interval which is not divided in that particular genus. [As Aristides states, as well as Boethius in his first book, and others in marg.] The Enharmonic proceeds through two Diesis or quarters of a tone and a Ditone (major third) uncompounded.

Which Melodies are said soft and which hard [[chapter]] and what is called thick and not thick. Chapter

Ptolemy says, in the mentioned chapter, that the first division of the genera is done into soft and hard. It seems to me that this is the best way to express what they call [syntonon] that with the term 'combination of sounds', as other do, since this words means more a style of timing fast and furious that what the Greeks mean. As soft Genera they intended the genera that [-<49>-] contain intervals which are smaller than the ordinary, such as the Chromatic and the Enharmonic, while as hard genus they meant one that has intervals that are no smaller and minute than those that are sung naturally, so the hard genus comes to be the Diatonic. [[Then]] we must know [see Ptolemy in the chapter quoted in marg.] that what the Greeks call [pyknon], namely thick, dense, busy, or made up of small intervals, it is typical of the Chromatic and Enharmonic, because it is not part of the Diatonic. They used to call thick [as Aristoxenus says and Aristides after him, and the others in marg.] (we ill use this

word ourselves as well) that part of the Tetrachord which contains two intervals which, even added together, are smaller than the third one. [[how because]] Therefore the think of the Chromatic is constituted of those two adjacent semitones, which, added together, amount to nothing but another tone, which, [without a doubt add. supra lin.] is smaller than a Semitone, namely three uncompounded Semitones and added together [which is the third interval in marg.]. Thus, in the Enharmonic, the dense or thick consists of those two dieses which add up to a semitone, which is a much smaller interval than a Ditone or major third. Thus, one must note that, although the Diatonic and Chromatic were divided carefully by the ancients into various forms and species, each of the Diatonic [[is convenient]] happens [-<50>-] to have the first two intervals larger than the third one, while in Chromatic the opposite happens, namely the two first intervals are smaller. [[And if the thick or dense is attributed]] Now, once one has understood what is thick and not thick in Harmony, I am not displeased [was displeased ante corr.] with calling the genera themselves thick and not thick (although one will not happen to find that the ancients called them in this way) as Salinas does, who calls the Diatonic genus Rare, the Chromatic thick and the Enharmonic very thick. He tells the truth when he says that this name is not completed suited because, albeit the chromatic and the Enharmonic are thicker in some part of the Tetrachord than the Diatonic, they are equally more sparse in the rest of it. But, be it as it may with regard to the names, which it does not matter. It is enough that, in order to understand the nature and propriety of the genera [[we do not abandon]] tat we do not abandon the doctrine and the principles of the ancients, as most of the modern writers have done, because otherwise we would not be able to understand them well and, consequently, to imitate them in the variety and beauty of their melodies.

[-<51>-] What Modern authors understand as thick and not thick in the Harmony, chapter

Zarlino and Salinas, who have been the most excellent writers on music among the modern ones without a doubt, the first one as to the practice of music and the second as to Theory, since have not been able to imagine how the ancient could practice the two genera per se and sing and play them (as we will demonstrate that they did sometimes) and believing [perhaps add. supra lin.] that they had been found only to perfect the diatonic, and [[perhaps add. supra lin.] also to avoid the hardship of establishing new principles and reforming music, they [[have]] understood and explained the thick and the not thick in a way that is different from the way adopted by the ancients. Thus, Salinas has been reprehended rightly by Father Mersenne on the Genera because he dared (in such an essential matter) [[Quaestiones page 168 in marg.]] to depart (without a valid reason) from their doctrine from which one sees that he has learned every good and beautiful thing which is contained in his seven books on music. Salinas, therefore, maintains that the thick genus is not the one that contains smaller intervals, but the one that contains the greater number. This is completely the opposite of what is true with regard to the fundamentals of the good and ancient authors, albeit almost all modern writers agree on this point. I aim to prove this in the most clear and brief way possible. Therefore, Salinas maintains that the genus not thick [-<52>-] is the one in which the consonances are divided by fewer and sparser intervals, such as the Diatonic, where the consonances are different from the larger Tone and Semitone, which are the small parts and intervals of the consonances and [[hence]] the Diatessaron does not contain if not three intervals. However, he wants

that the thick one is the one in which all the consonances are divided and separated by intervals more frequent and abundant. For instance the Chromatic, where one proceeds by larger and minor semitone, which are intervals more numerous than the tones with the Diatessaron, is divided into six intervals and seven notes in the perfect instrument, or five intervals and six notes in the participated instrument. He says then that the Trihemiditone or minor third is not an interval of this genus because it is a real consonance, and the consonances are not intervals of any genus, namely, they must not be laid out as [specific and add. supra lin.] un-compounded in any genus. [[In fact, if anyone] The name of the Diatessaron, which means '[[through]] of four', namely 'a consonance which is the result of four sounds' does not create any nuisance, as he says, because this has to be understood only with regard to the diatonic. Then, he adds that the Enharmonic genus is very thick because it progresses by smaller Semitones and dieses which are the smallest among all the intervals and closest together and that the Ditone cannot be an interval of this genus (albeit all the ancient [-<53>-] and modern writers say so) because it is a true and perfect consonance which has to be filled (namely, divided into other intervals) like all the others. [[For this reason]] [Therefore corr. supra lin.] the diatessaron (in this genus) will have eight intervals and ten Tones, because, if the Ditone and semiditone have to be placed un-compounded in this two genera, they would be less thick than the Diatonic, because all the dissonances are more sparse than the tones. Consequently, he holds that only the Diatonic has to be considered in the division of the Diatessaron and that for the Chromatic it is enough that one should divide the larger tone and for the Enharmonic the larger semitone with admirable artifice and correspondence of the Harmonic Reason, because it seems that the diatessaron is the interval that demonstrates and constitutes the Diatonic, since it is the amount by which the Diapason exceeds the Diapente. [[The tone]] and thus the [[ton]] tone specifies the Chromatic because it is the amount by which the Diapente exceeds the Diatessaron. Equally, it seems that the Semitone [[puts to]] demonstrates the Enharmonic because it is the excess or the difference between the Diatessaron and the Ditone. Moreover, he wants these three genera to be like the Good, the Better one and the best one, and, consequently, that the second one cannot [[be]] stand without the first one nor the third one without the second, while the chromatic is nothing but a thickened Diatonic, and, equally, the Enharmonic cannot exist by itself but that, once it is added to the other two, it constitutes a very thick and most perfect genus, which is not called Diatonic or Chromatic any more, [-<54>-] but Enharmonic. He also says that nobody ever thing that the chromatic and Enharmonic have been separated from the Diatonic, or that in [[any]] [one corr. supra lin.] of them it is possible to make any song, because one cannot proceed continuously through Chromatic and Enharmonic intervals, as he maintains to have demonstrated on the basis of Ptolemy's account of Ptolemy and of the sense of hearing, and how he will demonstrate [, albeit differently, add. supra lin.] further one when he will deal with practice. But he did not do so because he was prevented to do so by death.

[-<55>-] One presents the Enharmonic system of modern theorists [[divided into]], namely divided into the three genera. [[the opinion of modern theorists on the closeness of the intervals in the two genera is refuted]] chapter

This is what Salinas [have ante corr.] has written Salinas and almost all the other modern writers on the division of the Chromatic and Enharmonic of which they have put the examples in the system of an octave harmonically divided in a single line, with

many strange intervals [[like here]] which are completely impossible to sing or play and also useless, from what one will be able to know about it. Therefore, it will be sufficient to take as an example Salinas' System, which is the most perfect of all of them, where [[one has to notice]] one must notice that the simple letter signify the Diatonic strings and the ones marked with the diesis are the chromatic ones. Then, those which have the same sign and also the dot are the Enharmonic ones. Then, the numbers are the terms of the proportions of each interval. [-<56>-] Having seen in what the modern Enharmonic consists, to avoid to keeping the reader wondering and to come straight to the task instead, one has to be aware that modern authors have come to these chimeras and they have strained their brains to make such laborious divisions with little, if any, advantage, because they did not have a proper idea of the ancients and of their music and, principally, because he did not understand how they modes worked. In fact, had they understood well the nature of the modes, they would have recognised easily that these minute division were not necessary or not sufficient to their need to sing a mode in the 3 genera and they are not sufficient to sing with these notes [[all the seven species of the diapason in]] all the seven tones or the most part of them, as we will see better later on. However, we will see first how unanimously all the ancient authors talk about of the division of the Chromatic and Enharmonic and it will be easier and different from the ones of modern authors. When we have considered this and answered the objections made by Salinas and by the others against their doctrine, the object of our intention will be proved most clearly.

[-<57>-] Here I place the main authorities of the ancient writers around the division of the two genera, chapter

To start with Aristoxenus, say that he is the most ancient of those who have left us some scientific treatise on music. In all of his three books of Harmonics he never speaks of the Dense and thick and he does not mention the Ditone and of the trihemitone which added with that one form the diatessaron have taken from him the definition of the thick which is this one [pyknon de legeatho mekhri toutou heos an en tetrachord diatessaron synphonounon ton akron ta duo diastemata syntedenta tou enos ellatto topon katekhei], namely, “but the Thick has to be understood up to this term when the two extremes of the tetrachord sound two intervals at the distance of a Diatessaron when they are taken together and cover a larger space than the third one.” This means that whenever two intervals are joined together, are larger or smaller, and do not reach the span of the third interval, this has to be understood and called Dense or Thick. He says this a little earlier, but some way further on he says these words, [Sumbainei de hama pauesthai to pyknon synistamenon en te ton tetrachordon diairesei kai archesthai gignomenon to diatonon genos.], which mean: “Therefore, it happens that, as soon as the Thick ends in the division of the Tetrachords, the Diatonic is born.” This means that this is the only genus which excludes it in any species, and that [-<58>-] it is not suited but to the other two genera which Ptolemy calls soft. Where he starts talking about the singable notes, which he calls [to exes] or continuation, he says these notable words [Haplos men eipein kata ten tou meleos physin zeteteon to exes kai oukh os oi ten kata pyknosin blepontes eiouthasin apodidoun to syneches. Ekeinoi men gar oligorein phainontai tes tou meleos agoges phaneron de ek tou plethos ton exes pothemenon dieseon; ou gar dia tosouton dynamin deie tis; mechri gar trione phone dunatai sunteinein.], which mean: “To speak clearly, the series or continuation (of the notes) has to be extracted from the nature of the song, rather than in the way adopted by these, who have no other aim

than the thickening, because they show little concern for the melody that derives from it, as one can see from the multitude of diesis (which they use), since, consequently, it is not possible for anyone to sing them, but the voice can sing up to three of them. One can see from this that there were some who dealt with these divisions without considering whether they were viable or not. But let us move on to Aristides Quintilianus, a most learned and elegant writer, who did not deserve to remain hidden for such a long time in libraries. As one can see, he compiles a summary and a short explanation [-<59>-] of all music with the help of Aristoxenus' works which were available at the time, since he lived certainly before the fall of the Roman Empire. Therefore, he says this [Harmonia men oun kaleitai to tous smikrotatois pleounasan diastemasin apo tou synermoustai; diatonon de to tonois pleonazon epeide sfodroteron he phone kat'auto diateinetai khroma de to di'hemitonion syntononomenon hos gar to metaxu leukou hos melanos chroma kaleitai; outo kai to dia meson amphoin theorgmenon chroma proseretai [[technokoteron]]], which means "So, Harmony (which means the Enharmonic genus, which was called this without any other specification) is called (that genus) which is most rich of very small intervals from their being tuned together (which the Greeks call harmozesthai). However, the Diatone (or Diatonic) is the one that is rich in Tones, because the voice is extended more strongly in this genus (he means that the word [tonos] derives from teinesthai), but the Chroma (namely, the Chromatic one) which means colour or colouring, and here it means the chromatic genus, is the one that extends itself (or rises) through semitones, since what is halfway between white and black is called colour, thus it has been called chromatic the one that is considered halfway between the two mentioned above." The follower of Plato Theon does not depart much from this when he says, on Aristoxenus' authority, that the Diatonic is called thus [heteroi hoti dia ton tonon to pleiston diodeuse e hoti semnon ti kai erromenon hai eutonon ethos epifainei] which means "because it mostly proceeds by tones or because it shows something which is grave, robust and intense." [chromatikon de dia to paratetraphthai kai exellachtai tou prosthen; goeroteron kai pathetikoteron ethos emphainei] "But the Chromatic, which is different and other than the first one, shows a more pathetic and plangent quality." Finally, the Harmony or Enharmonic genus was called in this way [dia to arista einai apenenkamenon tou pantos hermosmenou ten prosegorian] "because it derived its name from the entire System of sounds, since it enacted what they called the [hermosmenon]]. [-<60>-] As far as Manuel Briennius is concerned, one has not to give it much consideration, as far as his reporting of ancient matters is concerned (although one has to value his speculations and all his work where he shows that he understood Ptolemy and the others well) because he is a modern author, and does almost nothing else but copying Aristides, without considering Authors whom we do not possess, albeit his speculations have to be valued and all the work that he has written in three books, because it clarifies greatly the most ancients, and particularly Ptolemy whom he shows to have understood well. Therefore, it will suffice <to say> that he agrees with Aristides and with others in his description of the genera, and to explain the smaller intervals of the Chromatic and Enharmonic. As to Nichomachus of Gerace, a very able mathematician, whose very beautiful work on arithmetic is available in print and two books of Harmonics, albeit incomplete, and was followed closely by Boethius, it will be enough to quote this, where he says [to de euarmonion tou procopen physikos toiauten ekhei diesis; hoper esti hemitonion hemisu kai palin alle diesis, symphoterai hemitonio isai.hemitonion emisou kai palin alle diesis, sunakfoterai hemitono isan]

[[But the Enharmonic procedes naturally thus]] [kai to leptomenon tou tetrachordou delon de tonon asyntheton hina kai touto dusi tonois kai hemitonou ison e [[<... ..>]], which means: “But the Enharmonic procedes naturally thus: one diesis, namely one half of a semitone, and then another Diesis, both of which are equal to a Semitone, then, the remaining part of the Tetrachord [-<61>-] a whole uncompounded Ditone. [-<62>-] As to Bacchius, and also Cleonides (taken by many as Euclid, who was a much more ancient and well known writer) and Gaudentius, [Alipio add. in marg.] and any other author that might be found in libraries, we have nothing but brief summaries, which were made perheps at the behest [[of that]] of the Emperor Constantine Porphyrogenitos who ordered the summaries of the authors de Re Rustica et De re Veterinaria and of other professions, as the most judicious and learned Signor di Peyras [[also that]] councillor in the Parliament which is in Provence. Nevertheless, these summaries are very learned and full of very useful knowledge, as also are those which were extracted from Aristoxenus' books and from those of many other men who wrote about music. Therefore, I will add some account of these. Bacchius says these words, written in the form of a Dialogue: [Posa oun ge ne esti ta melodoumena? Tria; tina? Tauta enarmonion; chroma; diatonon. to enarmonion pos melodeitai? Epi men to oxu kata diesin kai diesin kai ditonon; epi de to baru [[<.>]] kata tounantion; to de chroma pos melodeitai? Epi men to oxu kath'hemitonion kai hemitonion kai triemitonion.; epi de to baru kata tounantion. et cetera], which mean: “How many are the genera that are sung? Three. Which? These: the Enharmonic, the Chromatic and the Diatonic. How is the Enharmonic [-<63>-] sung? Moving towards the high register with a Diesis, then another Diesis and a ditone, but in the opposite way towards the low register. Then, how is the chromatic sung? Towards the high register with a semitone, then another one and then a Trihemitone (or minor third), and downwards in the opposite way. The summary of Cleonides says the same, except it mentions first the downward motion and then the upward one.

[-<63>-] [Answer to Salinas' doubts about the Chromatic and Enharmonic [[thick composed]] thick genera. add. in marg.]

Now, having seen which is the real division of the Chromatic or Enharmonic with the witness account of those who [[or were]] could hear them in practice or [[through]] who derived their knowledge from those who heard them in practice [[and to have answer]] it is left for us to us that we should reply [[what difficulties Salinas puts, and]] to the doubts raised by Salinas. Once we have solved this, I believe that nobody will object that the distinction of the genera which the ancient make is the only one which is true and viable, as it will be shown further on. Therefore, I say that the Axiom that he writes, namely that every consonance has to be divided in other smaller intervals has no foundation whatsoever. In face, albeit this happens to the diatessaron, the smallest consonance of the ancients (as I believe that the most ancient, especially the Pythagoreans <knew it>, but by chance, since they did not know any other smaller one, and if they knew it (as I believe that they knew as well at least around the times of Didymus' the imperfect consonances) they would have not, for this reason, placed the difference of the genera in any other interval than the diatessaron for the reason mentioned above, which are natural and true. As to the passage of Plato's Timaeus which he quotes, where he speaks with very profound speculations about the creation of the universal soul placed by the Almighty God (as he thought), it does not matter a jot, because, albeit [-<64>-] he says: [to tou epogdou diastemati ta epitrita panta syneplerouto.], namely that “it filled all the fourths with intervals of a tone,” it seems that what he wants to say is that the smaller intervals are born from the division of the

larger and consonant ones, rather than the consonances are born from the union of smaller intervals, and, since the intervals that he mentions are exclusively diatonic ones, it is clear that he speaks only about that genus. Had he spoken about the other two, he would have said, equally, that God filled the fourths of dieses, semitones, and ditones and semiditones. To say that if the ditone and semiditone have to be put uncompounded in these two genera they would be less thick than the Diatonic, does not prove anything, because if as 'thicker' we mean that those have more notes or divisions, I say that both one and the other genus have them, but if we understand this 'thick' in the way the ancients did (in the way that it should be understood to avoid confusing the terminology of the sciences) I say that the diatonic is not thick, but the other two are, just as always we understand as thick (as it is possible to understand) those that are capable of more voices and more frequent intervals, I will concede in this sense that the chromatic and the Enharmonic are thicker than Diatonic, because the Diatonic will be made thicker with the addition of the Chromatic notes, and in that case it will not be simply diatonic anymore, but it will be mixed of one and the other and it will be called simply diatonic, as also, but adding the Enharmonic notes to the Diatonic or to the Chromatic by joining them to one or the other [-<65->] the result will be a thicker genus which it will be possible as well to call absolutely Enharmonic, just as by adding the rational soul to the sensible and vegetative the result will be another species of soul which is the reasonable one. [[And how much that thick<ening>]] Therefore, being possible to create that thickening in this way [[with the second]] with the notes of the second genus added to the first one and with those of the third one added to both, it follows that the chromatic can be called thick or more susceptible to thickening (so to speak, than the Diatonic) and the Enharmonic of both of the other two. This thickening was not unknown to the ancient which called it, as we have seen, [katapyknosin] because they used it in the mixed genus, which was also practised (and perhaps was more beautiful and artificial than the others) because Aristoxenus and the others after him say that there are three genera, namely the Diatonic, the Chromatic and the Enharmonic, the mixed and the Common one, but we will see what that one is later one. Now, the comparison that Salinas makes of the three genera to the Good, the Better one and the Best cannot be very appropriate, because the second cannot exist without the third one, or the third one without the second one. Instead, much better is the comparison that he makes of the Diatonic to the line, of the Chromatic to the surface and of the Enharmonic to the solid Body, because at least we can imagine the second without the third one and the first without the third and the second one.

[-<66->-] On the Etymology of these three names, Diatonic, Chromatic and Enharmonic chapter [See the Chapter in marg.]

The perfect understanding of the words helps a great deal the understanding of scientific matters, especially when they are words which derive from foreign languages and that are not understood commonly nowadays, therefore, to make this doctrine easier, I will explain the origin these three words. The Diatonic was named by the Greeks [diatonikon] from the Tone, because it is the predominant interval in this genus, since there are two for every semitone besides the one of the division which is common to all of them. The Chromatic was called in this way from the word [chroma] which means colour because, as notes, it colours the other genera and has no need to be coloured by any of them. One can say also that it derives its name from its similarity to colour, because, if one compares the thickness of the

Enharmonic to black and the sparseness of the Diatonic to white which appear to be rather extremes and elements of the colours than colours per se, it seems, consequently, that this name is more suited to the chromatic which is like they colour yellow, red and green, for instance, compared with the other two. Alternatively, one could say that, just as in rhetoric a certain artificial manner of speaking used to prove something is called colour, as opposed to a simple and straightforward manner of speaking which is [[as here]] all direct and white, so to speak, thus the ancients had [-<67>-] called Chromatic that song which goes beyond what is ordinary with its closeness of intervals, and the Enharmonic, which was called by the ancients simply [harmonia], as the chromatic was called [chroma], has taken this name from the wider meaning that this word [enharmonios] had originally, which means excellently ordered and disposed, since this genus is more artificial and subtle than the others and was more highly regarded by everyone.

On the specific differences of these three genera chapter

From the division of each genus which we have seen made in the tetrachords one can say very probably that the difference and hallmarks of these three sorts of melody consists in this: in the Diatonic, the fact that there are two adjacent tones; in the chromatic, that there are two semitones, and in the Enharmonic, that there are two Diesis. I mean that this happens in that type of Harmony which uses equal intervals, as it is the case in the lute and in the viol, [-<68>-] and in which the ancients give their examples, albeit in practice then, as we will see, the perfect harmony was used, namely the one which distinguishes between larger and smaller tones and semitones. In this Harmony the larger Semitone indicates the Diatonic, because it is its smallest interval, and for the same reason the smallest Semitone is indicative of the Chromatic, and the Diesis of the Enharmonic. In fact, the Chromatic does not accept the diesis (which we always understand as enharmonic) nor the Diatonic does accept it, nor the minor semitone. However, if we consider the third interval, which is the largest and highest, equally we can say that the tone belongs specifically to the Diatonic, the Semiditono to the Chromatic and the Ditone to the Enharmonic. We can also say that the Diatessaron denotes the Diatonic in particular, not so much because one finds in it those three intervals which derive from the first division of the last consonance of the Ditone and Semiditone, namely, by dividing the Ditone firstly into larger and smaller Tone and the Semiditone into major Tone and major Semitone, I say, not so much for this reason, as Salinas maintains, but because the diatessaron was the smallest consonance at the time when the Diatonic was the only known genus. I really hold for certain that the fact that Chromatic and the Enharmonic began to be used generated the opportunity to use the Ditone and Semiditone as consonances (albeit perhaps they did not call them as such) [-<69>-] and to know them as such with the aid of the ear. I am drawn to believe, because it is very plausible, that the larger Semitone was introduced in singing when these two genera were first used, and it was introduced undivided in the Chromatic and divided in the Enharmonic. From this it follows, consequently, that the remaining part of the tetrachord is a ditone, that is really a consonance and is composed by adding the smaller semitone to the larger, and the result is the semiditone which is also consonant, while, as I said above, the two genera, which one maintains that were sung in those most ancient times, were not suited to it very well. Now, since the chromatic is based on the larger Tone and the Enharmonic on the smaller Semitone, I do not know how to square this with what concerns the chromatic, since, if we divide the larger tone into two semitones, what is left over is a minor third shortened by a comma, and therefore dissonant. I believe that that division does not suit the Chromatic, otherwise a consonance, which is its own, would be taken away. Since the larger semitone and the smaller one, as Zarlino demonstrates very well make up the smaller Tone and not the larger, why should one base the chromatic genus more in this one than in that one? Now, as to the observation made by Salinas that the 9, 16 and 25, which are the numbers of the notes [-70-] of these three genera according to the modern division the numbers 3, 4 and 5 as their roots, of which the third is equivalent to the other two because of that famous proposition by Euclid which is the forty-seventh of the book, and that the nine Diatonic sounds compared to the eight give the proportion of the larger tone $9/8$ and the 16 of the chromatic compared to the 15 give the proportion of the larger Semitone $16/15$ and, finally, that the 25 of the Enharmonic compared to the 24 create the proportion $25/24$ of the smaller Semitone, they are speculations which are more beautiful than useful, and therefore they have been mentioned by me only in passing.

[-<71->] That the Ditone and the Semiditone nel are not typical and specific Intervals of the Chromatic and of the Enharmonic Chapter

Some have believed, and among these Nicola Vicentino on the steps of Franchino Gaffurio, that the interval of the Semiditone belongs uniquely to the chromatic genus from the fact that it belongs to the definition of the chromatic, and, consequently, that it cannot be used in any way in the other kinds of melodies as the pure Diatonic or the pure Enharmonic ones. For the same reasons they believed that the Ditone is an interval which is typical and specific of the Enharmonic genus, so that it cannot and it must not be used in the other two genera, because were it to be used one would go beyond their natural disposition and they would be mixed together. These conclude that nowadays there are no Melodies which are purely Diatonic, because we see that these intervals are used in all of them without any restriction. This is so far removed from the truth and from every reason that anybody with a modicum of intellect can understand it easily. It is no wonder that Don Nicola, who laboured so much to restore the last two genera, and left also some compositions of his in print, wasted his effort and time, since his theory was not approved and that he was found to be mistaken by the judges who decided a certain dispute which he had with Lusitano, who was also a professor of Music and maintained [-72-] against Vicentino that the melodies of our day are Diatonic and not mixed, as one can see in the treatise by Vicentino himself and in the Dialogue by Artusi on the imperfection of the music of our day. And that Don Nicola made a blunder, or 'picked up a crab', as they say, I will prove in a clear way. The Diatonic Genus came before the other two and is common to all the nations who have no chromatic or Enharmonic genus. Even so, said intervals are found naturally in the Diatonic melodies and also in those which are composed naturally by shepherds. They would have been found certainly also in the most ancient songs which were popular before the invention of the other two genera. Therefore, they are not specific and limited to those two, but common to all. Nor it is appropriate to say that these intervals began to be excluded from the diatonic either by law or by habit after these two genera were introduced and the rules of each were established, firstly because it is fantasy without foundation and without the support of any author, nor one can believe that a custom so useless and a law so impertinent was ever accepted by the world, because this would be the same as if a poor musician, having tuned his lyre diatonically, or with the natural intervals and notes of this genus which are heard in our small harp (as I have said above the System is nothing but a series of notes laid out one next to the other) was ordered by law [-73-] [I could also rely on Boethius' authority, who says at chapter 23 of the first book in marg.] never to play this or that note after having played another one, for instance, as if he were always forbidden to move by leap from E la mi to G sol re ut and from this one to [sqb] mi, from F fa ut to A la mi re, from Gsol re ut to [sqb] mi, from A la mi re to Csol fa ut, from [sqb] mi to D la sol re, from C sol fa ut to E la mi and from D la sol re to F fa ut. This would mean to tie his hands and to stop him to do what he pleases. Did they believe that this law had ever been accepted and the ancient had been so foolish and clumsy to observe it. Let it be established as certain and indubitable that in any disposition of notes in any genus it has always allowed and always will be [I will not pursue this matter further, because this opinion has been recited amply by Zarlino at chapter 75 of the third book of the third part of the Institutioni, and anyone will be able to consult it. I add only this, namely, that if the Tritonicon can be used in the Chromatic and Enharmonic genus, which is a very harsh interval, one and the other interval which are sweet and consonant are suited to each of those two genera in marg.] to use all the intervals that can be practised feasibly from a note to another and this will not alter the nature of the genera. On the contrary the widening and shortening of the intervals,

which derives from changing the disposition of the movable strings (we will see which ones these are later) or with the addition or interposition of new notes and intervals, is responsible for the mixing of the genera, so that jumping from the first to the third note of the Tetrachord and to encompass a tone from the second to the fourth note will be allowed also in the Chromatic, as well as covering a semitone in the leap between the first and the third note in the Enharmonic, which one must not exclude from this genus than the Semiditone or the Ditone from the Diatonic. However, someone [74] perhaps will say, for instance leading by a tone from the first to the third note of the Chromatic, namely moving from E to F#, that they will no longer be two un-compounded semitones as the Chromatic requires, but an un-compounded tone. I reply that if this leap occurs occasionally, or when it suits the singer or the instrumental player, that leap or interval will not be un-compounded, because un-compounded is an interval that cannot be divided in that genus, as it is in the Diatonic. I am surprised that this was so badly understood by many in our time. Thus, also the leap of a semitone from E to F in the Enharmonic will be allowed because it is not forbidden to leap from the first to the third note, which require such an interval, while it is forbidden to sound two semitones in the Diatonic and Enharmonic and to cover in two leaps the interval of that Semiditone which is in the third place of the Chromatic Tetrachord and the one of the Ditone which is in the similar place of the Enharmonic. Therefore, the observance of the genera does not consist in applying all four of the intervals of each tetrachord consecutively, or the first three necessarily without being able to move from the first to the third, but in not sounding other intervals alternatively, but this will be understood better once we have demonstrated which ones are the movable and stable notes of the System.

[-<75>-] Which ones are the Mobile and which ones the Stable Notes of the System.

The entire System is composed of stable and mobile notes. As stable notes we understand the ones which do not move otherwise in the various genera, as Cleonides' Introduction explains, which occurs by lowering them or raising them proportionately by tones as it is understood proportionately in the natural notes. Therefore, one has to know that place is defined in the System as the location, higher or lower, of the voice. For instance, if we suppose that from the lowest note that one can sing lowering the voice as much as one can up to the highest he shall be able to produce the span or interval of two octaves, we can imagine for ourselves that there are an infinite number of places, either higher or lower, according as to whether the voice rises or descends, in this span contained within the two extremes of these octaves, just as in the example which I gave above of a string rubbed with a bow (which is alien to music) or divided into intervals (which one encountered in any melody sung or played) depending on whether someone pitches a sound higher or lower, we shall say that that note changes position stopping on a place which is either higher or lower. This same thing is understood to be happening in the notes of the entire System according to the variety of the genera, because, since the whole System is divided into four tetrachords and two extra to comprehend the notes contained within the extremes by the [-<76>-] Tetrachords and by the two Tones. The extreme notes of the Tetrachord and those which contain the above mentioned tones are called stable or immobile because they never rise or fall, while all the other ones, namely the two contained in each Tetrachord, are called Mobile, because, if in a genus they have produced a certain interval with each other and with the other two immobile ones, when the genus changes they also change place and tension, by descending or ascending. This could be done in a man-made instrument of four notes by using pegs for the middle notes, as lute players do nowadays in the notes b fa [sqb] mi when they move from the disjunct System to the conjunct or the other way round. Therefore, in the disjunct system of fifteen notes, in which the note b flat is not contained, the stable notes are the two Hypates, the two nete and the Paranetes with the Netes, which are the extremes of the tetrachord, and the Proslambanomenos which is outside of the tetrachords, while the Parhypates and the Lichani as well as the Trites are the mobile ones. And, because, if the conjunct tetrachord is also included, other notes are added there of which only one, namely the trite synemmenon, is different in sound, while the other differ only in name, equally in this tetrachord the Trites [-<77>-] and the paranete are mobile, while the Nete is stable. Therefore, as Bacchius says, the stable notes will be eight, namely the Proslambanomenos, Hypate Hypaton, Hypate meson, Nete, Paramese, Nete Synemmenon, Nete Diezeugmenon and Nete Hyperboleon, while, consequently, the other eight are mobile. And, since two notes of the Synemmenon Tetrachord are in unison with the other ones of the Diezeugmenon, namely the paranete synemmenon with the Trites Diezeugmenon and the Mese Synemmenon with the Paranete Diezeugmenon, this one, as Nete, shall be stable, and, as paranete, shall be mobile. This can be easily gathered from the illustration. Therefore, see with what great facility, order and with what small number of notes and intervals the wise ancients constituted the System which embraces all that great variety which contains music. Therefore, since they wanted to facilitate this perfection instead of confusing it, as modern theorists have done with a farrago of useless words and signs (especially in the matter of time signatures) they were satisfied of the same notes and names of the other two genera by adding the word Diatonic, Chromatic or Enharmonic to the two

middle notes of the Tetrachords. One can see from this that a simple genus does not contain more than four notes, as we were saying above, but we shall explain this better in a particular tetrachord. Therefore, let us take the lowest one of the Hypate, namely, [sqb] C D E. The first and the fourth one, which are Stable [-<78>-] notes and they are a diatessaron apart in every genus, are called simply Hypate Hypaton and Hypate Meson. However the second of the Diatonic, which is higher than the first one by a Semitone and a ditone lower than the fourth one, will be called Diatonic Parhypate Hypaton. The same note will be called chromatic Parhypate Hypaton in the Chromatic, and will also be a semitone removed from the first one and a ditone from the fourth one, as in the Diatonic. In the Enharmonic, the same note will be called Enharmonic Parypate Hypaton, and it shall be higher than the first one by a diesis and lower than the third one by another diesis and a ditone lower than the fourth. The third note of the Lichanos Tetrachord in the Diatonic will be removed from the first one by a tone and a half and from the fourth one by a tone, but in the Chromatic it will be removed by a tone (which will be split into two semitones) from the first one and a Semiditone from the fourth. The same note shall be a semitone (divided into two dieses) removed from the first one and a ditone from the fourth one, which is equivalent to eight dieses. One must note that the second note of the tetrachord, since it is the same in the Diatonic and in the Chromatic, it can be called stable and mobile, as, in fact, it was called by the ancients and how Zarlino observes, since it is stable in the first two genera and mobile only in the Enharmonic, which is the third one. However, since the third one is mobile or of different place in all three the genera, it will called simply mobile. For this reason for the most part it is called by the ancient Greeks simply Diatonic, Chromatic and Enharmonic without adding the word lichanos, and without adding Paranete in the higher tetrachords. Truly, this disposition could not have been laid out better or more clearly, and so that everything may be better understood, here we have placed the System in its three genera.

[-<79>-] Perfect System of the three genera.

Nete Hyperboleon. Last one of the extremes dell'estreme

DiatonicParanete Hyperboleon. Last one of the extremes. Diatonica

[-<80>-] That the tone of the Disjunction is common to all three the genera and it is not specific of the Diatonic, chapter.

I have found not one of the modern writers who understood truly this statement, except Hercole Botrigari, a Bolognese nobleman who was very expert in the subject of music, on which topic he had some dialogues printed, where truly he could display his good judgement. In fact, although Gallilei, as someone who proves himself to be of very fine intellect, wrote it in his Dialogo della musica antica e moderna, nevertheless he did not dare to state it as a certainty, but he used these words: "Although I doubt greatly, albeit against common opinion, that any harmonic genus was allowed to proceed by the tone of the disjunction in its own System, since it is common in any species of any genus and not subject, together with the lowest (namely the one of A re la [sqb] mi) to alteration as all the other ones which are not contained in the stable notes of the Tetrachords." This opinion contrasts with what Zarlino says at chapter 15 of the third part of his institutioni, because it is true that the larger tone is specific of the Diatonic, which, as it has been demonstrated, is not at all true, and, even if the Diatonic that he understands to be sung nowadays had a particular and specific Tone, that would be the smaller rather than the larger one. At this point, I shall say, [-<81>-] to pick up on the last of Gallilej's words that Zarlino

did not perhaps to be criticised because he said that the larger tone is typical of the Diatonic, if he believed that tone to be the one contained within the tetrachords, rather than one of the Disjunction, rather than the smaller Tone, as he maintains, because the smaller Tone is found also in the Chromatic, at least compounded, namely moving from the first to the third note, since it is very clear that its integral parts are the larger semitone and the smaller one. However, if we modulate the larger Semitone as the perfect chromatic requires and if we want to have the remaining minor third as a consonant interval, one will not find the larger Tone, because, if one splits the larger tone into two Semitones, the third is reduced as much as the smaller semitone is enlarged, which is by a comma, hence the third stays dissonant. This semitone is located between

[sqb] et b, which notes are not specifically chromatic. It consists of the proportion 138/125 which is almost an equal semitone. Those who criticise too rigorously someone else's doctrine fall into this sort of errors without noticing.

[-82-] Reports of authors and arguments which prove the above mentioned statement chapter

However, so that one does may not walk in the dark in such an essential matter, and so that any one may know the truth of the matter from the evidence, I will adduce some irrefragable authorities and other pieces of evidence which shall demonstrate manifestly that this axiom is absolutely true, namely that the Tone of the Disjunction is shared by all the genera. Aristoxenus says this in the third book: [ean oun dekhthe to idion tes diazeuxeos me kinoumenon en tais ton genon diaphorais; delon hoti leipetai en autois tois tou diatessaron meresi ten kinesin einai.], which means: "If it will be proven that the first disjunctive interval does not move in the difference of the genera, it will be clear that the alteration has to be in the parts themselves of the fourth or tetrachord." He says a little later: [En ekasto de genei tosauta esti asyntheta pleista hosa en to diapente par men gar genos etoi en sunaphe melodeitai, e en diazeuxei. Kathaper emprosthen eiretai, dedektai d'he men syaphe ek ton tou diatessaron meron mone synkeiemene he de diazeuxis emprosthen tetheisa to idion diastema. Touto d'estin ho tonos; prostithentos de toutous pros ta tou diatessaron mere to diapente sumpleritai. hos einai phaneron hoti epeideper ouden ton genon endechetai kata mia khroan lambanomenon, ek ton pleionon asyntheton syntetheinai ton [[ek]] en to diapente onton. Delon hoti en ekasto genei tosauta estai ta pleista asyntheta hosa en to diapente. Tarattein de eiothen enious kai en touto to problemati pos ta pleista prostithetai cai dia ti oukh aplos deiknutai outi ek tosouton asyntheton [-83-] ekaston ton genon [[esti synkeikenon]] sunesteken hosa estin en to diapente; pros hous tauta legeto oti ex elattonon asyntheton genon (lege meron) esti synkeimenon ekaston; ek pleionon oudepote dia tauten de ten aitian touto auto proton apodeiknuytai, hoti ouk endekhetai ek pleionon asyntheton syntethenai ton genon hekaston e osa os diapente tunkhanousi onta; oti de kai ex elattonon pote suntethestai hekaston auton en tois epeita dechthesetai.], which means: "However, in each genus there are as many uncompounded (intervals) at the most as many there are in the Diapente, because every genus is sung according to the conjunction or according to the disjunction (by b flat or [sqb] hard) has it was said before. It was also shown that the conjunction is composed only of the parts of the diatessaron (namely of two or more fourths) but the disjunction adds more to it (as this is what that word [emprosthen] means, as it sometimes does in Attic writers) but, if one adds the Tone to the parts of the Diatessaron, the result is the Diapente. Hence, it is clear that, since no genus can be

composed of several compounded intervals than those of the Diapente are, if it is taken according to a single species (namely, if it is not composed of several species or colours) it is clear that in every genus there shall be as many uncompounded interval, at the most, as those that are contained within the Diapente. The fact that we add that 'at the most' in this statement, rather than saying simply that each genus is composed of as many uncompounded intervals as there are in the diapente, appears to be worrying some. [-<84>-] To these it is replied that each genus can have a smaller rather than a larger number than those, and for this reason it has been proven in the first place that no genus can be formed of a larger number of intervals than those of the Diapente, but that each of them might have a smaller number of those, this will be demonstrated through what we shall say further on." Since these words are so clear and conclusive, I wanted to put them to you. In fact had Vicentino and those who exclude the Ditone and the Semiditone from the Diatonic and the Tone from the Chromatic and Enharmonic red them and considered them in depth, they would not have incurred this error. The Same Aristoxenus says then that [en armonia kai khromati duo toniaia exes ou tetsetai], namely, that "two consecutive intervals of a tone will not be placed in the Enharmonic and in the Chromatic," which is an implicit way of saying that a single one can be placed in those genera. He repeats the same a little further one, where he says [hoste delon hoti en armonia kai chromati ou tetsetai duo toniaia exeses. En diatono de tria toniaia exeses tetsetai; pleio d'ou], which means: "Therefore it is clear that two consecutive tones will not be employed in the Enharmonic and in the Chromatic, but one will be able to place three in the diatonic one after the other, but no more." A little further one he says: [en to auto de genei touto duo hemitoniaia exes ou tetsetai], which means: "In this middle genus (Diatonic) one will not be able to place two consecutive intervals of a semitone." [-<85>-] And, since I do not avoid difficult matters, although Aristoxenus does not appear to offer any other reason for these statements of his, if not to say that the notes of the other intervals which would be added, as the fourth tone to the three of the Diatonic or the second semitone under the first in the middle genus, would not be their corresponding of fourths and fifths, this is no reason to say that this argument is not valid nowadays when we also have the consonant thirds, because, apart from the fact that I deem certain that they had them also at the time of Aristoxenus although they did not call them with this name, I also believe that one may accept as certain that that it would not be possible to employ such System of four consecutive tones because of its harshness, since not only it is not natural (since not even the Chromatic and Enharmonic tetrachords are natural) but it is also against nature, just as to place two semitones under three tones would be unnatural, although, if one places the D# under the E in this way, D# E F G a, namely:

[Doni, On the genera and on the modes, 85].

the tritone is contained between the first to the fifth note, which is also found in the natural System between F fa ut and [sqb]. Nevertheless, that instance is different, because there, although the F has not got the fourth above it, at least it has the fifth, which is sufficient. The same argument applies to the semidiapente between [sqb] and F, but in this case the D# would be neither a fourth or a fifth above. To state that that above the b flat above the a would respond in fifth to the D# would not resolve the matter, because a very great draw-back would follow, [-<86>-] namely, that one would not be able to use said note D# in the conjunct System. Moreover, the Division

of the tetrachords, so well organised, would be disrupted by the division of the disjunctive tones and the genera and the entire Harmony would be in disarray. Moreover, if Aristoxenus did not avail himself of any other arguments apart from his requirement that every sound should have its corresponded by fourth and fifth, he did so because it was sufficient for his scope.

[<87>-] This Statement is demonstrated with the authority of other writers and with other arguments chapter

One will find almost no ancient author who wrote about music from whom one may not derive the truth of this statement with certainty, nevertheless, to avoid extending myself without any need, I will be happy just with these supportive pieces of evidence.

Firstly, if one looks at Ptolemy, one sees that he places the Systems of any genus with its Species everywhere and that he places a tone in every octave of every mode besides its two particular tetrachords, as one can see easily from the proportions contained within the numbers which indicate each note and interval of the System. Moreover, Cleonides, Bacchius and all the writers who wrote compendia says this expressly. Cleonides, for instance, where he discusses the seven species of the octave which belong each to one of the seven modes, says clearly that one has the tone in the first place, another one in the second and so forth in this way, firstly in the two genera Chromatic and Enharmonic, and then, separately, in the Chromatic, which, albeit it has other tones, it also avails itself of the same illustration from the fact that it has the tone of the disjunction in one of the Seven intervals. Bacchius says the same in his *Isagoge*. [<88>] It is also clear that this is also what reason requires, as, if it were otherwise, the disposition of the tetrachords and of the pentachords, or, rather, of all melodies would be disrupted and would change from a body ordered, structured and divided into all his parts into a disfigured animal as that fish that they call <chaos>, which is really 'crude and unstructured'. It is obvious that the melody would be disrupted because all the Modes, would be in disarray, as our good Vicentino does not believe that they would suit the two most artificial genera, and an octave could not be found in these two genera constituted only by eight notes, since, for instance, if one places two conjunct tetrachords in the Chromatic, seven notes will be laid out, which lack a tone to complete an octave, and, as such tone should be divided necessarily, one would need another two notes. The same occurs in the Enharmonic, so that in these two genera there will not be difference of [sqb] square and b molle, and many more drawbacks of this type will follow, as, for instance, the loss of that beautiful variety which he modes produce in all the genera with the help of this tone of the disjunction, since, (to employ the example above) just as in painting one cannot produce words of great perfection by using only two extreme colours, thus in music it is not possible to create perfect melodies just with the large and interval intervals of the tetrachords (which are just as the extremes) [<89>-] but one would need even more the middle interval, which is the tone, on the basis of which some admirable union of colours is produced (which according to Pliny it is the hardest part of painting) as one can see in the rainbow, which, equally, was called *harmoge* [harmoge] with a word taken from music, which means accord, harmonious combination of differing elements or pleasant union of extremes, as the warmth is in between heat and cold. Should anyone require further arguments as evidence of this truth, one should read what Bottrigari writes in his Discourse addressed to Annibale Melone, Dean of the musicians of Bologna. There, among other matters, one will note Don Nicola's Inconsistency in

having contravened his own laws by availing himself of the uncompounded Ditones in his compositions which he also calls chromatic, how badly he and his adversaries founded their arguments and how unjustly those Judases condemned Don Nicola, although they gave the right verdict, because none of them understood what they were fishing for. As to the evidence which Bottrigari adduces, taken from the ancient tablature of certain Greek hymns by Dionysius, a very ancient musician, which are found as an appendix to some copies of the text of Aristides, I say that one should not take them into account because said notes are very corrupt and defective nowadays because of their great antiquity and of the inaccuracy of the copyists, since, not only all the notes of the Instrumental part are missing (which would be called Basso continue) and also those of the tempi and of the parts of the bar (which were distinguished by the ancients) but because it is acknowledged openly that [-<90>-] the notes of the voices are very incorrect, lacking in number of notes and devoid of the signs of the Enharmonic, of which genus those compositions used to partake completely or partly, as I will demonstrate with appropriate evidence elsewhere. Therefore, we conclude that, if Don Nicola wanted to reform music and bring back into use the two genera Chromatic and Enharmonic, he should have studied first the good authors and he should have learned from them the nature of and properties of the genera, and only then he should have embarked on to this enterprise. Had he done so, he would have deserved much more the nickname of Arch-musician. However, do let us return to our subject matter.

That not even the Tritone, the Semidiapente and similar interval must be banished from the Diatonic. chapter

There are also some, who believe firmly that the Tritone, nowadays called commonly false fourth, which occurs between F and [sqb], and its second part, called false fifth, and called by me pseudodiapente in my Latin works with more appropriate terminology, which contains two semiditones or minor thirds, as from [sqb] mi and F fa ut, are not diatonic intervals, since they are drawn to believe this, in my opinion, from noting that in the Ecclesiastical chants, [-<91>-] which are very ancient for the most part, these intervals are not found. However, these theorists do not realise that those intervals, being harsh and difficult to pitch, were not suited to a simple and placid kind of music such as plainchant, and this is why they were not accepted therein. In any case, they are used with good judgement in the settings of certain Italian poems to express certain harsh and particular feelings, as nature appears to have placed them in the System among the above mentioned notes to express them. However, although they are applied very seldom because of their difficulty, just as the sevenths, this does not mean that they are not Diatonic intervals, just as the others are. The intervals of a sixth, which are half-way as to the ease with which they are pitched between those and the intervals of a fifth, a fourth and a third, are used much more often, and, if someone said that they do not suit the Diatonic because they are found rarely in the Ecclesiastical chants, one would be very mistaken. They were drawn to believe this also from our current practice, by seeing that, where in an continuous progression called Agoge by the ancients three adjacent tones were produced one after the other, when one produces them in the opposite direction, the mi is changed to fa to avoid the Mi against fa (which the mi would have produced) and to avoid that harshness. However, if this is [-<92>-] appropriate for music which has no other end but to produce pleasure, it is not suitable, however, for the kind of music that has as its main aim to move the feelings and to divert the soul, as the subject of poetry seeks

to do. Glareano was of this opinion, where, [first book, chapter eight in marg.] describing the intervals, he says: “The Tritone is a harsh sort of fourth and it is totally unsuited to the Diatonic genus.” In fact, although he was knowledgeable about music and a very good humanist, nevertheless he did not have that culture and grasp of these matter that many believe that he had. Therefore, he cannot be entrusted with such authority. Therefore, I have to believe that the Tritone and the Semidiapente are excluded from the Diatonic genus, moreover, I believe that many prefer this genus than with the other because the harsh intervals are more suited to the genus that is harsher than the others [[for instance, secondarily because there are small intervals in it naturally, although they are not uncompounded but divided by others. For this reason I said that both of them suited the Diatonic.]]

[-<93>-] Whether the Diatonic is natural and the other two genera are artificial

After we have seen what the nature and the order of the three genera is, it is appropriate to consider the origin of each and their main properties and qualities. First of all, that nature itself is invented the Diatonic is agreed by everyone, because one can see that it is used commonly by everyone and that every simple peasant and rough shepherd who sings a song of his uses the Diatonic rather than any other genus. This, I believe, occurs in countries and among all nations with little variation, because one should not believe that everywhere everyone who has not been trained in the art of singing sings exactly the same intervals and the same species of Diatonic, because nature delights of variety in every thing that belongs to her, as we shall see in the different traditions of the nations and in the very different languages that peoples use. Moreover, one can here some variety in the common songs which are sung, because sometimes one hears the larger semitone instead of the smaller one, although this is not enough for the melody to be able to be called chromatic, if that is the only Semitone. Therefore, the Diatonic is the most ancient of all, as the authors state as well. The second to be invented was the Chromatic, which is as much harder and subtler than the Diatonic as this is harder and subtler than the Enharmonic. Nor anyone can state as certain that it is used or it has ever been used by any nation as the natural genus. Finally, the Enharmonic is a thoroughly Greek invention, albeit it is also very ancient in origin, because it was found even in Homeric times [-<94>-] (according to the ancients) and before the Trojan War. Nevertheless, one must believe that it is more recent than the Chromatic, which is attributed to Timotheus, as we shall see soon. Therefore, the Enharmonic was a Greek invention and for this reason Plutarch, following the report of Aristoxenus, as I believe, calls the music practised by Pindar and by the others of that most florid and uncorrupted era [kala kai ellenika mousike], which means “the beautiful and Greek music.” However, it has to be noted that Aristoxenus, I believe, quoted by Plutarch maintains that a genus is not older than the other one by its own nature, but as to human practice and as to the occasion which presents itself. Therefore, just as the Diatonic can be sung by everyone with a little study and natural predisposition, thus the Chromatic requires greater artistry and application. Theon, following Aristoxenus authority says: [to de diatonon genos aploun ti kai gennaion kai mallon kata physin], which means that “the Diatonic genus has something of the simple, masculine and more akin ton nature which caused it to precede the others for this reason.” [-<95>-] The ancients say commonly about the diatonic that it is rather harsh and rather rustic, and, as Aristides says, that it has something of the “masculine and austere,” [arrenopon kai austeroteron]. He writes that the Chromatic is “very sweet and suited to laments” [hediston te kai goeron], and

for this reason it is suited to express the joy and the sweetness of love, but also laments and tears. He maintains that the Enharmonic has some sweetness but that, nevertheless, it is energetic (as this is the meaning of that word [egertikon]). Hence, it is not surprising if music was so effective at the time when it was employed, although I believe that the most effective of all is the mixed one used with good judgement. The Latin writer Vitruvius says

[<96>-] On the Inventions and on the Inventors of the two genera, Chromatic and Enharmonic chapter

Although it is a natural law that what is simpler and pure should predate what is compounded and artificial, one can doubt whether the Chromatic was discovered before the Enharmonic. Nevertheless, as to its practical application, it appears if the opposite happened, because very serious author, as Plutarch and others, teach us that in those very ancient times of Greece's young age, so to speak, only the Enharmonic was used and well regarded. For this reason, Aristoxenus writes at the beginning of his Harmonic Elements that those who came before him were intent on dealing with this genus alone instead of the others. He says: [tous men goun emprosthen harmonikous einai boulesthai monon (corrupted passage); autois gar t'harmonias hepton to monon; ton d'allon genon oudemian popote eunoian eikhon; semeion de; ta gar diagrammata autois ton [[enarmonian]] harmonikon (or, enharmonion as one reads in Proclus' Commentary on Plato's Timaeus) ekkeitai monon systematon; dia tonon de e chromaticon oudeis popoth'[popote ante corr.] heorake; kai toi ta diagrammata ge auton edei louv ten pasan tes melodias taxin. En hois peri systematon oktakhordon harmonikon (or enharmonion) monon elegon; peri de ton allon genon et kai skhematon en auto te to [-<97>-] genei touto kai tois loipois oud'epecheirei (against the preferable reading of an English manuscript reported by Signor Holstenio) oudeis katamanthanein all'apotemnoumenoi tes holes melodias [[tou tritou]] to triton merous [[che cosi si deue leggeré]] hen ti genos, megethos de to diapason peri touto pason pepoientai pragmateian], which means: "Those who came before us wanted to be only Harmonic, because they dealt only with the Enharmonic, but they did not worry at all about the other genera, and this be the proof, namely, that the descriptions of the Systems which are found in their writings are only Enharmonic and that nobody has ever seen their descriptions of the Diatonic and of the Chromatic genus. Nevertheless, those Descriptions or tables of theirs contained not only the entire sort of melody which they discussed in the Enharmonic Systems of eight notes or letters, but those belonging to other genera and forms (or species) and in this very genus (I doubt that the text is corrupted)." [So, although Adrastus quoted by Proclus opposes Plato's diatonic disposition to Aristoxenus, which Plato reports in his Timaeus, nevertheless, this does not seem enough otherwise, in my opinion, to find Aristoxenus guilty of lying, because that was not a System that could be sung, used in practice and complete with all its notes, intervals and letters, but only a fantasy of Plato used to demonstrate the harmonic proportions of that universal soul of his. in marg.] "As to the others, he tried to acquire the knowledge not even of one. But selecting only one third of the melodies, namely, a single genus, and confining themselves to the span of one octave, they applied all of their study to this one." This passages proves only that the only the Enharmonic was regarded highly and considered by the composers, but not that it is the most ancient as to its origin and its nature. In fact, as Zarlino notes, Aristoxenus demonstrates the opposite. One can gather from a passage towards the end of the same book that the Chromatic began to be considered at that time and it

began to be practised very much. He says: [oi men gar te nun [-<98>-] katekhousi melopoiia sunetheis monon ontes eikotos ton ditonon lichanon exorizousi suntonoterai gar khrontai schedon oi pleistoi ton nun. touto d'aition to boulesthai glukainein aei. Semeion d' hoti toutou stokhaizousi: malista men gar kai pleiston chronon en to chromati diatribousin' otan d' (this is the best reading, taken from Holstenio's) aphikontai pote eis ten harmonian engus tou [[kh]] khromatos prosagousi synepispomenou tou ethous], which means: "In fact, those who are used to the type of singing popular nowadays with reason do not allow the note Diatonic Lichanos, which is found at the distance of a ditone from the mese, which is the closest to it, because the majority of musicians use the most tense intervals. The reason of this is the intention of wanting to sweeten the melody all the time, as the fact that they spend the majority of the time in the chromatic genus highlights, and, if they move sometimes to the Enharmonic, they render it closer to the Chromatic, being to it attracted by their familiarity." Plutarch states the same, apparently on the basis of the same passage taken from Aristoxenus' work. One can see clearly that, albeit it is contradictory to say that the musicians of his time almost did not know the note lichanos which is a ditone away from the mese and then that they favoured more intense intervals and belonging to the chromatic genus and liked to sweeten their singing, we shall not find any contradiction in them if we remember that the larger the third interval of the tetrachord is, the smaller the other two. therefore, when Aristoxenus says that they were more keen to use more intense intervals, he wants to say that they used the Semitones instead of the Semitones, and, consequently, that they are [-<99>-] larger or more intense intervals that, as a result, would reduce the size of the third interval turning it from a ditone into a semiditone. Thus, they did not pitch a ditone from the lichanos F fa ut to the a la mi re, as the Enharmonic requires, but a chromatic Semiditone. Had I translated, as Gogavino does, [syntonoteron] as 'with more robust and intense', the contradiction would subsist, because robustness is ill-suited to sweetness. Therefore, one can gather that at the time of Aristoxenus, who lived when the Greeks extended their domain towards the Orient as a result of Alexander the Great's victories and they became richer and more effeminate, if, I say, at that time the Chromatic genus was prevalent, whose invention is attributed to Timotheus of Miletus, as Suda reports, who increased the number of the strings of the lyre and for this reason was condemned by the Spartans because caused young men to become more dissolute because of the more effeminate style of singing which he introduced. Anyone who wants to know more on the matter can examine the Decree itself preserved by Boethius and written in that Spartan language, so virile and severe. This happened at the time of Philip, Alexander's father, hence he could have been still valid at the time of Aristoxenus, on whose basis Plutarch says that without Timotheus we would not have had such a wide range of Melodies. For this reason he was accused by the Comic poets [-<100>-] such as Pherecrates, according to Plutarch, to have corrupted that ancient majesty that music possessed, although he was not the first one, because before him Philo and those who are mentioned in the said book by Plutarch had already begun to change it and to corrupt it, as those who were strict and lovers of the ancient style were saying. One can also believe that music was changed and corrupted more profoundly after Timotheus, because the sciences and all the other liberal arts remained flourishing for many centuries after him, but we have no surviving knowledge of this.

Difficulties raised by some on the above mentioned Timotheus and on Olympus, the inventor of the Enharmonic genus Chapter

Therefore Timotheus is considered commonly the inventor of the Chromatic genus, but it is not easy to know who this particular Timotheus is [[from the scant details provided by Suda]]. In fact, some believe that this one is the same person who moved Alexander the Great to embrace the arms in a banquet with the effectiveness of his music, which is hardly possible to believe, not because that one lived at the time of Philip and this one at the time of Alexander, as he could have lived long enough to be active under both of them, but [-<101>-] because this other one is nicknamed flute-player [auletes] by Suda itself, which is a very different profession from the one of the lyric poets and it was performed by a single player. Although Zarlino suspects that Suda's text is corrupted, he has no reason to believe so, because it is common for Suda, for reasons of conciseness, to quote passages from this or that writer in the book with their exact words without naming them and distinguishing them as appropriate. The fact that renders much more difficult to know with certainty if we are dealing with two people called Timotheus or only one is that the birthplace of the second one is not mentioned. However, the first one hailed from Miletus, which was the main town of the Ionia, rather than from Milos, which is [Melos] in Greek, an island of the Archipelago, as Gallilei believed, not being very well versed in Geography, because the adjective of Milos or Melos is Melius, rather than Milesius. Not even Zarlino noted this mistake, as, had he done so, he would not have let it go unmentioned. However, leaving aside to investigate more in detail this, which belongs to the Historic part, let us see whether it is acceptable that this person, who lived so many centuries after Olympus, inventor of the Enharmonic, created the Chromatic genus, as I said above, since it is reasonable that the Enharmonic, as I said above, being more artistically elaborate than the others, should be more recent. Zarlino imagines with good reason that the two most ancient genera had been discontinued as a result of some accidental event and only the one of the Enharmonic had survived, [-<102>-] which, he says, was the most difficult, as everyone agrees, and that Timotheus, moved by its difficulty, rediscovered the original form of the Chromatic and added to it something new. However, this cannot be the truth of the matter. Moreover, I would not find it very inconvenient to believe that, although the Chromatic predates the Enharmonic by its nature, at least as far as human practice is concerned, nevertheless it had not been used before Timotheus because it did not agree with the customs of that time, which were the most uncorrupted and severe, since the Greeks had not mixed with other populations, and they preserved intact that ancient purity and magnificence of the Heroic times, which anyone of good taste can detect easily in the language and in the traditions reported by Pindar. As to myself, I do not believe it impossible that, of two man-made creations, as last two genera are, albeit rooted very much in nature, the most ancient would have been practised at a later stage, just as a trireme was used in practice before a Bireme, as it is reasonable to suppose that a boat with a single order of oars [moneres] should be more ancient than any of the previous two. To quote an example which is nearer to us, it appears that history and oratory are, by their own nature, older than poetry, but poetry was known and practised before historical accounts and rhetorical speeches. However this may be, since to know it in detail is not particularly important, it is enough to know that throughout the many centuries in which great poets lived (Aeschylus, Sophocles, Euripides, Pindar, Alcman [-<103>-] and the other lyric poets, neither the Chromatic or the Enharmonic were used and highly regarded, although the Diatonic which was used was not the simple one, hence it remains probable that this was more ancient than the Chromatic as to its application. As to Olympus, Zarlino raises some difficulties to defend the fact that Enharmonic

was invented after the Chromatic. He imagines that there were three people named Olympus, and that this Invention was due to the third one, but Plutarch only names two, to the younger of whom, who, he says, was of Phrygian origin and also the first flautist, he ascribes that invention on the reports of ancient writers and of Aristoxenus himself. So shed some light onto this, let us consider something more important about these two people called Olympus. Alexander, who wrote a collection of facts on Phrygia and is quoted by Plutarch himself, reports that Olympus was the first one who imported the Crumati into Greece, namely, the sound of percussion instruments (since here the word [kroumata] does not mean 'the plucking of a string' as the translator intended, although Suda said of him that he had been [hegemon te genomenos tes kroumatikes mousikes tes dia ton aulon], namely, that "he became the leader of the percussive music of music for the flute) and of the Dactylic ones" and that Hyagnis was the first flute player, then Marsyas, his son, and then Olympus who, as one can gather from these words of Plutarch, was Marsyas' son. In that passage, he also writes that someone called Olympus created a Nomos, which was called Polykephales, for flute, namely, an Air for flute to be played at the sacrifices in honour of Apollo, which as called [Polykephale] exactly because [-<104>-] it was divided into many sections or passages, and that this man descended from the first Olympus, pupil of Marsyas, who composed the Nomoi or the sacred Airs about the Gods. In fact, he was loved so much by his Teacher, that he learned from him the art of the flute, he established the Enharmonic Nomoi in Greece, which were still used in his time by the Greeks in their celebrations of the Gods, that others thought that Grates, pupil of Olympus, was the author of that Nomos, which Pratinas ascribed to the younger Olympus, while the Nomos Naumatios was believed to have been composed by the first Olympus, pupil of Marsyas. I wanted to report all this because, since Plutarch is a very accurate writer, if ever there was one, and one should not believe that he made a mistake. Therefore, one can see that the man called Olympus who imported the [kroumata] into Greece is the same as the son of Marsyas, although he is mentioned in that passage before Marsyas and Hyagnis, his father and his grandfather, as the fact that he taught the Greeks the art of the [Kroumata] or of the cymbals, castanets and similar instruments is not in contradiction with his practising the art of the flute, because in those ancient times not only among the Greeks, but also among the Jews, those two types were used in combination with each other. Therefore, there are only two people called Olympus, rather than three as Zarlino suspected, as, otherwise, Pratinas himself would have mentioned the three of them and he would not have referred simply to the younger. It is true, however, that Suda as well writes that there had been two people called Olympus who played the flute, but the first one was born in Mysia and the second one was born in Phrygia, but Plutarch's authority, which is of a different degree of judgement and knowledge, [-<105>-] from whom we know that they belonged both to the same nation, or rather, to the same family. However, it is possible that Suda found that an Olympus from Mysia, who was also flutist, existed from some other author (unless he misunderstood Plutarch), since Mysia and Phrygia are not very far from each other and the populations, who both used this type of music in abundance, were not very different, so that many details which were ascribed by a writer to Olympus from Phrygia would be ascribed by another one to Olympus from Mysia.

[-<106>-] How the Chromatic and Enharmonic Genus was found and on which occasion.

Although it appears, as I said, that the Chromatic had not been used in practice before the Enharmonic, nevertheless, one can judge that it originated from the addition to the conjunct Tetrachord and from the use of the note Trite Synemmenon, or B flat. In fact, since the ancient recognised that the lowering of the tone of the Mese a la mi re to the Paramese [sqb] mi by a Semitone contributed to render the melody softer and sweeter, they were encouraged little by little to place two semitones one next to the other by putting the Paramese immediately after the trite, as in Mi fa, fa, instead of Re mi fa

[Doni, On the Genera and the Modes, 106].

Then, taken to the end of the fourth by nature itself, they were encouraged to ascend the note of D la sol re itself, which is the Nete in the Disjunct System and the Paranete in the conjunct one. Therefore, having recognised the Sweetness of this way of progressing they put it further into practice by establishing its tetrachords, as they had done in the Diatonic.

As to the Invention of the Enharmonic, Aristoxenus, quoted by Plutarch, thought that the matter may be explained, as he says, with words of this tenure, which I want to insert here in their entirety as they are, since they have not been understood and translated properly by Zarlino. [Olympos de, hos Aristoxenos phesinhypolambanetai hypo ton mousicon out enarmoniou genous heureses gegenesthai; ta gar pro ekeinou panta diatona kai khromatika en. Hyponoousi de ten heuresin toiauten tina [-<107>-] genesthai. anastrephomenon ton Olympon en to diatono kai diabibazonta to melos pollakis epi ten diatonou parypaten toto men apo tes parameses, tote de apo tes meses kai parabainonta ton diatonon lichanon kata kadei to kallos tou ethous kai houpo ek tes analogias synestekos systema thaumasanta kai apodeixamenon en touto poiein epi tou Doriou tonou; [[oute gar ton tou diatonou idioon oute ton tou khromatik]]], which means: "Olympus, as Aristoxenus says, is believed by musicians to have been the inventor of the Enharmonic genus, because there was nothing but the Diatonic and the Chromatic before him. They estimate that the invention might have happened in this way, namely, while Olympus dwelled in the Diatonic melody and often took the melody (or, he made the leap) to the Diatonic Parhypate (F fa ut) now from the Mese (a la mi re) now from the Paranete ([sqb] mi) and, transposing the Diatonic lichanos (G sol re ut), he recognised the beauty of that melody, and, consequently, admiring and embracing the System corresponding to this, he modulated in this one according to the Dorian tone." These words appear to me to be very clear, although they appeared to be very unclear to Zarlino, as one can see from chapter thirty-five of the second part of the Institutioni. In fact Aristoxenus means nothing else but that Olympus in creating his melody (which one has to believe that he did with a flute of any species it may be, whether it be a flute or a recorder of some sort or other) often made the leap of the ditone or of a third which is found between F fa ut and a la mi re and, conversely, downwards, [-<108>-] and that he recognised the beauty and the pleasant sound that that leap of a third produces and practised often creating its System, namely, placing all the tetrachords and all the notes in their right position in the Dorian, in which, as we shall see, this genus was used mainly. However, since one has made no mention of the Thick, but something is said in the following passage, which is really not too easy to understand, I want to quote the words of Plutarch himself to the benefit of the scholars. [Oute gar ton tou diatonou idion oute tou chromaticou aptesthai; alla oude ton tes harmonias; einai d'auto ta prota ton enarmonion toiauta ; titheasi gar touton proton ton spondeion, en ho oudemia ton

diaireseon to idion ekphainein ei me tis eis ton touton syntonoteron spondeisomn; blepon auto touto diatonon einai apeikase; delon d'hoti kai pseudos kai ekmeles thesei ho toiouto ditheis; pseudos men hoti diesei elatton esti tonou tou peri ton egemona keimenou; ekmeles de hoti kai eitis en te tou toniaou dynamei tithesi to tou syntonoterou spondeiasmou idion sumbanoi anduo exes tithesthai diatona to men asyntheon to de syntheton; to gar en tais mesais enarmonion pyknon ho nyn khrontai ou dokei tou poietai einai. rhadion d'esti synidein ean tis archaikos tinos aulountos akouse; asyntheton gar bouletai einai to en tais mesais hemitonion; ta men oun prota [-<109>-] ton enarmonion toiauta; hysteron de to hemitonion dierethe en te tois Lydiois kai en tois Phrygiois; phainetai d'olympos auxesas mousiken to agenneton ti kai agnomenon hypo ton emprosthen eisagogein kai archehos genesthai tes Ellenikes kai kales mousikes]. This is the translation: "In fact he did not practice what is specific of the Diatonic or what is specific of the Enharmonic, since these are the foundations of the Enharmonic. Firstly, they place the Spondaeus among these intervals, in which none of the Divisions demonstrates its own being. If then someone looked at higher Spondiasmus and did not judge that that is Diatonic, it is clear, however, that whoever will harbour this opinion, will judge it as the false and unsingable one. I say the false one, because said interval will be found to be smaller than a Diesis than the tone placed in the first and main place, and unsingable, because, albeit someone will place the highest Spondiasmus in the interval and proportion of the Tone, what will happen is that two diatonic intervals, one uncompounded and one compounded, will happen to be placed one next to the other. Therefore, it does not seem to me that the Enharmonic Thick practised today can be attributed to said Inventor, and it will be easy to understand this if one listens someone who plays the flute in the antique style, because that semitone of the Mese wants to be uncompounded. Therefore, these were the beginnings and the foundations of the Enharmonic. It appears, therefore, that Olympus enlarged music and introduced elements which were not known and did not exist earlier, was the first author of the Greek and beautiful music." Since all these facts are very notable and interesting, as all of those that Plutarch teaches us, it is right that we should explain them as well as it shall be possible, [-<110>-] because they provide us with much information about ancient music in a few words. Firstly, one has to know that Spondaeus and Spondiasmus in this passage do not mean the foot or the Rhythm of the Spondaeus, which contains two long ones, but an harmonic interval of three dieses, or three quarters of a Tone. Aristides is the only one who teaches us this, to my knowledge, as, without him, we would be unaware of something very essential in ancient Music. However, since Zarlino did not observe this, he was convinced with great probability that Rhythm was part of the essence of the ancient Tones or Modes, but we shall show elsewhere that this is false. Therefore, one must know that said term has various interpretations and meanings related to each other, since, not only it means the metric commonly called Spondaeus by the Grammarians, but also the Rhythm which uses that foot and also the song or the air which was used in the sacrifices. In that case, it is accompanied, as an adjective, to the word [melos]. This was not only slow and solemnly measured as to its Rhythm, but it adopted also slow intervals and difficult to pitch, such as those of three dieses. Therefore, that interval as well was called Spondaeus and its use was called Spondiasmus. So, Aristoxenus says that Olympus did not have any knowledge of the proper and well ordered disposition of the genera which artists established later on, which have their tetrachords ordered and laid out as we have seen above, but that the foundations of his Enharmonic [-<111>-] appeared to be as we shall endeavour to show with this illustration, since they can be deduced

either from the tablatures of those airs which were used in the sacrifices or from the practice of the performers which had been handed down to that age.

[Doni, de' generi e de' Modi, 111; text: a, G, F, E, D, C, [sqb] Tetracordo della Mese, Hypate, settima minore, Disdiatessaron, Tuono, Semiuono, 3 Diesi, Diesis, Mese, Lichanos, Meson, Parhypate Meson, [[Mesé]], Lichanos, Hypaton, Parhypate, Hypate]

Firstly, he says that they place the Spondaeus (between [sqb] and c) from which one cannot deduce the division of any genus, because this interval is not expressly Diatonic, Chromatic or Enharmonic, although one can see that then it was accepted within that species of the Diatonic which was called soft according to Aristoxenus and forms its fourth with two dieses, or semitone, three dieses and five dieses. In fact, if anyone ascribes the proportion of the tone to the highest Spondaeus, namely, the second one between C and D, one can see that this is false and that it destroys this Harmony or modulation. It is called false, because one will realise in the end that said interval is a diesis smaller than a tone placed near the principal note (this is what this word [hegemon] means) which has to be understood as the middle one, namely, Hypate meson, which is the Toe between D and E. However, it will destroy [-<112>-] this harmony and throw it into disarray, because, if the second and highest spondaeus will be made into a Tone, it will place two Diatonic intervals one next to the other, one uncompounded which is the upper tone between D and E, and the other compounded between C and D. One might say: “What inconvenience shall be born of these?” Such drawback will be that the interval between C and D shall have a Tone divided into three dieses and one (this is what it means to be compounded) and shall measure three dieses from C to D, as musicians will pitch it, and four dieses, as these maintain. This could not be, not so much because an extra hole was needed in the flute, as one could do without this with the appropriate fingering, but rather because an extra note was needed and such interval compounded and uncompounded was in contrast with the melody and the airs of Olympus, since Plutarch says further on that they were built on very few intervals but the beauty of the melody and the artful quality of the Rhythm were so attractive that modern composers who were much more expert than him considered them incomparable. Moreover, he says that the Thick of the middle ones (namely, the semitone between E and F divided into two dieses) could not have been invented by Olympus but by others after him, and that this could be understood easily if one could hear someone playing according to the ancient style and Diatonically, because he would have realised that that Semitone was not divided as it was divided later on [-<113>-] [[From this we can also gather that, since the opinions they had about the intervals of the story of Olympus]] in the flutes and in the Phrygian and Lydian Tones. This, in my opinion, is the meaning and the interpretation of this beautiful but obscure passage of Plutarch, although I refer myself to the judgment of those who are more learned and able to understand it. One can also deduce from the various opinion that were held about the intervals of Olympus' Aairs, and from the judgment that later musicians made on them (in contrast to what happens nowadays when what is ancient is despised, and what is new is always sought after, especially in music) and which Plutarch mentions further on, that the Melodies of Olympus, Terpander and other similar composers, which were [trikhorda], which

means of three notes and contained only three notes, were written in truth only with three notes, but were sung or played by musicians with varied intervals. For instance, while the lowest note in their compositions was marked with the sign of the Hypate, the middle one with the sign of the Parhypate and the third one with the sign of the Lichanos, the same three had to be used in the two tetrachords of the Hypate and of the Mese, a fourth higher and a fourth lower, while only the parhypate was used as a mobile note, which was sounded a semitone or three dieses higher, perhaps even more or less, and produced varied intervals higher and lower, so that I believe that great part of the beauty of those airs consisted in this. As the material strings themselves of an Instrument may produce a varied sound without the use of frets, which, it seems, were not used at the time, I discuss this through conjecture in my book on the Lyra Barberina.

[<114>] On the notes added by Timotheus to the ancient lyre chapter

The contradictions which are found among the other classical authors cause many difficulties and produce many doubts in the mind of those who are not happy to acquire but superficial knowledge. Therefore, Zarlino, at chapter thirty-two of the second part of his *Instituzioni*, demonstrates learnedly who Pausanias and Boethius may be made agree with each other, when the latter says that Timotheus, the inventor of the Chromatic, added only a string to the lyre, which had ten previously, and the former that he added four to the ancient seven. Therefore, to understand this correctly, I say that, if Pausanias understood that the lyre had only seven strings, as they say that it had in the most ancient times of Terpander, he was very mistaken. In fact, as Nichomachus and Boethius and others after him, we know well that the number of the strings was increased up to the number of ten by several musicians mentioned by them, so that there is no justification as to this part of the statement. However, if we suppose that he played the lyre with seven strings, which ones shall we say that are the four added by him? Zarlino explains this with the thickening of the tetrachords produced by the chromatic and Enharmonic notes in the Diatonic, which would happen if Timotheus had also been the inventor of the Enharmonic genus, because if one adds two notes to any tetrachord of the two contained in Terpander's System, one chromatic and the other Enharmonic, four are added to the seven, and thus the total number is eleven. However, since he was the creator of the Chromatic, to maintain the chronology, it is more probable that Pausanias made a mistake [<115>] [book 7. chapter 56 in marg.], as well as Pliny did where he says that Timotheus added the ninth string. Nobody should think that this is strange, because 'to make mistakes is human and sometimes the good Homer falls asleep'. Therefore, if there is a discord between these authors, it will be more reasonable to trust those who are more consistent in their views and where expert in that profession, such as Nichomachus and Boethius. Therefore, we believe with certainty that Timotheus, at least at the beginning, added only a single string to the lyre, and, if he added four in total, that he added three later on to the eleven, as it is probable that it happen, to create the perfect System, rather than four to the seven original ones. Be this as it may, others added more later on up to the number of eighteen, as I demonstrated elsewhere with the aid of Nichomachus.

[<116>] Whether there are or there can be other genera both of the Soft Diatonic and of the Mixed and common Genus, and of the species of these genera.

It seems very clear that there can be no other genus than the three mentioned. All the good authors agree in this, since all the other divisions of the tetrachord that can be done, will be named according to whether they are closer to this one or that one of the same ones, which is what happens to the soft Diatonic, which is half-way between the ordinary Diatonic, which is the Syntonic, and the Chromatic, since it has the first interval of a Semitone or less, the middle one larger than a Semitone and less than a tone and the third one larger than a tone and smaller than a semitone. However, since it is not closer to the Diatonic and the definition of Thick does not suit it, because it has the first two intervals which are no smaller than the third one, it was called Diatonic rather than chromatic. I said of the same size or larger because, according to Aristoxenus progress of equal semitones and diesis at least in Theory, it has the first two intervals equal in size to the third one, since the first one is of two and the second one of three which are equivalent to the third one of five. However, we shall stop discussing this matter. Aristides (together with Bacchius, Cleonides, Briennius and the others) says that the mixed genus is the one which is composed of two or three genera, or, as Pappus says [en ho duo e tris kharakteres genikoi ekphainontai], “the one in which two or three general (namely belonging to the genera) characters can be seen,” therefore, since the Enharmonic and the Diatonic can be mixed with the Chromatic, the two extremes together and also all of the three of them, one can gather that the forms of the mixed genera are five, [-<117>-] which shall we consider more separately in practice. The common Genus is the one that can be called diatonic just as Chromatic and Enharmonic, because it progresses always through the notes which are common to all the genera, namely through the immobile ones, as Pappus and Cleonides report. One must note, however, that the ones which, as I said above, are stable and immobile are not excluded. These are the Parhypate and the Tritone, which are stable in relation to the Diatonic and Chromatic and mobile if one compares one of those genera with the Enharmonic, because, since those notes are common to the three genera, the melodies which employ them will become common to all of them equally. Therefore, as in this example, the melodies which are common to the three genera will be able to employ the notes A [sqb] C E, but not the others.

[Doni, On the Genera and the Modes, 117, 1; text: A, Tono, E, D, C, semituono, diesis, Hypate Meson. Diatonica, Chromatica, Enarmonica. Commune, [e add. supra lin.] Stabile, lichanos Hypaton, Diatona, Particolare, [o add. supra lin.] Mobile, Hypaton, [e add. supra lin.] Mobile, [[et Particolare]] [e Stabile, Mobile add. supra lin.] Parhypate, Enarmonica, Proslambanomenos. Commune [e add. supra lin.], Tetracordo]

[Doni, De' Generi de' Modi, 117, 2; text: C#, C, [sqb], A, diesi tuono]

[-<118>-] We conclude that the genera which are pure and simple are only three and that they cannot be any different. As to the Super-Enharmonic proposed by some modern writer, I have not seen how it is composed, so I cannot discuss it. However, I am convinced that, if it is simple rather than mixed, it will have to be referred to one of these ancient ones. Principally, all the melodies are divided into three genera because the Divisions of the Diapason, queen of the consonances by excellence in music, are also three, namely according to the Diapente and Diatessaron, according to the Semitone and major Hexachord, and according to the Tritone and the minor

Hexachord. The Diatonic relates to the first Division, the Chromatic to the second and the Enharmonic to the third.

[-<119>-] How long the last two genera were employed and flourished and when they fell out of use [[and who tried to restore them]] Chapter

Therefore, the Diatonic has always existed and shall always exist as long as the universe lasts, because it is natural. However, it is hard to establish with certainty when the chromatic began to fall out of use, as it has been seen. Nevertheless, if one presumes that its inventor, or re-discoverer at least, was Timotheus, who lived years before Christ, it is very probable that it lasted until the end of the Greek civilisation first, and then of the Roman one, and as long as all the good disciplines were held in consideration and esteem. As to its demise, one has to believe that music fell into a decline when the other arts did so as well, but, since some decayed before others, and others disappeared suddenly and others gradually, we can believe that the Chromatic melodies lasted until about the times of Theodosius and Valentinianus, when the Empire began to deteriorate more noticeably, and with it all the most noble occupations. However, as to the Enharmonic (which began with Olympus, as we have seen, about years before the coming of Christ) it is not easy either to establish when it fell out of use. We can gather from the works of Plutarch, who lived under the emperors when the Roman Empire was in its most florid phase, that it had already been abandoned and that the musicians of his time mourned its demise. Therefore, we can believe that perhaps it had already fallen out of use before the coming of Christ our lord because there few innovations took place in the World between Augustus and Marcus Aurelius. [-<120>-] Therefore, since the supremacy of the Greeks, who were more devoted to this and to all the other liberal arts, waned very much with the advent of the Roman Empire, equally, we can believe that the Enharmonic genus decayed slightly earlier or later, and as a kind of music which was quintessentially Greek, it followed the fortune of the Greeks in the same way. As further evidence of the fact that it was already extinct during Plutarch's life, he state himself that in that time there was no shortage of musicians who stated that the Enharmonic diesis could not be perceived and that said genus was an intellectual invention rather than something which was used in practice, as many also believe nowadays and try to convince me. Plutarch's words are these, and, as usual, I want to transcribe them in their entirety in order to explain many issues. [hoi de noun to men kalliston ton genon hoper malista dia semnoteta para tois arkhaiois espoudazeto pantelos paretasanto hoste mede ten toukhousan antilepsin ton enarmonion diastematon tois pollois hyparkhein. Houto de argos diakeintai kai rhthymos hoste med'emphasin nomizein parekhein kath'olou ton hypo ten aisthesin piptonton ten enarmonion diesin exorizein d'auten ek ton melodematon; Pephlyarekenai te tous doxantas te peri toute kai to genei touto kekhremenous; apodeixin d'iskhurotaten tou t'alethon legein ferein oiontai; malista men ten auton anaesthesian hos pan ho, ti per an autous ekphygei touto kai de pantos anyparkton ov pantelos as akhreston; eita kai to men dynastahi lephthenai dia symphonias to megethos; kathaper to, ton hemitonion kai ton tonon kai ta loipa de ton tosouton diastematon; egonekasi d'hoti kai to triton megethos, houtos an kai to pempton ekballoito kai to hebdomon on to men trion, to de [-<121>-] pente, to de hepta dieseon esti. Kai katholou pasi hosa peritta phainetai ton diastematon, apodokimazoit'an has akhresta par' hoson ouden'auton dia sumphonias labein esti tauta d'an eie hosa hypo tes elakhistes dieseos metreitai perissakis; hois akolouthein ananke kai to medemian ton tetrakhordikon diaireseon khresimen einai

palin monen tauten di'hes pasin artiois khrestai diastemasin sumbebekei haute d'an eie hete tou syntonou (kai) diatonou kai he tou toiniaiou khromatos. To de toiauta legein [[kai]] te kai hypolambanein, ou monon tois phainomenois enantiou meion estin, alla kai autois machomenon chromenoi gar autoi toiautas tetrachordon malista phainountai diairesesin en hais ta polla ton diastematon etoi peritta estin e [[analogia]] [[()] aloga [()]] (instead of analogia) malattousa gar aei tas te likhanous kai tas paranetas; ede de kai ton hestoton tinas paranesi pthongon, logo tini diasemati prosainentes autois tas to tritas kai tas paranetas; kai [[<.>]] ten toiauten eudokimein malista pos oiontai ton systematon Khresin en he ta polla ton diasematon estin aloga, ou monon ton kineisthai pephykoton pthongon alla kai tinon akineton aniemenon hos esti delon tois aistanesthai ton toiouton dynamenois]. Here is their translation: “However, modern musicians consider the lowest among all the genera the one which was most highly regarded and most used by the ancients because of its gravity, so that the majority cannot understand any longer the Enharmonic intervals, [-<122>-] but they are paralysed by their laziness and they not see at all that the Enharmonic Diesis produces any impression and that it allows itself to be distinguished from the bass, and thus they exclude it from the melodies anzi sono occupati dalla pigrizia et they believe that the Enharmonic Diesis produces any impression and that it cannot be distinguished by the ear. Therefore, they banish it from the melodies, and that those who have dealt with this genus or have used it <aliqua desunt>.

They are convinced that they can put forward as an invincible argument their own insensitivity and ignorance, as if what they cannot comprehend were useless and non-existent, and, moreover, the fact that interval cannot be detected with the help of the consonances, as in the case of the Tone, semitone and other similar ones.

However, they do not know that in this way one would banish the third, the fifth and the seventh interval, of which the first one contains three dieses, the second five and the third seven, and, finally, all of the intervals of uneven number would be excluded because none of them can be found through the consonances, as all the ones which are measured with the smallest diesis. It follows necessarily from this that no division of the tetrachords is of any use, except for those which use all the even intervals, as in the case of the Syntonic Diatonic and the Chromatic Tonianus. To say this is not only the sign of someone who is openly opposed to aural experience, but of someone who contradicts oneself, because one can see also that they adopt mainly those divisions in which most of the intervals are either Odd or Irrational, because they always relax the lichanoi and the Paranetai and even some of the stable sounds, and also, with them, the Tritai and the Paranetai, and they keep the use of these divisions in the highest regard where the greatest part of the intervals is irrational not only between the mobile notes, but also between the stable ones, as it is clear to anyone who can express an opinion on similar matters.” Aristides also disagrees where he says, after he discussed the other genera: [akribesteron de to enarmonion para gar tois epiphanestatois en mousike tetukekhe paradoches; toi de pollois estin adunaton; oithen apegnosan tines kata [-<123>-] diesin melodian; dia ton auton astheneinan etoi kakotekhnian pantolon amolodeton einai to distema hypolabontes]. I wanted to quote this passage here in full because it is taken from such a serious and wise author because it contains many notable details which will be highlighted in due course. Here is the translation: “The Enharmonic, instead, is more subtle because it was left to us by those who were most admired in music. The majority consider it to be impossible to sing, and therefore they rejected any melody which proceeds by Diesis, because they thought that that interval was completely impossible to sing or because of their feebleness and lack of method.” Therefore, one can see that, even in those times there were those who derided the

Enharmonic genus and considered it a mere fantasy, since they did not believe that the Diesis was applicable and useful. However, one must note most of all the argument adduced by them against the use of the diesis, which is that it could not be found through any consonance, since it is not the difference between two consonances, as in the case of the tone, which is the interval by which the fourth exceeds the Ditone. From this one can notice that the consonances which are called imperfect were known very well at that time, although it is commonly believed that the opposite is true.

[<124>-] Why the last two genera were lost, and who set out to restore them Chapter

Apart from the succession of events in human history which renders variable and changeable all the parts of nature as well the inventions of man, it appears that the cause of the loss of the two genera may be ascribed principally to those two great revolutions and falls of the two last Empires, namely, the Greek and the Roman, which were destroyed and ruined to such an extent by the barbarians together with what of good and beautiful was contained in them, that even the most necessary arts were either lost or were very lacking and the world was enveloped for many centuries in the greatest ignorance, so that both for this reason as well because of the laziness and sloth of those who could have taken on this discipline, had they wanted to labour on it, one can believe that, since even their writers on those subjects were lost with the passing of time and since the world fell into greater disarray than before, even the memory of them was lost. Hence, just as the Enharmonic came to light later than the others, thus it also vanished earlier. One can find the main reason for this in its complexity, because, as we have seen, this genus requires great study and continuous practice on the part of the singers. Hence, since music was not highly regarded even by the Romans and since its practitioners were not as well regarded as by the Greeks, and since singing and playing competitions were as commonplace in public festivals, as this must have been a great incentive for those aspiring to great glory, it is not surprising that such a great genus was lost. Besides, we know that it is less pleasing and more convoluted than the others. In fact, since the first two intervals are so small that the experts of the art and those endowed with a refined ear are able to distinguish them with difficulty, [<125>-] it could not, nor it can now please simple people who are more numerous than the experts. Hence, it seems to the majority that such music is poorer and composed of fewer intervals, since they take the first two almost as a single one and hardly distinguishing the second not from the third one. Moreover, that leap of an un-compounded third, if it used often, will bore inexperienced listeners, since it will make it look as if the melody lacks the middle note which divides it in the diatonic. Besides, since everyone appreciates more the type of music which is closer to its attitude, and, since persons belonging to the lower class and who indulge in carnal desires, have a lower character, as Aristotle points out , they will not appreciate such an interval which has something of the magnificent and of the Heroic, since the music which employ frequently such large intervals are apt to express the magnanimous and magnificent character, which, therefore, is suited to tragedy, as Greek Writers note. Therefore, let it be without question that since [This is confirmed by Macrobius in his *Somnium Scipionis*, book 3, Chapter 4, where he says that “it was abandoned because of its excessive difficulty” in marg.] the Enharmonic genus had this character, it was lost, and that the Chromatic, albeit it was sweet and cheerful, nevertheless, since it was harder than the Diatonic and required a considerable amount of application, was also abandoned many centuries ago. [This is the reason why it was abandoned, rather than one reported by Ptolemy in his

second Solitario, because the tone is hard to divide into two parts, because it is impossible to divide it Harmonically, while it is not hard to divide it Geometrically in marg.] Whether our contemporary compositions ought to be considered Chromatic or otherwise, we shall consider this in the third book. However, since in every age there were men endowed with elevated intellect, speculation and study of practical matters who have attempted to restore what time and other events and people had destroyed, we read in Photius that Damascius mentioned in the life of the philosopher Isidorus that in his time, namely, under the Emperor Anastasius [-<126>-] a certain Asclepiodatus, a man very versed in every field and very gifted in musically, was not able to restore the Diatonic, as he did, by dividing the other two genera and by using at least twenty-two Magadis (the Greek text says 220, hence there is a mistake in the original text or in the translation) or particles which make up every note, hence one can see that he worked with the Canon (this is an Harmonic Instrument divided into many parts suited to measure the distance between the strings and find all the notes) but he lost the right way, if, perhaps for lack of good judgment, he was not able to apply what was needed. I am convinced easily because of what Damascius writes, namely, that he was considered very subtle in proposing objections, but not equally perceptive, because he managed to penetrate with his intellect very obscure and divine subjects, such as the Platonic Axioms, but he could not arrive to the deepest level of knowledge of the Orphic and Chaldean Mysteries.

Whatever the reason was, Asclepiodatus was not able to rediscover the Enharmonic genus, despite his intense effort, but, as to whether others tried to do the same up until the time of Vicentino, I would not be able to say, since I have not seen all the books, since so many centuries have past and we do not have any writer on music.

[-<127>-] On the qualities specific to each of the three genera.

Theon states that the Enharmonic is [dysmelodeton] extremely difficult to sing, and, as Aristoxenus says, [philotechnon Kai polles deomenon synetheias], namely, it requires to be practised with love and diligence and needs long familiarity.

Proclus, in the third book of his Commentary on Plato's Timaeus calls the Chromatic [eklyton kai agennes], dissolute, et cetera.

Macrobius [book 2, Chapter 4. add. in marg.] in his commentary of the Dream of Scipio states that the Chromatic is 'infame mollitie', namely, notorious because of its excessive tenderness.

[-<128>-] On the Species of all three genera, and, firstly, on the ones of the Diatonic chapter

[[Adduced this knowledge about the genera of the Harmony and of the melodies, it follows that we should move on to the species of each, which the ancients called [khroas], namely colours, as one can gather from Aristoxenus and others]]

On the relationship which the three Genera and their species have with other matters chapter

Albeit I have always maintained that some comparisons dragged by their hair, as one says, and little suited used by some are not very beneficial in musical matters, such as comparing the consonances and dissonances to taste, as Cardanus does, nevertheless, when they are not so disproportionate and are useful to express the essence and quality of such matters vividly, I do not believe that they are to be despised.

Therefore, to express more fully the character of Enharmonic Harmony, I would say that it can be compared to the sort of wines which have a flavour which is both sweet and spicy, and that this does not correspond badly to those properties attributed to it by Aristides, namely to be [epion], namely, soft and sweet, as well as [egertikon], namely energetic and effective in moving the emotions and awakening the imagination, just as one of these two flavours pleases and melts the palate, and the other one titillates, so to speak, the sense of taste, pleasingly twice in the process. Hence, it is clear that the Diatonic shall be like those wines that have only something of the brusque and the pleasant, while the Chromatic is judged universally as resembling sweet and suave wine. One might also say that the metaphor according to which some wines are called generous and grand, [-<129>-] such as the Greek wine which I believe was called Aminaeus by the ancients, corresponds equally to the Enharmonic Genus, to which that [semnon], or grand and magnificent manner, is ascribed. But, since the word austerus, in this particular matter of the wines, does not mean, according to the Greek Physicians and other good authors, that unripe and rustic flavour which can be tasted in certain small and new, as it is mostly believed, but rather, what it in Latin is called dry and appears to denote only a lack of sweetness and tenderness, I would say that, in this sense, it is better suited perhaps to the simple Enharmonic, while the sweet and spicy suits the mixture of the Diatonic and Chromatic, since a certain dryness, severe simplicity and a certain majestic grace as well is really suited to the Enharmonic, as it is the one that can see, moving from one comparison to the other, in the ancient paintings (as long as by good Masters) which have lost, because of time, that brightness of colours, hence we can also say that in painting as well the Diatonic resembles that colour which we say has something of the crude, while the Chromatic resembles the paintings made with florid colours or percolori floridi, as Pliny call them and the Greeks before him called [antherous]. Those are understood to be the ones which are more brilliant and delightful such as the ultramarine among the blues and the Cinnabar called Dragon's Blood among the reds, which, according to Pliny, were provided by those who commissioned the work at their expense, as it is the case still nowadays, and not by the Painter. The paintings that have beautiful colours are like the Chromatic melodies, while the ones which are composed of austere colours will resemble the Enharmonic ones, since austere were called the colours what are the opposite of the florid ones, which are not very brilliant and render the painting more mature and ancient, as in the case of <aliqua verba desunt>.

[-<130>-] Also, since Architecture has some affinity with painting and with Harmonics, we can also consider its five styles, which, in my opinion, are more similar to the Genera than to the Modes. They are the Tuscan, the Dorian, the Ionian, the Corinthian and the Roman or Composite. The Tuscan, the simplest of all, which was very unsophisticated and with few Canons, was compared very aptly to the common genus which produces the melody which is exactly the most simple. The Dorian matches the Enharmonic melody, since it has a certain simple gracefulness as that one. The Chromatic matches the Corinthian, which is more ornate than all the other simple genera and it has many different intervals just as that style has different Canons. However, it seems to me that the Diatonic resembles more closely the Ionic style, since it more suited better than the other ones to sad and cheerful moods and other contrary qualities, just as the relaxed order seems to be that it would be more suited than the others with its simple details and its added ornaments. Finally, the order which is called composite and Italic, which is better named Roman, since it was applied by the Romans, as the Tuscan in particular was no less Italic than that one,

which is the most subtle and adorned of them all, corresponds exactly to the mixed musical genus. Moreover, should we want to consider the matter with further comparisons, we could say that the composite or Roman order resembles most the genus composed of Diatonic and Chromatic, just as the Capitals of the columns of this order [-<131>-] are composed of the Corinthian and Ionic order, since they contain the volute of this one and the foliage of the other one. Since it seems that Vitruvius also mentions the Ancient style that he called Atticourges [attikourges] in Greek fashion, leaving a record of it only when he talks about the doorways, which, if it had some particular disposition and workmanship, it was definitely very subtle and perfectly harmonised, since the Athenians were the most acute and ingenious people of the entire Greece, and how one can gather from their medals, which are very beautiful, I would believe to be right if I said that the Genus composed of Diatonic and Enharmonic or of Chromatic and Enharmonic resembles such style, while the one which is composed of all three does not resemble perhaps any Architectural style. Similarly perhaps, it would not suit any sort of Melody if it were used for too long, since good judgment abhors excessive artifice as well as excessive simplicity. Since we are discussing the proportions of buildings, we shall be allowed to find, in brief, something connected to the proportion of the animated bodies created by ingenious nature with greater skill, with which the divisions of the genera have some correspondence, as I mentioned above. In fact, just as we can consider five parts of harmony, the first one being the tone of the Disjunction, the second one the first two intervals towards the low register in the Tetrachord, the third one the interval towards the high register, and since these two parts are repeated in two tetrachords, the total becomes of five parts, which can correspond to the parts of the animals in this way: we take the head instead of the tone of the Disjunction, as it is almost separate from the other parts through the lower intervals, in the first tetrachord we shall take the arms, and in the other one the legs, and for the two intervals of the high part of the tetrachords when shall take the two sections of the body, namely, the one above or breast, and the lower one or belly. This comparison seems to me to be all the more appropriate because the proportion of the head compared with the entire width of the body is in proportion of eight to nine or a little less, as one can see in the book written by Durero On the symmetry of the human body. [-<132>-] Moreover, since there are animals (I am referring only to the most perfect because one should not consider the Insects) that have arms or legs both in front and behind which correspond very closely to the size of the body, some smaller, some of larger proportion, although the head is often a little out of proportion, nevertheless we see that this variety of proportion is not unattractive, but, on the contrary, it constitutes a pleasant and admirable variety which should help us certainly to understand the greatness and omnipotence of who is the Author of everything, and prompt us to laude him and celebrate him continuously. Equally, the variety of these genera which is produced by the varied distribution of the tetrachords must not be judged out of proportion and useless, so that it would inspire us to demonstrate them in practice so that, by turning out to be as such as I believe that they will, they may invite us to celebrate with the most excellent melodies possible that ineffable power and that infinite goodness which has created men to His image and provided them with talent and intelligence to discover so many profound mysteries within music, not only as food for their mind and as entertainment of the soul detained in this prison of the body, but almost as a taster of what they shall enjoy when, freed from these worldly shackles, they shall understand high up in the sky that inexplicable Harmony of that most simple music divided into three, which is the true source and origin of every goodness and

knowledge.

[<133>-] On some correspondence between the three genera and human nature and others mentioned by Ptolemy chapter

Other comparisons have been made and can be made with the three musical genera, either to demonstrate better their nature, for mere intellectual curiosity and erudition. However, I like very much to compare them with the three parts of our soul, namely the Vegetative, the Sensitive and the Reasonable, because, just as these same three are three different types of soul and they are found individually in the Plants, in the animals, in man, and they are also part of a single soul, albeit many have believed them to be separate, since the vegetative is part of the soul of the Beasts (although it is not given to know how this part should be understood) and the vegetative and sensitive part are part of the human soul, thus these three genera are found or can be found individually, as we have seen, or united together in twos or all three. Equally, just as the sensitive part is more noble and perfect than the vegetative and the Reasonable part is more noble and perfect than the sensitive part, thus the Chromatic genus is more noble and perfect than the Diatonic, and the Enharmonic is more noble and perfect than both of them, with this convenience, that, just as the first soul cannot perfect the second because it is inferior to it, nor the second can perfect [<134>-] the third one, which it is also built on it, thus in case of the musical genera the Diatonic does not usually perfect the chromatic or the Enharmonic, nor the Chromatic perfects the Enharmonic, or the other way round, because, although one can add a Diatonic note to a Chromatic or Enharmonic tetrachord, nevertheless, after it has been added to it, it will be the origin of the Chromatic or of the Enharmonic. I wanted to distinguish this better to clarify what some say without thinking, namely that the Chromatic and the Enharmonic were never found pure. I also approve of the comparison between the three genera and the style of living, which are the Contemplative, the Working life and the Pleasurable life, as the Enharmonic corresponds to the first one, the Diatonic to the Working life, which is more flexible in any way and more common and apt to express the human actions, and the Chromatic to the third one, which is regarded also the softest and most effeminate. Moreover, it seems to me that this comparison is no less appropriate than the one used by Zarlino when he compares the chromatic to a varied life. However, Ptolemy considered only two types of life, namely, the Contemplative and the Active one, and he assigned three virtues to each: physics, mathematics and theology to contemplative life, and Morality, Economics and Politics to the active life. He assigned a genus to each of these three: the Enharmonic to the Natural and Moral virtue, the Diatonic to Theology and Politics, and the Chromatic to Mathematics and Economics. I will not stop to report what moved him to do so, but his comparison between the genera [<135>-] and the movements of the stars according to high and low, namely, 'according to depth', seems to me much more logical, just as he compares the progression of the notes in the System to the movement of the stars 'according to length', namely, from east to west and the size of the tones to the width of the stars towards the poles or towards the Ecliptic. However, it does not satisfy my intellectual curiosity to compare the high Sounds to the Meridian heights and the low ones to the oriental and occidental apparitions according to the reason that he quotes, namely, that the lowest Sound is akin to silence, since I am convinced instead that it is akin to the highest sounds, which are also called exiles, besides the fact that the higher and meridian heights represent the longest strings, which produce the lowest sounds, and the oriental and occidental the highest notes.

The comparison of the three genera with the three styles of speech, namely, Historic, Oratory and Poetic, seems to me to be much more measured and appropriate. I interpret the first one as a simple and unadorned style of speech which tells the facts as they were (but not in a completely uncouth and rustic manner as peasants speak) without rhetorical figures borrowed from the orators, and not like the Historical accounts produced with far-fetched and too learned words, in a poetical style, because these cannot be called pure and simple Histories, as we intend them to be, but like the Annals of the Pontifex Maximus of olden times mentioned by Cicero, or, like the Histories of Giovanni Villani in our language. We can compare to these the simple Diatonic pieces of music, which, I believe, have no other aim but to render festivities more solemn and entertain people, such as unadorned histories aim to preserve the memory of events. We can compare poetry, whose chief aim is to entertain, to Chromatic music (which [-<136>-] seems to have as principal scope the entertainment of the listeners) while the Enharmonic melodies will be able to be compared to the speeches of the orators, whose aim is to move the souls and to benefit the audience, since those melodies are considered the most able to move the feelings and lift the souls of the listeners above their mundane and mortal reality. Moreover, although it appears as if there is some disparity, since the Enharmonic does not mix as well with the other two genera as Rhetoric does with History and Poetry, and poetry does not mix as willingly with History and Rhetoric as the chromatic with the other two, nevertheless, if one considers carefully, this disparity does not exist because we can take any leap of a ditone and even larger intervals, apart from the soft ones which are similar to the Enharmonic Thick, as part of the Enharmonic, and the Generous and sonorous style which leads all those three genera of speech can be interpreted as poetic quality.

[-<137>-] On the Species of all three Genera.

After the explanation of the genera, good structure requires us to deal with the species, which were called [chroma] by the ancients, taking the term, as I believe, from the analogy between Music and painting, since they wanted to imply that this variety of more specific divisions, which is what we call species, is nothing but varied colours which diversify the three types of Harmonic colour, namely, the Melody or Melopeia, which is the singing itself realised with the voice, or the art of producing it with the voice or with the Instruments. Therefore, the ancients considered, either because they recognised a certain variety of intervals in the natural diatonic melodies, or because they observed that the interval of the fourth could be divided in different ways, that, if such a division was made, the variety and the attractive qualities of music were enhanced greatly, and for this reason they investigated different types of Division, to each of whom then they attached its name. So, since two were the main schools of music, namely the one of the Harmonics, followers of Aristoxenus, and the one of the Canonics, followers of Pythagoras, they progressed through different roads with different methods. In fact, the Harmonics, being more concerned with the ease and facility of playing, without [-<138>-] concerning themselves with mathematical detail, they availed themselves of certain equal and imaginary particles, instead of using numbers, with which they divided the tetrachords, starting from the division of a quarter of the tone up to twenty-four particles, which are equivalent to sex tones, which, they said, composed the octave. This happens if the Tones are made equal and if the numbers contained between the extremes of the octave are measured with geometrical proportions, as Zarlino teaches. The followers of Aristoxenus said that the

octave contained six tones, and, consequently, twelve semitones, three major thirds and four minor ones, although no mention is made of these. Starting with one diesis, which was considered and is, in truth, the first interval which is possible to sing or play, they placed one of them for each of the first two intervals of the Enharmonic, and they assigned to the third one the interval of eight dieses, namely two major thirds, counting always ten of them in each tetrachord. Then, they composed the first chromatic species, which they called soft chromatic, as it approached the Enharmonic and had the intervals just a little less close together. They assigned an Enharmonic diesis to the first two intervals, and a tone each, calling them chromatic soft Diesis. Consequently, they left seven and $\frac{1}{3}$ diesis to the third interval. However, before I move on, this has to be understood well, so that one may not believe that there is a contradiction in saying that the enharmonic Diesis is the smallest interval which one can sing, and that it measures all the Harmonic intervals, according to Aristoxenus and the practical writers on music, and in saying now that this diesis [-<139>-] is divided by assigning one and $\frac{1}{2}$ of it to the intervals of the soft Chromatic, because, although the Enharmonic Diesis is impossible to divide in actuality and as far as singing and playing is concerned, because if two notes or Sounds produce that interval, no difference shall be perceived or not enough to be applied in practice in the melodies, nevertheless it is not impossible to divide it in potency and according also to its physical nature, as every continued quantity can be divided into infinite parts. Therefore, the interval of an Enharmonic diesis can be increased by a third or by a half and a third actual part of this Excess just with the imagination and with the tightening or relaxing of the voice, and, equally, by tensing or relaxing the strings. Aristoxenus explained it in this way. According to Ptolemy, he imagines that the whole interval of the fourth contains sixty particles (or thirty, according to Cleonides, who gives always the numbers divided by half). If six of these are assigned to each of the first two enharmonic intervals, which constitute a semitone, understood to be composed of twelve particles, forty-eight are left as the third interval of the Ditone. Then, in the Soft Chromatic, he assigns eight of these particles to each of the first two intervals. Thus, he denotes one and a half Enharmonic dieses, while forty-four are left for the third interval which is smaller than a ditone. Moving on to the third species, called by him Hemiolic Chromatic, which in Latin means sesquialtero, because a diesis of this species contains a whole Enharmonic diesis and a third of it (and for this reason he could have called the first chromatic Equarto or Sesquiterzo) he assigns nine dieses, particles or units to each of them, hence forty-two are left for the third interval, which lays between a minor third and a major third of this species [-<140>-] half way between the soft Chromatic and the Tonianus which follows. He called it in this way because its first two intervals add up to a whole Tone, since each of them equals a semitone of twelve units, which are the fifth part of sixty, since that number contains the semitone five times. Fifty units or particles are left for the third interval which approaches the size of an exact minor third, and, consequently, this chromatic approaches the one which is played, or rather that could be played with better results, on the lute and on the viol, which are two Instruments which correspond to the Division of Aristoxenus, as modern writers point out. Aristoxenus puts the soft Diatonic in fourth place, which is half-way between the Soft Chromatic and the Syntonic Diatonic. He assigns twelve particles to the first interval, or a Semitone, eighteen particles to the second one, or three quarters of a tone, and thirty particles to the third one which equals the sum of those two and constitutes five dieses, which is an interval halfway between an equal tone and a minor third of the lute. This species was called Soft because it approaches the chromatic very closely and has something

of the soft and delicate. Therefore, the last of the five species, the second of the Diatonic and the one which I call Syntonic Diatonic were used very widely because they have intervals which are more tense and equal among each other. They assign twelve units or a Semitone to the first interval of them, twenty-four to the second, which is a tone, and another tone to the third, so that they reach the number of sixty units. This division corresponds to the species which is used in the lute and the viol which everybody uses, which is the easiest and common of all of them. [However, although Tiard believed that this name of hemiolic was more suited to the Chromatic, because the three semitone uncompounded are in hemiolic proportion with the two dieses, nevertheless, since Aristoxenus, who could do as he wanted, did not consider this but the proportion of the diesis of a species to the one of another, it does not befall us to reprehend him. in marg.] [Thus Aristoxenus, as Ptolemy says at chapter 12 of the first book, came to divide the Tone into two, three and eight equal parts. in marg.] However, two details are worth noting: [-<141>-] the first one is that, although the voice cannot progress with dieses a long way, as also Aristoxenus admits where he says

, namely, it is not as if it cannot do it at least for two or three dieses in succession, which is enough as far as the Enharmonic Melodies are concerned, as we shall demonstrate in practice. In fact, although a learned man contemporary of ours maintains that one could progress also through smaller intervals if one became accustomed to it as a child, nevertheless I state resolutely that this would be useless, because an interval smaller than the ancient diesis would not produce a good result and the ear would be able to distinguish it with difficulty, nor the examples which he provides, one of the intervals of the spoken voices and of the lowering of some notes in *l'elonggiare* will be suited to its purpose, because the intervals which one produces when speaking are larger than they think because of their accents, and they consist more in the continuous voice and not divided into intervals, which is the only melodic and musical one, as Aristoxenus says at the beginning of the first book, and Aristides and the others after him. Equally, that lowering of the notes which some produce in their singing, because of weakness or laziness, are continuous sound (as the Sound of a bell) and not divided into intervals, and, consequently, they are alien to singing and they do not express Enharmonic Intervals. The other point that scholars must bear in mind occurs when Cleonides says that the tone is divided into twelve very smaller particles [*eis dodeka tina elakhista moria*] and in a proportionate manner, he never meant that particles are divided with the voice, but only through the imagination, which occurs when thirty or sixty are assigned to the fourth and to its parts proportionally. In fact, it would be naive to believe [-<142>-] otherwise. As to the mistake made by Patritio, who believed that the notes, rather than the intervals, were divided with these particles, it is so enormous that it did not merit that Bottrigari wasted so many words to reprehend him. Therefore, one sees that, albeit Patricio was a man of great intellect, nevertheless he lacked judgment and perhaps he was similar to that Asclepiodotus described by Damascius quoted by Photius, albeit, while Asclepiodotus could never arrive to understand the orphic chaldean Mysteries, Patricio believed to have understood them completely with the collection that he put together. There must have been other divisions made by Aristoxenus' followers at the time of Ptolemy, judging from what he says at chapter twelve, but, since the memory of this has been lost, it is not worth speculating any further. However, let us come now to the Tables of the three genera according to Aristoxenus, which I thought that it was right to provide

before the others because they are more ancient, in order to point out the differences between these two Schools. We shall start from the Diatonic and we shall consider all the Colours and species drawn up by Aristoxenus.

[Doni, On the Genera and the Modes, 142; text: Diatonico Sintono [[d'Aristosseno]] Prima Specie, a, G, F, E, 24, 12, Seconda, Molle, A 30, 18, Spezie Cromatiche, Cromatico Tonico, 36, Hemiolio, 32, 9, Terza, 34, 8, Enarmonico, 48, 6]

[<145>-] These are the different divisions of the genera according to the doctrine and method of Aristoxenus and of the other Harmonics, who had almost no other aim but to facilitate the practice of music by building intervals which are easily to understand and to form that variety of colours which proves sufficient to diversify any sort of melody. However, the Canonics were not happy with this but they wanted, besides this, that the intervals should be constituted by rational numbers, and not only by rational numbers, but as much as possible of multiplex and superparticular proportion, which they believed to be more perfect than the superpartienti, paying great attention to this and insuring that the ear would not contrast this or not worrying too much if it did, because most of them were more concerned with theory than practice. Nevertheless, one has to believe that they tried out the proportions on the canon and on the monochord and that they had investigated them Arithmetically. However, as I shall show further on, despite this many of their divisions are more useful and suited to practice than some of the ones of Aristoxenus. However, to avoid a plethora of Divisions, it will be appropriate first of all that first of all we execute the Diatonic Divisions and species, then the Chromatic ones, and finally the Enharmonic, placing first the ones which are ascribed to the most ancient authors. Therefore, we must put first the Diatonic Ditoneus, called thus because it contains two entire and larger tones, which as called wrongly, because of a textual mistake, by Zarlino and others [<146>-] Diatonico Diatono, which sounds the same, although the adjective [diatonikos] in Greek and Diatonicus in Latin is more simple and more usual. In the most ancient times they used to sing in this species either exact or with the addition of some variant, as it is used nowadays, as I deem more possible that Pythagoras and the other more ancient philosophers speculated and as Boethius, Fabro and the other modern Pythagoreans theorise. I will use Zarlino's rather than Galilei's numbers because those are radical, smaller, and therefore easier to understand and practice in the Harmonic Rule.

[Doni, On the Genera and the Modes, 146; text: prima specie, Specie Diatoniche Diatonico, a, G, F, E, 192, 216, 243, 256, 9/8, sesquiottava, supertredicesimartiente243]

The second species was laid out by Archytas of Tarentum, a very noble philosopher, mathematician and a great expert in all the good arts, who lived

[<147>-] [Doni, On the Genera and the Modes, 147; text: Diatonico [[Dia]] Toniéo, seconda specie, 168, 189. 216. 224. a, G, F, E, 9/8 sesquiottava, 8/7 sesquissettima, 26/27 sesquientisettesima]

[[terza specie Diatonico di Didimo]]

The third species follows in sequence after the one of Didymus, because its proportions were established by him. This species contains the same intervals as the one by Ptolemy, but in this one the larger tone comes first and then the smaller, while the opposite occurs in the other one. Therefore, since there are more consonances within the octave in this one by Ptolemy, because the two smaller tones are laid better with the three larger one, it was accepted universally. Didymus hailed from Alexandria. I do not know if he was a professional musician or if one has to believe that he is that Grammarian nicknamed [chalkenteros], which translates as ‘with an intestine made of brass’ because of the immense effort which he put into writing an infinite number of books. Suffice it to say that he hailed from Alexandria, in Egypt, where the good arts and sciences flourished for many centuries more than elsewhere in the world, and where there was a very large number of excellent books, although that very famous library, assembled by the Ptolemies with every care, was burned down during the siege waged by Julius Caesar. However, although this was an incalculable loss for the humanities, nevertheless one can believe that copies of the most part of the works of those authors survived, since there was an abundance of copies then which is at odds with our modern practice.

As far as the record which we have [-<148>-] in Ptolemy’s book, this Didymus was described as very skilled in the Canon. In Porphyry’s commentary there is a list of several of works on music, that time, which devours everything, has taken away from us, and among them Porphyry names one by Didymus.

Therefore, the distribution of his Diatonic is this one. As one can see, both of its thirds, major and minor, are consonant.

[Doni, On the Genera and the Modes, 148; text: Diatonico di Didimo, terza spezie 5/4, 6/5, a, G, F E, 24, 27, 30, 32, 9/8 Tuono maggiore, 10/9, Tuono minore, 16/15, Semituono maggiore]

The fourth species is Ptolemy’s one and it is only materially, rather than formally, different from the one of Didymus, but it is so much more perfect that Galilei should not have accused him of having ascribed it to himself as his own, as there is no evidence that he had any intention of stealing it from him, as Galilei imagines, nor this sort of scruples had its place among the ancient philosophers. In this division, there are also minor and major thirds. He calls it Syntonic because its intervals are more tense and equal than in the other species. However, I want to warn you that it appears that it was used by the ancients more than Ptolemy’s one. This can be inferred from what I observe in the second book with regard to the Disjunct and conjunct Tetrachords, in my [-<149>-] observations on the universal Diagram of the fifteen Modes. I believe this to be the case also because, although this distribution is more lacking in consonances, nevertheless, since they used only a few, they did not pay great importance to this but they were more intent in refining the pleasant character of the intervals. Didymus’ distribution is more suited to this effect, as I demonstrate to you, since he had been a very important musician not only in the field of Theory, but also in practice, as Suida states with these precise words: [Didymos ho tou Erakleidou; grammatikos; hos dietripse para' Neroni kai ekhrematisato; mousikos te oun lian kai pros mele epitedeios]. This is their translation: “Didymus, son of the Grammarian Heraclides – to distinguish from others mentioned by him – lived at the

court of Nero and was famous. He was an excellent musician and was very able in composing melodies.” Therefore, we can suppose that, since he had been employed by a prince who was a great patron of music and of its practitioners, since he was eminent not only in music making but also (as Ptolemy himself admitted by stating that he [-<150>-] improved greatly the use of the Monochord) in the field of Music Theory, and since he had composed, as Porphyry mentions many works on Music, it is reasonable to believe that he was very highly regarded by the musicians of his time, and that his division was used more widely by the ancients, aside from the fact that it means a lot that he was more highly regarded than others were.

[-<151>-] [Doni, On the Genera and the Modes, 151, 1; text: quarta Specie, Diatonico Sintono di Tolomeo, 5/4, 6/5, 36, 40, 45, 48, a, G, F, E, 10/9 Tuono minore, 9/19 Tuono maggiore, 16/15 Semituono maggiore]

Ptolemy himself established another species, which is recognised as his own invention and that he called [diatonon homalon] or equitable Diatonic, because its intervals grow equally by a unit, since the first one lays in the sesquiundecima proportion, the second in the sesquidecima and the third one in the sesquinona, and, since the Tone of the disjunction, which follows, lays is sesquiottavo, one can see that all of the four intervals proceed with equal and beautiful order.

[Doni, On the Genera and the Modes, 151, 2; text: quinta Specie, Diatonico Equabile di Tolomeo, 9, 10, 11, 12, a, G, E, F, Tuono minore, sesquidecima, sesquiundecima]

[-<152>-] There follows the soft Diatonic, called in this way because it approaches the Chromatic of Ptolemy himself, which consists in these proportions and has no consonant thirds, as it happens in the previous one as well.

[Doni, On the Genera and the Modes, 152; text: sesta Specie, Diatonico molle di Tolomeo, 63, 72, 80, 84, a, G, F, E, sesquissettima, [[Tuono]] sesquinona Tuono minore sesquiennesima]

One has to know that, although Ptolemy himself knew well that Aristoxenus did not measure the intervals of his tetrachords with the proportions of the notes, nevertheless, where he placed the Table of those Divisions, namely, at chapter fourteen of the second book, he used numbers, and he placed, instead of two equal intervals (where they are usually), which, according to his method, cannot be found, two very close ones, which are the one deriving from the doubling of both the numbers of the proportion, placing them in order and from taking them, as Zarlino demonstrates, with their radical and last numbers. For this reason I deemed useful to report myself these divisions of Aristoxenus according to Ptolemy’s method, which changes them from uncertain and irrational proportions in their numbers to other proportions, which are certain and close to them, by dividing them Geometrically, although they are not superparticular, as Ptolemy wants them to be. Therefore, they are changed a little.

[-<153>-] [Doni, On the Genera and the Modes, 153, 1; text: Diatonico molle

d'Aristosseno secondo Tolomeo, 15, 17, 19, 20, a, G, F, E, superbipartiente 15, superbipartiente 17, sesquidecima nona]

Nevertheless, Galilei demonstrated this division with other larger numbers, whose differences correspond to those particles with which Aristoxenus measured the intervals, believing that the learned Aristoxenus used those numbers, as Zarlino noted:

[Doni, On the Genera and the Modes, 153, 2; text: 90, 102, 114, 120, a, G, F, E, Differentia 24, 12].

The Soft Diatonic of Aristoxenus, distributed according to Ptolemy's method, is represented here below, according to Zarlino's number which are the radical ones:

[Doni, On the Genera and the Modes, 153, 3; text: 30, 35, 38, 40, a, G, F, E, sesquisepta, superpartiente 35, sesquidecimanona].

[<154>] and according to Gallilei, with the number which exceed one another by the aforesaid amounts:

[Doni, On the Genera and the Modes, 154; text: 90, 105, 114, 120, a, G, F, E, differentia, 30, 18, 12].

On the method used by Ptolemy to realise his Division, and whether others may be found Chapter

All of the Harmonic intervals can be divided by doubling the Divisor and the denominator, and among the terms of the number produced there will be other intervals which shall divide the one placed among the extremes. In fact, if one and the other number, namely the Divisor and the Denominator, differ just by the unit, if they are doubled, they will show two intervals, once it is taken away, in which the next division shall be based.

For instance, in order to divide the Dupla, which represents the octave, I multiply both numbers and I obtain 4/2. Now, between these numbers there's only the number three, which represents two proportions, the sesquialtera between 3 and 2, which represents the fourth, and the sesquiterza, which represents the fifth. Therefore, one can see that the closest division of the octave is done into a fifth and a fourth, and since the dupla is in its radical numbers it cannot be divided in any other way. Equally, as to the sesquialtera, [155] if we want to divide it, we shall find that it results into two intervals which divided immediately into a major and minor third, into which it is resolved because the doubling of 3 and 2 produces 6 and 4. The number 5 is contained within them, so that between 6 and 5 there is the sesquiquinta proportion which represents the semiditone or minor third, and the sesquiquarta between 5 and 4, which represents the ditone or major third. However, if we double the 5 and the 3, which represent the sixth, the result is 10 and 6, between which more than one number are contained, because they are not prime numbers with each other. They are 9, 8 and 7. I order them in this way, 10, 9, 8, 7, 6, and I show that said interval

contains a smaller tone between 10 and 9, a larger one between 9 and 8, a sesquissettima between 8 and 7 and a sesquisesta between 7 and 6. Moreover, since to say $8/6$ is the same as saying $4/3$, which is a sesquiterza, and $10/8$ is the same as $5/4$, which is a sesquiquarta, I demonstrate equally that a major sixth contains a fourth and a major third, and that a Sesquipartientequinta contains a sesquiterza and a sesquiquarta. Since all the Harmonic Intervals are contained in this way, it is clear that who wants to divide the tetrachords in different ways has to divide the sesquiterza, which represents the Diatessaron, and that he has to find three intervals which are able to be sung and to produce a good Harmony. However, since 4 and 3 are prime numbers between each other, if one doubles them they shall produce a single number and two intervals. Therefore, since three intervals are needed, it is necessary to double the numbers again or to triple them. In fact, by doubling the numbers 4 and 3 one obtains 8 and 6, and if I place the in order in this way, 8, 7, 6, I demonstrate only the division of the sesquiterza into a sesquissettima and a sesquisesta. Therefore, if I want to use the first interval and divide the other, I double 7 and 6, which produce 14 and 16, [-<156>-] namely, 16, 15, 14, which contain a sesquidecima, which represents the larger Semitone, and the decimaquarta, which is a rather larger interval. In this way, a division of the tetrachord is realised which will show a species of melody with this order, placing the largest interval in the high register, as it is customary:

[Doni, De generi de modi, 156; text: a G F E sesquissettima, sesquidecimaquarta [sesquiqui ante corr.] sesquidecimaquinta].

Since the first two intervals create a sesquisesta, which is larger than a sesquissettima, this division cannot be Chromatic and even less can it be Enharmonic. Therefore, it shall be Diatonic, and it will be the form which was called soft because it approaches the Chromatic. This is the method used by Ptolemy in dividing the sesquiterza. Moreover, he required that the intervals produced should be superparticular or they were rejected, since he did not believe that they were suited to a division which was perfect and truly harmonic and which accepted the most pure and simple consonances. Therefore the Pythagoreans refused all the consonances which were not represented by multiplex or superparticular or participate proportions, rejecting, apart from these two, also all the ones which are not contained in the number Six and those that move away from being pure and simple. However, since he favoured more the ear than reason, and practice more than Theory, I believe that he refused that superpartienti proportions because they produced intervals which were less beautiful and less suited to be sung or played. In fact, the more something is simple and well structured, the more it can be understood by the ear, the imagination and the senses. Therefore, this is why we see that the Sixth are difficult to pitch, namely, because they are of superpartiente proportion. [-<157>-] However, since some may argue that not only they are [emmeleis], but also consonances, which is much more, and, consequently, that they had to be intervals more perfect and able to be sung or played, I state that this does not matter, because their being consonances is accidental to them, since they are composed in truth of a fourth and a major or minor third. Going back to Ptolemy, I state that is clear that he divided the $4/3$ into two intervals in the only three ways which appear to be useful, by doubling, trebling and quadrupling its numbers which produce a sesquisesta and a sesquissettima, a sesquiquinta and a sesquiquarta, a sesquiquarta and a sesquiquinta, and assigning the higher places of the Tetrachords to the larger intervals in the thick genera. Equally, he divided the smaller intervals into

two superparticular intervals in a very ingenious way of his own discovery. In fact, trebling the radical numbers and rejecting the product of the two middle ones, which is not superparticular with both of the extremes, and taking the other one which is superparticular in the said way, he places the largest interval in the middle space and the smaller in the first one and lower. Consequently, in the first division of the $\frac{4}{3}$ which is made quadrupling the numbers, the result is a $\frac{5}{4}$ and a $\frac{16}{15}$. Therefore, if one places $\frac{5}{4}$ as the higher interval and trebles the numbers $\frac{16}{15}$, the result is 45 and 48. The 47, among the ones in between, is discarded because it is not superparticular to 45 and the 46, which is in superparticular proportion with both the extremes, is taken on. Then, he divides that interval into a sesqui²³ from 48 to 46, and he assigns to it the middle interval and a sesquiquarantacinquesima, which is placed in the lowest part. Thus, he establishes the Enharmonic [-<158>-] in this minimal numbers 276, 345 and 360. Then, following the second method, he takes the numbers 27 and 30, he discards the 29 and selects the 28 for the reason mentioned above, he divides the sesquinona into a sesqui¹⁴ and into a sesqui²⁷, and, placed the larger in the middle space and the smaller one in the first one, he constitutes the Soft Chromatic in these numbers 108, 126, 138, 140. Then, following the third method, placed the sesquisesta in the highest place and trebling the numbers of the sesquissettima 7 and 8, from which 21 and 24 derive, discarded 23 and taken 22 for the same reason, he divides them into a sesquiundecima and sesquivigesima. He places the larger of those intervals in the middle and the smaller one in the first and lowest, and he creates the Syntonic Chromatic, contained within these numbers 66. 77. 84. [[88.]] However, in the Diatonic genus not often he does the opposite because he places the smallest of the two intervals in the high place and the larger. Multiplying its numbers, he divides it into two of which he places the larger in the middle and the smaller in the lowest place. Therefore, placed its sesquidecimaquinta in the highest place and trebled the numbers of the sesquiquarta 4 and 5, from which 12 and 15, he rejects 13 and accepts 14. He divides it into a sesquidecima and a sesquidecimaquarta, each of which is larger than the sesquidecimaquinta. Therefore, he could not create a Diatonic Division with these numbers and avoid that a smaller proportion were placed in the highest place, which is something that was avoided by all the ancients. Ptolemy then abandoned that division, took the sesquisesta and the sesquiquinta, placed the smaller one in the highest place, trebled the numbers of the sesquiquinta 5 and 6, which makes 15 and 18, [-<159>-] he rejects 17 and took 17, he divides it into a sesquiottava and a sesquissettima. He placed these intervals in the lowest space and established the Syntonic Diatonic in the second place with these numbers 72, 80, 90, 96. Then, he took the sesqui⁷, he placed it in the highest place and he trebled the numbers of the Sesqui⁶ 6 and 7, from which 18 and 21 derive. He rejected 19 and took 20, divided it into a sesqui⁹ and a sesqui²¹, he placed one in the middle and the other in the low position and created the soft Diatonic in these numbers 63, 72, 80 and 84. Moreover he created the Diatonic Tonianus, which he called middle, with the sesquiottava placed in the high place, the sesquissettima in the middle and the sesqui²⁷ in the low place with these numbers 168, 189, 216, 224. Moreover, he accepted the Diatonic Diatonaeus of two sesquiottave and a Comma, not because there is little difference between the Sesqui⁸ and the Sesquinona and between the sesquidecimaquinta and the Comma, as Salinas says, but because he did not want to disregard it, since, as we will show, as it was used in his time, it turns out to be useful for the mutations, as we shall see in the practical part. Finally, he established the equitable Diatonic by dividing the sesquiquarta in the __ way by trebling the numbers arithmetically and using these 9, 10, 11, 12. Archytas must have followed the

same method or a not very different one in dividing his tetrachords. Now that we have examined this, one may wonder if nowadays we can find other forms and divisions of these which may be used in practice, and of the others which shall be placed in the two other genera. Personally, to speak freely, I believe that the places found are the best ones that have been found, and that one may not find divisions more suited to harmony than these. Nevertheless, I would also believe that one may find some other ones which are not completely useless and that may be used to produce some variety in Music. For instance, one may divide a fourth into a $27/25$, which is a larger Semitone with and added comma and into two smaller tones, in this way:

[<160>-] [Doni, De generi de modi, 163; text: a G F E Sesquinona Tuono minore].

As we shall demonstrate in the Practical section, this division would turn out to be useful in some mixtures to produce the mutations, because the smaller tone is very useful to the most perfect form of the Chromatic, which is the Syntonic, which divides it into two Semitones, one larger and one smaller and has two consonant thirds. Moreover, this Division would have a larger third in every octave and, consequently, a consonant minor sixth, which does not occur in the two species Diatonic Toniae and Diatonia although they used very frequently and . It would also have the advantage that a Chromatic species could be created from it by dividing the first interval into a sesqui 25 or smaller semitone and into a compounded interval of the smallest diesis, which is the difference between the larger and smaller Semitone in these numbers, and of an added comma, or of a limma and of an interval of two commas taken in these numbers. Therefore, by adding a single note or interval to the Diatonic, one would be able to move to the Chromatic, which is a particularly attractive feature of the Diatonic Toniae, where the first interval of a sesqui 27 is common to all three of the genera. One could constitute also another Diatonic species by dividing the sesquisepta into a sesqui 13 and a sesqui 12 and by placing the remaining sesquissettima in the third place, while the sesqui 13 will be placed in the first one and the sesqui 12 in the second one. This would be a type of soft Diatonic, which should not be overlooked, [<161>-] in my opinion, even just to mix it with Ptolemy's Syntonic Chromatic, which is its opposite, since the positions of the sesquisepta and of the sesquissettima are placed in the opposite order, as one can see here:

[Doni, On the Genera and the Modes, 161, 1; text: Cromatico [Sintono add. supra lin.] [[di Tolo]] Tolomeo, $21/21$, $12/11$, $7/8$, $8/7$, Diatonico opposto, $14/13$, $13/12$, $8/7$ $7/6$].

For this reason, we wanted to place here its demonstration, because the first two intervals are at a small distance, which happens also in the Ptolemy's Equitable, and despite the fact that it does not have the consonant thirds, which are found in few divisions:

[Doni, On the Genera and the Modes, 161, 2; text: Diatonico molle nostro, a, G, F, E, sesquissettima, sesquiduodecima, sesquiterzadecima].

[<162>-] On the Chromatic Species

As we continue in our explanation, we shall demonstrate the Chromatic Species starting first from the most ancients. The first of them is the one reported by Boethius and of which we do not know the author. However, as far as I can judge, perhaps it was not used, because it seems to me more probable that the Chromatic was not used before Timotheus, and, since he was a very excellent musician, I am more inclined to believe that he used the Syntonic, which is more perfect, rather than this one. However this may be, this Species is the one that corresponds to the Diatonic Diatoniaeus. When the ancients created the Chromatic from it, they must have created this division:

[Doni, On the Genera and the Modes, 162; text: Cromatico antico posto da Boetio, a., G, F, 192, 228, 243, 256, Supertripartiente16. Trihemitonio, Super5partiente76, Super13partiente243 Limma].

Iacopo Fabro, learned Theorist and great follower of Boethius and of the Pythagoreans, placed the following one instead of this one as the ancient one, and, since the Limma is used in the Diatonic, thus the Apotome had to be placed in the Chromatic after the Limma, which forms the Tone with it. However, I believe that he was mistaken in this, because, as Gallilei notes very well, the Apotome was never applied to any System, since it was not found except as in the relationship between the disjunct tetrachord and the conjunct, namely between the [sqb] and the b in the Diatonic Diatoniaeus, just as in the Syntonic one finds this interval 135/125. Therefore, [-<163>-] consequently, it must not be placed as a specific interval of the Chromatic Tetrachord. Nevertheless, we shall provide this division as well, especially because it appears that Aristides confirms it. In fact, he says that the Apotome does not belong to the Diatonic, therefore he appears to allow it in the Chromatic.

[Doni, de generi e Modi, 163, 1; text: Cromatico antico secondo il fabro, a, F, E, 243, 256, Trihemitonio che contiene un Tuono minore et un Semituono [maggiore add. supra l.], Apotome, limma]

[[Cromatico di Archita Tarentino]]

Archytas' Tetrachord follows, in which, because it kept one interval the same, which is 28/27, in all three of the genera, he did not worry that about the fact that the intervals should be superparticular and formed of simple numbers.

[Doni, On the Genera and the Modes, 163, 2; text: [seconda Spezie add. in marg.], a, G, F, E, 189, 224, 243, 252, super 5 partiente 32, Super 19 partiente 243, [[Super]] Sesquientesima Settima]

Before I demonstrate the Division of Eratosthenes, who lived between Archytas and Didymus, it is appropriate to say something of his character. He was born in Cyrene and was one of the most learned men in all antiquity. He was a most profound philosopher, a very subtle Astrologer and Mathematician, a very diligent cosmographer and a most eloquent poet and historian. Hence, he was called 'the

smaller Plato' by many. He was a pupil of Ariston [-<164>-] of Chios, a famous philosopher and of Callimachus of Cyrene, who was a Grammarian and a very erudite poet, and he took care of the Library of Alexandria at the time of Ptolemy Philadelphus, who built it and of . He also theorised a lot about Music, and for this reason he is mentioned by Ptolemy, and his Divisions of the three genera are placed together with the others at chapter 14 of the second book. His Chromatic follows this sequence and, as Zarlino and Galilei note, it corresponds to the Soft of Aristoxenus, except for the fact that that one is produced by uncertain and irrational proportions, while this one has its intervals of rational and harmonic proportions. Nevertheless, they are very similar. Hence, one sees that both he and Didymus aimed to depart from Aristoxenus as little as possible. However, Ptolemy did not worry much about this, being further removed from those times and being more interested in pure theory than these two were.

[Doni, On the Genera and the Modes, 164; text: terza spezie, Cromatico d'Eratosthene Cireneo, a, G, E, F, 90, 112, 116, 120 super¹³partiente⁴⁵, sesquiientesima ottava [[sei]]sesquiientesima nona.]

We shall place the Aristoxenus' Chromatic Toniaeus, not as we placed it above, but according to the division produced by Ptolemy with the proportional numbers which divide an interval into two rational and almost equal ones, which, as we said above, is very suited to the lute and to the viol:

[-<165>-] [Doni, On the Genera and the Modes, 165, 1; text: Cromatico Tonieo d'Aristosseno secondo l'ordine di Tolomeo, 90, 108, 114, 120 sesquiquinta, sesuidecima ottava, sesquidecima nona].

Dydimus' Chromatic follows, which is the most beautiful and most suited to be used in practice of them all, [[and it is the one which is used with little differences in the harpsichord, albeit confused to the Diatonic, as I have mentioned above, and it has the first interval in common with its Diatonic]] [[a, G, F, E add. in marg.]] There follows the Hemiolic Chromatic of Aristoxenus according to Ptolemy distribution, who assigns to him rational intervals with the Harmonic numbers in this way:

[Doni, On the Genera and the Modes, 165, 2; text: Cromatico Hemiolio d'Aristosseno conforme l'ordine di Tolomeo, 90, 111, 115, 120, Super⁷ partiente 30, Superseipartiente 115, sesquiientesima terza].

Didymus' Chromatic follows this one. This is the most beautiful and most suited to be used in practice of them all. Moreover, it is the one which is used participated nowadays on the Harpsichord, albeit confused with the Diatonic, as I mentioned above, and it has the first interval in common with its Diatonic.

[-<166>-] [Doni, On the Genera and the Modes, 166, 1; text: quarta Spezie, Cromatico di Didimo Alessandrino, a, G, F, E, 60, 72, 75, 80, tuono minore, ditono, semiditono, Sesquiquinta. Terza minore, Sesquiientesima quarta Semitono minore,

Sesuidecima quinta Semitono maggiore]

Ptolemy's Syntonic follows after this one, which we were discussing above.

[Doni, On the Genera and the Modes, 166, 2; text: quinta Spezie, Cromatico Sintono di Tolomeo, a, G, F, F, 66, 77, 89, 88, sesquisesta, sesquiundecima, sesquiutesima]

[Sixth Species in marg.] However, the Soft Chromatic itself is contained within these numbers and proportions, as we were saying. This has the consonant minor second and the first interval in common with Archytas' division:

[Doni, On the Genera and the Modes, 166, 3; text: Cromatico Molle di Tolomeo a, G, F, E, 105, 126, 135, 14, Sesquiquinta. terza minore, Sesquiquartadecima, Sesquiutesima Settima].

[-<167>-] On other species of the Chromatic chapter

It is possible to constitute and put into practice other types of Chromatic, if one had the skill to do it, in imitation of the ancient ones, since perhaps they would not turn out to be useless and unpleasant. For instance, one might place those first two intervals of Dydimus in the opposite order, namely the smaller Semitone in the first place and the larger in the second. This would prove useful in the mixed genera, as we shall see, and in practice it would render the harmony softer and more cheerful, and thus one would avoid exceeding the boundaries set by the ancient, as Colonna in his *Sambuca Lincea* did, where he would like that soft should be understood as Therefore we shall be able to call this tetrachord, which is built in this way, Chromatic.

[Doni, On the Genera and the Modes, 167; text: Cromatico di Didimo al rouescio, a, G, F, E, terza minore, Semituono maggiore, Semituono minore]

[-<168>-] Similarly, if we want to place the other intervals straight after the smaller semitone placed in the first position, we shall be able to divide it in this way, as we can see here, where the last one is a minor third increased by a comma, and, consequently, the middle one is reduced by the same amount, hence it turns out to be a limma:

[Doni, de' generi de Modi, 168, 1; text: Altro Cromatico, a, G, F, E, 243/200 terza minore [[di]] acresciuta d'un Comma, 256/243 limma, 25/24 Semituono minore].

One may also use this one, where a larger tone is divided into two Semitones, a larger one from a la mi re to b fa and a middle-sized one, as from b fa to [sqb], which is a smaller Semitone augmented by a comma, as Zarlino demonstrated learnedly, so that the third interval is the which amounts to a Semiditone reduced by a comma and dissonant:

[Doni, On the Genera and the Modes, 168, 2; text: Altro Cromatico, a, G, F, E, 27/25 terza minore con un comma meno, 135/128 Semituono mezzano, 16/15 Semituono maggiore].

One can vary this division otherwise by placing the smaller Semitone in the first place, the larger enlarged by a comma in the second and a minor third in the third one reduced by the same amount, thus:

[[Doni, On the Genera and the Modes, 168, 3; text: a, G, F, F, 27/25, 25/24] in marg.]

[-<169>-] However, the following one, which resembles the ancient and can be used comfortably by mixing it with Didymus' Chromatic and to produce a mutation from one into the other, seems to be much more useful to us:

[Doni, On the Genera and the Modes, 169, 1; text: Altro Cromatico, a, G, F, E, 6/5 Sesquiquinta, 135/128 Semituono mezzano, 256/243 limma].

We also believe that another species, similar to the Aristoxenus' soft Chromatic according to Ptolemy, except that that one divides the Sesquissettima into two different intervals, and this divides into two intervals which are not very different from each other, namely, a sesquidecimaquinta and a sesquidecimaquarta, and he places the sesquisesta in the third place, as it is here:

[Doni, On the Genera and the Modes, 169, 2; text: Altro Cromatico, Sesquisesta, Sesquidecimaquinta o Semituono maggiore, Sesquidecimaquarta Semituono maggiore accresciuto, 8/7 Sesquissettima].

[-<170>-] These are some other species of Chromatic which we have recognised as possible to use in practice without much effort, if we do not worry about achieving a large number of consonances, following the example of the ancients, without employing too much effort in it, because we have a sufficient amount of divisions. I am sure, however, that the fourth manner could be very useful because of what we mentioned, as we shall demonstrate more fully. Therefore, let us move on to the different distributions of the Enharmonic Genus.

On the Divisions of the Enharmonic chapter

As we stated above, no good author introduced more than a single division of the Enharmonic, but, since every one of them started and finished differently, it appears that it was distributed in different forms. They place the old one first of all, namely, the one that, they maintain, was invented by Olympus, albeit we showed above with the authority of Aristoxenus and Plutarch that Olympus' Enharmonic in this form was rather more similar to the soft Diatonic. However, these founded this Enharmonic that they call ancient in the Diatonic Diatoniaeus and they left undivided the ancient dissonant placed in the numbers between 8 and 64 as its third interval. They divide the

limma to produce two dieses in the proportions that one can see here:

[<171>-] [Doni, On the Genera and the Modes, 171, 1; text: Enarmonico antico fondato nel Diatono Diatonico, a, G, F, E, 384, 486, 499, 512, [[Ses]] Super Due Tuoni maggiori, Super13partiente 486. Diesi. Super13partiente499. Diesi].

We shall place in the second place the one of Archytas, which is the best distributed and most practicable of them all. Ptolemy and his followers must be content with this, as it is not surprising, since this genus was still practised at the time of Archytas. Its major thirds are consonant, and one must be aware of a printing error in the Zarlino's text, because one finds written sesquivesimiquinta instead of Sesquitrentesimiquinta in the second place.

[Doni, On the Genera and the Modes, 171, 2; text: Enarmonio d'Archita, 108, 112, sesquiquarta. Terza maggiore, Sesquitrentesima [Sesquientesima ante corr.] quinta, Sesquientesima settima]

Next, there follows Eratosthenes' Enharmonic, which is the same or the equivalent to the one of Aristoxenus. One must note that there is another mistake in Zarlino's text, because one finds written Sesquitrentesima ottava instead of Sesquitrentesima nona.

[<172>-] [Doni, On the Genera and the Modes, 172, 1; text: Enarmonico d'Eratostene, a, G, F, E, 90, 114, 117, 120, Supertripartiente 15, sesquitrentesimi [sesquient ante corr.] ottava, sesquitrentesima nona.]

Didymus' division comes after this one. Didymus used the same method consisting in making the two dieses equivalent to two identical ones, albeit Ptolemy says that he did not divide the sesquidecimoquinto interval, but that, had he divided it according to his principles he would have done it in this way. Therefore, it cannot be said that he produced the division of the Enharmonic, perhaps because it was no longer in use in his time.

[Doni, de' generi de Modi, 172, 2; text :Enarmonico di Didimo, a, G, F, E, 24, 30, 31, 32, sesquiquarta, sesquitrentesima, sesquitrentesima prima].

I warned the scholars that Gallilei, in Ptolemy's Enharmonic, puts a super23partiente90 in the last interval between 345 and 276, which is a mistake, since there must be a sesquiquarta. This [<173>-] was noted by Zarlino as well, although it seems to me that there is an error in Zarlino's text as well. In fact he states that said interval produced a larger interval with the Sesquivesimaterza placed in the second place than the Sesquidecimoquinta, which must contain the first two intervals, but this is absurd.

[Doni, On the Genera and the Modes, 173, 1; text: Enarmonio di Tolomeo, a, G, F, E, 276, 345, 360, 368, Sesquiquarta, Sesquientesima terza, Sesquientesima quinta]

The author of this division is not known, albeit since it has been reported by Zarlino and by Galileo I did not want to leave it out. It seems to me that it is not very useful because its first interval is so small that it can produce any barely audible difference.

[Doni, de' generi de Modi, 173, 2; text: Enarmonio d'Incerto, 924, 1155, 1210, 1332, Sesquiquarta, Sesquientesima prima, Sesquicinquantesimaquinta]

Zarlino and Salinas place a division of the Enharmonic as the last one, which has the difference between the larger and the smaller Semitone as its second interval, [-<174>-] contained in these numbers 384/375, which is the smallest Diesis. This interval, since it is so small that it can be pitched with great difficulty, can be used to perfect the Diatonic and the Chromatic, as one does on the Harpsichord rather than to modulate this genus:

[Doni, On the Genera and the Modes, 174, 1; text: Enarmonio Moderno, 300, 374, 384, 400, Sesquiquarta, Super partiente Diesi minima Sesquientesima quarta Semituono minore]

Finally, we shall report a Division where the first two dieses are considerably larger and more audible than the one which form the larger Semitone, because they are part of the larger Semitone enlarged by the comma, which, consequently, is lacking in the last interval, which, therefore is left as a Dissonant ditone composed of two smaller tones:

[Doni, De generi de modi, 174, 2; text: Altro Enarmonio, 100/81, 26/25, 27/26, Ditono composto di due tuoni minori, Sesquientesima quinta, Sesquientesima sesta]

[-<175>-] Whether the Ptolemy's Syntonic Diatonic has to be called natural instead of the other Species and which is the one derived nowadays chapter

No contest was more famous in this century perhaps than the one which arose between Gallilei and Zarlino as to choosing among the aforesaid Species the one which musicians and singers are used to play and sing nowadays, in which they were transported by such animosity and ardour that it is easy to know that Gallilei wrote that Dialogo della musica antica e moderna of his with no other aim than to obliterate Zarlino's opinion and that Zarlino set himself to compose his Supplementi musicali in his later years with no other scope than to answer resentfully, as he does, to the arguments and censorship of Gallilei and justify himself in front of the world. We must be grateful that this disagreement took place between them on this matter, as one and the other wrote works of good size and replete with varied doctrine, as they were both learned and ingenious and they were helped, when necessary, by the work of their friends, as, without this disagreement, this subject would not be subject to such great interest. Moreover, although I do not expect to interject my judgment in a question so important and to pacify two men so great and such famous Musicians, nevertheless, since discussing and writing with excessive passion make it such that great men go too far, [-<176>-] I have decided to consider this topic, to satisfy the curiosity of the Scholars and to exercise their minds, as somebody who by chance

meets two men engaged in a furious fight and who comes between them with his sword, so that, despite being less strong than each of them tries to quieten them down and pacify them together, or at least stops them to fight any further. The first item of the contention consists in the fact that Zarlino supposes as certain that Ptolemy's Syntonic is the species which is more natural than the others, while I have always been a bit dubious and I have been surprised that Gallilei let him say that with little redress, since, if it is true that the Diatonic Diatoniaeus was the only one sung in antiquity, since nobody disputes that nature created it, that one should be called natural rather than the Syntonic. However, since I believe that its probable that both now and then some variety of intervals occurs in the natural melodies (which are the ones sung without being musically trained) and this variety is such perhaps that often one will hear now the progress of Ptolemy's Syntonic, now of the one of Aristoxenus and now of the Diatonieus, it is difficult, consequently, to state that a species is sung more than another one. Therefore, the objection raised by me is based merely on their principles, and, therefore, I would deem it said more considerately [-<177>-] that the Diatonic is natural, and not a particular species of it more than another one, although, as I mentioned above, one could find some difference in this nowadays as well among the nations, because some will use the Semitone more relaxed and others more tense. However, I do not believe that one might describe if the larger tone or the smaller one is sung and other differences of which can heard with difficulty. As to the matter of the difficulty which exists between Gallilei and Zarlino, it seems to me that the first one showed himself as too passionate rival and severe critic of the second one. In fact, although, according to the subtle pieces of evidence which he adduces in his dialogue to show that it cannot be sung and according to the arguments which he weighs on the scales of a goldsmith following the modern practice, in the Syntonic Diatonic, for instance from D la sol re to a la mi re one would hear a dissonant fifth because there are two smaller Tones and a larger one, and not the other way round, as it should be, nevertheless, since one knows that this occurs in a similar way to the modern instruments which have participated intervals, consequently, there cannot be such a difference among the intervals of this System which is sung (which Zarlino calls artificial and I called melodic System instead, while I called organic the one used by the Instruments and Harmonic the one that is perfect and without participation) that the name of Ptolomy's Syntonic may not appropriate to it. Therefore, it seems to me that Gallilei showed himself to be a too passionate critic of poor Zarlino, to which music and its professors are very obliged, and, albeit, being a man, he made a few mistakes in some little details, this should not have been blamed on him [-<178>-] as a mistake. On the other hand, since Zarlino admits that when one sings accompanied by the instrument no dissonance at all is heard with that same participation, it is not easy to believe that one should expect to find the correct intervals when one sings unaccompanied. In fact, although a good singer always strives to reach perfection, as somebody who can mould the sound as he pleases, nevertheless the strength of habit is such that he will not succeed in doing so when he wants to, especially in the case of fast notes, which are not easy to pitch as one leaps towards them and do not allow time to alter them. Therefore, a singer used to sing accompanied by the organ or the harpsichord, which are instruments most used nowadays and almost regulate the melodies, he will not be able to sing intervals other than those found on those instruments. This will happen if a singer has always used his voice without the accompaniment of an instrument, because he will learned from others at least who will have corrupted the correct intervals of his voice because of that Instrument. Hence, I have heard people of good judgment, and, in particular, Signor Giovanni

Girolamo Kapsberger, say that nowadays people sing with little taste. This, in my opinion, derives from nothing but from the fact that few work on it with that application and diligence used by the ancients. Hence, neither Gallilei should have reprehended Zarlino with such bitterness, nor Zarlino should have defended himself from something that is so improbable.

[<179>-] On three Species of Instrument which diversify greatly the Harmonic intervals.

Modern musicians, such as Zarlino, Galilei, Buttrigari, Artusi and others divide the Instruments into three types: some of them have stable and inalterable notes, such as Harpsichords and organs, while others have changeable notes, since one can play interval as large and small according to the will of the player. These are the Trombone, the violins and other similar ones. Finally, others are half-way between these two sorts because, although they have their notes and intervals fixed and precisely established, they can be altered somewhat with the frets or by cross-fingering through the expertise and the industry of the player, since he can press the finger higher or lower or close the hole more or less, and increase or decrease the intervals by blowing harder or softer. These instruments are the lutes, the viols and other instruments with a neck and every sort of flute, recorder or cornetto. It is common opinion that the Ptolemy's Syntonic species is used in the first type of instruments, after Zarlino recognised it to be so with very well founded reasons, although he was reprehended in this by Gallilei. Nevertheless, it is used with its intervals participated, as I said. One should also know that those who divide the comma among the intervals of the System call this process participation, and its aim is to increase the number of the consonances in order to be able to play in several parts and use the largest number of fingers. The formal reason of this is the fact that one finds three larger tones and two smaller ones in the perfect System, [<180>-] hence it is not enough to create four from two larger and two smaller ones by dividing each comma in two halves by which the larger exceeds the smaller. In fact, one must also divide the one of the fifth tone among the intervals of the same tones and of the two Semitones left over. Moreover, albeit said participation renders the consonances less perfect, so that one can hear the fifth being smaller or blunted, as the makers of instruments call them, the fourths enlarged and also, consequently, the thirds and the sixth quite different from their precise perfection, nevertheless their difference is not such as to offend the ear. The advantage has been to have consonances which are outside their exact perfection, but more numerous, instead of more perfect but fewer in number. Moreover, one has to know that the Semitones are larger on keyboard instruments, namely, they are larger than half of the Tone, while they are almost equal on the lute and on the viol. Nor anyone should be surprised that I should add that word 'almost', because I do not find that it is true that the Semitones completely equal are used otherwise in that sort of Instruments, on the contrary, as far as one can see, the third fret is always larger, particularly on the cetera, on which one can see more than anywhere else the difference of the Instruments in comparison with the exact System of Ptolemy, and this is something that has not been observed by anyone else. This is not surprising because few notes are played on it, and if one wants to play several things in a short time often renders them imperfect. Moreover, these semitones are altered a little [<181>-] by the expert hand of the Player and they try to approach as much as possible the inequality required by good music and exact Harmonic reason. Hence, I am drawn even more to think that the Diatonic which they call

Syntonic of Aristoxenus was not used by the ancients nor that he was its author, but only the person who divulged it, so to speak, while using those regular intervals because they were useful for his theory, rather because of a strict obligation to employ them as such. On this basis, I believe that nowadays the Syntonic of Aristoxenus is used in those instruments with a neck. This is not a statement made randomly, although I say that it cannot be completely true. Therefore, it follows from the equality, or less inequality, of the semitones that the fifths and the fourths are more perfect on the lute and on the viol, while the thirds and the sixths are more perfect on the harpsichord and on the organ. The reasons and the process of how this occurs can be seen diligently explained in the work of Zarlino, Salinas and Galilei, to which I refer you to avoid extending myself too much. Buttrigari as well deals with this topic very well in his Dialogue entitled Desiderio or on the playing together of several musical Instruments, where one can see, as to the practice, by now engrained, of playing together with lutes and viols with harpsichords and organs, that, since these two sorts of instruments have their System divided in a very different way, they cannot but produce a poor effect. Therefore, we see that who plays the viol or the lute among those instruments will play divisions most of the time, and rarely, if ever will stop upon a note, so that a dissonance, which the refined ears would not be able to bear, may remain undetected. As to the Instruments of the middle group, which must be regarded as the most perfect, these can be [-<182>-] tuned very well to the Syntonic described by Ptolemy and to the one of Aristoxenus with the above mentioned participation. I do not need to make any other considerations at the moment.

Of the quality and accidentals of the species mentioned above chapter

It is not easy to determine the particular properties and qualities of each species, since nowadays we use so few, namely, only about two or three, so that wanting to produce an exact judgment on the other would be too bold. Nevertheless, I shall say something about them as far as I can conjecture, in order to satisfy your curiosity, entrusting myself then to what experience judges and those who are more knowledgeable and experienced than I am in the field of Music. First of all, generally speaking, there is no doubt at all that the species which are capable of the greatest number of consonances have to be more highly regarded. These are, for instance, the Syntonic described by Ptolemy, the one of Aristoxenus and the Chromatic of Didymus, not only to compose for several parts but also just for two, because always in music one must seek variety, employing it judiciously in one's [-<183>-] melodies. However, I do not believe that the other species should be rejected as useless and completely empty as Zarlino judged them, because, if they are used protractedly and, especially, if they are mixed with the common species, I believe that they will not produce just a good result, but a miraculous one. Among the diatonic Species, the one which is called soft, whichever author we take it from, is very suited to the Chromatic, as I said, and it approaches it more closely. Conversely, the Equitable of Ptolemy is diametrically opposed to the Enharmonic, since it has, as Ptolemy himself confesses, something of the rustic and of the foreign, although he states that it was spurned without good reason by the musicians of this time because he had something of the and because it was not very well laid out, and that, even when it is sung by itself, nevertheless it does not offend the ear. He states that this happens almost only in the Diatonic Toniaeus, which is very notable because one can see that in practice this Species was very highly regarded. I believe that it is sweeter and more pleasing than

the Diatonic, as it is richer in different Intervals, which is something that renders the melodies more beautiful and cheerful. Therefore, although the Syntonic which is called of Aristoxenus has extremely perfect intervals and consonances, nevertheless it would not please quite as much the one of Ptolemy. Because of the unevenness of its intervals, the one of Didymus is much more imperfect than Ptolemy's, hence he was right to declare himself its author, as Zarlino maintains against Galileo, since it has many more consonances within an octave than the one distributed by Didymus, as the following Example shows:

[<184>] [Doni, On the Genera and the Modes, 184; text: Semituono, Tuono, maggiore, minore, terza, quarta, quinta consonante, dissonante]

[<185>] On the Mixtures produced by Ptolemy in the Species reported.

Ptolemy ordered different types of mixtures of the main species named above at chapter fifteen of the second book with incredible effort and inestimable diligence, leaving aside the Enharmonic and the soft Chromatic because at that time they did not appreciate such small intervals. He did this not merely in a single mode but in all seven, ascribing to each note and interval its numbers and proportions, not only the ones that could be found in the continuous series of a Harmonic rule divided into many thousands of numbers, so that this may be useful in all the occurrences of the genera and of the modes, but also those that are almost larger mixtures and are in common with all the divisions. He assigned sixty of them with a very beautiful invention to the high notes of the octaves and one hundred and twenty to the low notes and distributed them proportionally to the ones in the middle. These could be restored with the help of the Greek text, good patience and exact diligence, since the translation of Gogavino is very defective, as I said, and they could be demonstrated with their numbers. However, this would require a long study and suited to someone who had nothing else to do. Therefore, leaving this aside, one must know that Ptolemy chose four species of Diatonic and one of Chromatic in order to mix them together by paring them two at a time, namely dividing one of the Tetrachords of the octave according to a species and another one according to another one. The Diatonic ones are these: The First one is the Diatonic, the second one is the Toniaeus, the third one is the Syntonic, fourth is the Soft one. Among the chromatic species he chose his own from the Syntonic. Now, he combined these five species in four ways, the first one [<186>] by connecting the Syntonic Chromatic with the Diatonic Toniaeus, the second by connecting the Diatonic Toniaeus and the soft one, the third by mixing the Diatonic Ditoniaeus and the Toniaeus, the fourth by mixing the Diatonic Toniaeus and the Syntonic. As the fifth form, he placed the Diatonic Toniaeus by itself. He did this because this one by itself does not offend the ear, albeit it is not mixed with any others.

On the objections raised by Ptolemy against the ancient Species and on those which are raised against his own chapter

Albeit I mentioned above that there was no such pride among the ancient philosophers nor there reigned such great envy and resentment as one sees nowadays among the writers of any same profession, nevertheless one cannot deny that, transported sometimes by the excessive desire to correct and by the pride that one takes naturally

in his work, sometimes they showed themselves to be too zealous censors in examining the basis of someone else's doctrine. Therefore, it will be good that we examine a little, as far as it pertains the present topic, if the objections raised by Ptolemy against Aristoxenus, Archytas and Dydimus, as well as other that many more modern writers have raised against Ptolemy himself are reasonable and true [-<187>-] or just apparent, superficial and unfounded. To start with the most ancient, I do not want to waste time examining the foundation of his doctrine, whether he was right or wrong in dividing the Harmonic intervals into equal parts, in saying that the Diapason contains six tones and, instead of assigning numbers to the notes, in using them only for the intervals and similar matters which are not relevant to our purpose and were examined diligently by others. What I said above is sufficient, namely that all these statements can be defended as far as the aim that he had is concerned (I believe this to be completely true) to measure the intervals with the smallest possible and common measure, to facilitate the matter for practical musicians and theorists. Also, we must remember that he did not abolish the judgment of reason on Harmony, as modern writers had stated, and, therefore, Salinas reprehends him without any justification, when he writes: "We say that he made a grave mistake in the first place when he took away any rational judgment from Music," nor, equally, his doctrine can be blamed as being crude and basic. Had Bottrigari taken account of this, as someone who was endowed with excellent judgment and had great consideration for the ancients, he would not have used that expression when he talks about the construction of Vicentino's Archicembalo, saying that it was done in approximate way as a 'practical musician follower of Aristoxenus' rather than as 'a true and good Ptolemaic Theorist'. However, if we leave this aside and we come to our topic of the Divisions of the Tetrachords, Ptolemy noted that the difference of the Chromatic intervals into the two species, Hemiolic and Soft, are two small according to Aristoxenus, since the Diesis of one and the other do not differ except by one twenty-fourth of a Tone, which is barely audible, while his Diatonic deviates openly in many details from the one that was heard in the usual melodies, and that the two lowest intervals in the two thick genera must not be made equal in any other way, but the second is recognised always as larger. [-<188>-] All this would count really against him, except that, as it seems to me that I have proved sufficiently, he never expected to force the singers and the players to tune those intervals as equal, but as they sounded best to ear. Nor is it true to say that in the Chromatic and Enharmonic the middle interval must always be larger than the first one, because one cannot adduce any sufficient reason nor experience confirms this, since one hears that, in Didymus' Chromatic, which is used mixed with the Diatonic, a smaller Semitone after the larger one produces an excellent effect. In fact, if this was not practised in Ptolemy's time, it could not have been practised in Aristoxenus' time. As to that part where he mentions two intervals of the Soft Chromatic and Hemiolic, it seems to me that Ptolemy is correct and that there is no notable difference, hence Aristoxenus would have been contented with just two species of Chromatic, without dissecting that Tone of his so much. Nevertheless, we cannot pronounce a definitive judgment as to his aim in this, since he is very succinct in his style of writing, just as Aristotle, his teacher, is, and since we have almost not even a hundredth of his writings. On the contrary, Ptolemy criticises Archytas because his intervals in the three genera are two different, that [2. add. supra lin.] some numbers are not in superparticular proportion with each other, that he placed the first interval (28/27) in the Chromatic smaller in size than the one that one heard used, while he availed himself of the same interval in the Enharmonic, which he wants that it should be smaller than the others in said genus. Moreover, [-<189>-] he accuses

him to have placed in the second place an interval smaller than the one that he placed in the first one, as Aristoxenus did. I believe that it is possible to answer for Archytas to these objections that he did not worry otherwise if the proportions of his intervals were superparticular, because this does not make much difference in the melodies, since one must be careful to make the intervals of proportioned size between each other and such that they imitate the natural ones, by establishing them in simple and perfect proportions. Although this was observed diligently by Pythagoras, his teacher, since he had little concerned for practice and devoted all his studies to theory, and, if I have to state freely my opinion, it seems to me that time and experience spoke in his favour because, since the two sixths, which do not consist in superparticular proportions but only superpartienti, have been recognised as consonances, it seems that the intervals of such proportion may be allowed all the more, since they not have to be used as consonances, but only as parts of the melody. Therefore, it is clear that it is not necessary that the intervals [emmes] and apt to singing should be superparticular otherwise, although they are to be preferred to the others if they can be such. As to the second objection, I cannot see what reason convinces us not to make the intervals so unequal. On the contrary, it seems to me that Ptolemy contradicts himself in this, since he used the Diatonic Toniaeus in his mixtures, which Archytas himself discovered, and since he praised it so much. As to the fact that one could hear in his time [-<190>-] the first interval larger than the Sesquivesimasettima placed by Archytas, it does not follow because of this that it was not used in this way in Archytas' time, especially since then the Enharmonic was used extensively at the time, hence it was very useful to the instrument makers to make the first interval common to all the genera, since so many strings were not required, and for this sole reason, had the ordinary Chromatic had the first interval larger even in that time, it could have been reduced very reasonably. I would be tempted to say that it seems to me that Archytas had excellent judgment in trying to find an interval which could be adapted to all three genera. However, as to express an opinion as to what the Enharmonic must have been, I say that Archytas would have been better equipped for this task than Ptolemy, because its nature would have been more clear because it was used constantly at the time, hence its character could be observed between as what more suited to it and what produced a better result in practice. Therefore, I consider certain that Ptolemy first interval, namely a sesquiquarantacinquesima, would not have been accepted at the time of Archytas when the Enharmonic was in full use, because it was really too small, hence it would produce little variety in practice and it almost would not allow the second note to be distinguished from the first one. However, let us see what Ptolemy criticised in Didymus divisions. Firstly, he criticises him because he placed a larger interval, namely the sesquioctavo tone, in the third place rather than in the middle one, where he placed the smaller tone. Although this does not produce a good result according to our modern practice when we sing so many melodies at the same time, nevertheless, with regard to the practice of those times when few voices were used, it did not matter much to place the larger tone before or after, unless he had done this [-<191>-] against the experience of the senses, as one says, which would demonstrate that at the time the tones were sung unequal and, consequently, the consonances perfect, unlike nowadays. As to the fact that it is not a mistake to have placed in the Chromatic the first interval larger than the second, I have demonstrated it a little earlier, and Salinas maintains it as well, although I disagree with his remark when he says that if the smallest proportion was assigned always to the first and lowest intervals, one would eliminate the three species of the Diatessaron which differ because of the different position of the Semitone, now in the

first, now in the second, not in the third place, because this does not follow from Ptolemy's words. In fact, always and in all of the Systems the smallest interval is in the first and lowest place of the Tetrachords, and for this reason these three kinds of fourths are not forbidden. In fact, in that case one does not progress from a Tetrachord to a Tetrachord, but from a note to another note, and thus one takes one part of a Tetrachord from one and another one from another. However, this derives from the fact that the subject of the tones is not understood thoroughly nowadays. Therefore, we can see that Ptolemy was too ambitious and prone to criticise the writers who came before him, and perhaps too ambitious in wanting to divulge his doctrine. For this reason Zarlino would have done better if he had proven in some way the ancient Divisions and verify the effect that they could have produced, rather than run immediately to condemn them as defective and useless on the basis of Ptolemy's authority, whose Divisions have been also considered useless by modern writers from the one of the Syntonic onwards.

[-<192>-] On Salinas Judgment on Didymus' and Ptolemy's Divisions.

It appears as if Salinas himself wants to excuse Didymus in part for having placed the smaller tone and then the larger tone in his Tetrachords, by saying that this sequence is found in certain deductions of fourths. However, this reason is too flimsy, because Salinas should have known that when one talks about the Tetrachords, one must understand them as they are in the system, since they did not share their parts as the modern tetrachords do, although sometimes they are sometimes joined at their extremities. Therefore, it is of no use to show the deduction of a fourth that starts upwards, because it will not be the start of a tetrachord, nor should one start from a fourth downwards, because when one talks about the division and of the genera, one must consider the tetrachords as they were placed in the Stable and immutable system, where the always start from an interval which is smaller than the third one. Salinas again showed himself to be too conceited where he reports that Ptolemy, had Didymus divided the sesquiquintadecima into two parts to distribute his Enharmonic, would have divided into a Sesquitrentesima and a Sesquitrentunesima, because he says that he does not believe it, but that he would have divided it into a Sesquivalentesimaquarta and a Sesquipartiente¹², which is the form of the smallest modern Diesis, as, according to him, harmonic reason requires. I side with Ptolemy, because that smallest Diesis, which is impossible to sing because of its small size, it is not used in the pure Enharmonic [-<193>-] but only to render the other two genera more perfect and to facilitate certain mutations of Tone, as we shall see in practice. [[However, this was not understood by Salinas or by others.]] For this reason, therefore, Didymus would not have made this division, rather than because this smallest diesis is not represented by a superparticular proportion or because the Instruments of his time lacked dieses, since, as far as I believe, that interval was not found in actuality not even in the instruments in the most ancient times. However, let us see in which matters he criticises the method and the foundations of Ptolemy's doctrine. Firstly, he condemns the third manner of dividing the Diatessaron into a sesquisepta and a sesquiquinta, which, according to him, although appear to be very appropriate, because they divide the fourth closely, as the sesquiquarta and the sesquiquinta divide the fifth, nevertheless they are not apt to the Harmonic intervals, considering these as those that produce a consonance. However, this reason of his is not acceptable because it is not necessary for all intervals to be of that kind, because, otherwise, the Enharmonic dieses which can be sung would not be harmonic intervals, because they consist of the

differences between a consonance and another one. Moreover, should all the intervals be required to be such, we could not have but two or three sorts of melodies, and our melodies where the participated intervals are sung and played would not produce a good effect, because not only their intervals are not harmonious, as Salinas requires, but they are not even represented by superparticular proportions, but by unknown and irrational ones, nevertheless, they please and they are liked. As to the fact that he did not adopt the same method used in dividing the fourth to find the division of the middle Diatonic or Toniaeus, this does not matter much, [-<194>-] because he could Divide the divide the Diatessaron well not only by trebling its numbers, but also by doubling them and quadrupling them in order to find all those divisions as it was most comfortable to him. In fact, if he did not use the same method in dividing the Diatonic Toniaeus as he used in dividing the others, he cannot be criticised for this, because that species was not found by him but by Archytas. Moreover, coming to the particular divisions, he states that the division in $24/23$ and $46/45$ is not acceptable in the Enharmonic, because the number 23 is prime and uncompounded, and, consequently not even the 46 is acceptable, because it equates 23 multiplied by two. This reason seems to me very weak and far-fetched because, in the case of small intervals, one cannot 'save the goat and the cabbages', or constitute them of adequate size, and because, just as it not necessary that the proportions of those very small intervals should be simple and superparticular, thus it is not necessary that they should be made up of those numbers which satisfy all those requirements. Following the same method, one can justify the interval that he placed in the intense Chromatic as well (there is a mistake in Salinas text because it says 'soft') namely, those of sesquisepta and sesquidecima, and, equally, those of the soft Chromatic, which one can see that is called intense by mistake, and in the case of the others. Salinas is also surprised that he availed himself of the Diatonic diatoniaeus, which he calls Pythagorean, and consequently of the limma, which is of suprepartiente proportion and goes against his basic principle to use only superparticular intervals, believing thus that he did not divide the sesquiquinta into sesquiquarta and sesqui128/127. However, he should not have been surprised at this because such diatoniaeus was always very well regarded, it was also used even then, and it is very useful in the mixtures and mutations of the genera, [-<f.195>-] as we shall see. This will prove that such minutiae do not match the sense of hearing, and that Aristoxenus was not wrong in relying on it so much. Now, from this we learn to examine carefully the objection raised by the more modern and more ancient writers, because we shall realise that most of the time those who are worthy of praise are criticised.

[-<196>-] On the Musical Intervals and on their difference Chapter

Since the study of the intervals is one of the most essential parts of the Harmonic science, it is necessary that we should say something about it, but only in as much as it is necessary to understand everything else, because who desires to have more complete knowledge can refer to those who wrote more amply about the principles of music, such as Salinas, Zarlino et cetera. Therefore, the interval (considered as a musical term, since there is no need discuss the general meaning of the word) is nothing, as Aristides defines it, but the distance of low and which lays between two notes or Sound who are not in unison, and, just as two numbers compared one with the other are either equal or unequal and there is no third option, thus two sounds are necessarily in unison or not in unison. Nor the unison corresponds to two equal numbers, but also to two equal continuous quantities. Therefore, two strings of the

same length, thickness, density and of the same tension equally produce a sound which is perfectly in unison. Also, just as in numerical proportions the one that is considered most beautiful and noble is the one that has the remainder which smaller and easier to understand, thus, among the musical proportions, the ones that produce the most beautiful and perfect consonances are the ones that are the most simple, consist of smaller numbers and resemble the unison more closely, such as the Diapason, and then the Diapente et cetera. Now, the differences between the intervals are varied and most of them are mentioned by Aristoxenus [book 2, and by Aristides book one in marg.]. In fact, one considers what is Major or Minor, Consonant or dissonant, Apt to singing or unsuitable for singing (thus one may translate [-<f.197>-] what the Greeks call [Emmeles] and [Ecmeles]), Rational or Irrational, Audible or Inaudible. Among the apt to singing, some are Diatonic, others Chromatic and others Enharmonic. Of the consonants, some are equisonant, other parequisonant, and others simply consonant, just as the Dissonant ones are divided into apt to singing and unsuitable for singing. We shall explain these differences in order with as much brevity and clarity as possible. Major intervals are the ones where there is a larger distance or difference between a high and low sound, such as the Diapason compared to the Diapente, while the Minor ones are the opposite of these. The Consonant are the ones that, when their extremes (namely, the notes or sounds that contain the interval) resound, produce a pleasant mix of sound and delight the sense of hearing, as between the consonances mentioned and the other minor ones. Dissonances are the ones which offend the ear and in which the sounds do not coalesce. Now, it has to be known that some of the consonants some are called [antiphona] by the most ancient writers, as Aristides, while they are called [homophona] by Ptolemy and the more recent writers. This word [antiphona] means equisonant, since this prefix [anti] does not denote opposition, as Gaza, who translated this word as obsona (of contrasting sound) but such a perfect similarity that one can be taken for the other one. Therefore, Aristides defines [antiphona] those intervals which unite their extremes so closely that they appear to be a single note. Such are the octaves and their compound intervals which are heard almost as unisons and have this characteristic that, when they are added to any other consonance, they maintain it as a consonance and of the same nature, as it happens in the case of the number ten. In fact, all the numbers that are added to it [-<198>-] maintain the same property and name. This does not happen to the other consonances, because neither two fifths nor two thirds nor two fourths are consonant, but two, three, four, five and more octaves are. Similarly, an octave and a fifth, an octave with a fourth, an octave with a third, an octave with a sixth, and so on are also consonant. The other difference has no specific name but they are simply called consonances. However, according to the most ancient writers two species are derived from this one, since some approach the equisonant closely and their extremes are almost in unison, as it happens in the case of the fifths and of their compounded intervals above the octave, and, in my opinion, also in the case of the major thirds and their compounded intervals. In fact, we hear them as so perfect and sweet that they are only marginally less perfect than the fifth. Aristides calls these [paraphonous], which we translate into Latin as paraequisonae. The other species uses the general name of consonant from the Greek [symphonai], which comprehends all the other which are consonances, as the fourth, the minor thirds and both of the sixth with their compounded intervals. Theon, in his Encheiridion, departs from the others because he calls paraphona the Diatessaron as well as the Diapente, and the Harmonic or [Emmeles] intervals which are placed in the systems one after the other, such as the Tone, the Semitone and the Diesis, the [symphona kata synecheina] or those that are

consonant according to their sequence. in marg.] One has to note that the intervals that Zarlino and the others after him call empty correspond to the equisonant, because they are so closed and consonant when they are played together that they appear to be a single Sound and give an impression of emptiness to their combination of middle sounds, and therefore they are less pleasant. The full ones correspond to the paraequisonae, which are the most pleasant of all because they are not fused so intrinsically that resemble the unison nor so little that offend the ear. Zarlino and the other practical writers call the third Species [-<199>-] the one of the beautiful sounds because they stand out more and allow the listener to hear the extremes more clearly. I do discuss the difference between perfection and imperfection because it is useless and was not known to the ancient. They did not like to call the fourth a perfect consonance either, because it is of a worse kind than the major third or ditone, at least when it is alone or among others, hence they did not consider as perfect none but the octaves and their compound intervals. Personally, I would call perfect all the consonances of any species that are exact and in their correct intervals and imperfect the ones that are too intense or less intense than it is correct, such as the ones which are used in our Instruments, from the octave onwards. I would call the fifths and fourths 'first ones' to distinguish them from the thirds and the sixth, which I would call 'second ones', because they are born from the first division of the Diapason, while the thirds and sixths are born from the other divisions. The intervals are classed also as compounded and uncompounded. Compounded are the ones that are divided by other smaller intervals, while Uncompounded are the ones that are not divided but are almost elements which constitute other larger intervals. It was said elsewhere how an interval can be uncompounded in a particular musical genus can be compounded in another one. Meanwhile, see Boethius, book one, chapter two. Equally, the consonances can be compounded or uncompounded. Compounded are the ones that are not born from the union of other consonances. Nobody should be surprised that I do not define the Uncompounded as the ones that are not divided by other consonances, because it is not the same thing, as the Diapason, which is by nature the first of them all, is divided by the fourth and by the fifth, and, nevertheless, is simple and not compounded, and, equally, the fifth, despite being divided by the major and minor third. In fact, the most perfect consonances [-<200>-] are not born from the division of the imperfect, but the other way round. Now, it is true that the result cannot be changed, but the compounded consonances are the ones which are composed of two previous consonances and of a smaller interval, as in the case of the sixth, which is composed of a fourth and of a third, and in the case of the tenth which is composed of an octave and of a Third. One might divide such species of consonances even more than those did who mentioned the compounded ones, but, since the basic principles must be succinct and clear, these divisions will suffice for now. Moreover, one must know that all the consonances are apt to be sung, while, conversely, not all the ones that can be sung are consonances. Therefore, when one says 'apt to singing' one considers them as species rather than as genus. The apt to singing or [Emmeleis] are the ones that are useful in producing the melos., while the Unsingable or [ekmeleis] are the ones that are not such, and, therefore, are considered only accidentally by writers of music theory and only for the sake of classification, in the same way as practical musicians or composer the dissonances are considered in the same way accidentally, but differently, because he does not consider them just to avoid them, but to use them as servant and subordinate to the consonances. Moving on, the rational intervals are the ones whose ratio and scope can be demonstrated because they can be contained with numbers, as the interval of a fifth, which is the

one placed between 3 and 2, namely, [-<201>-] the one produced by two notes one of three particles and the other of two of equal size. Irrational intervals are the ones that cannot be demonstrated with numbers, such as the interval of an exact half a tone, or of a comma of any consonance and harmonic interval. However, we can say that the Rational interval embraces the more and the less, because more rational is the one of multiplex proportion, less rational the one of superparticular proportion, and even less the one of superpartiente proportion. If we want to be precise, no number is Irrational in relation to another one because they all contain the common measure which is the number one, and, however out of proportion with one another, they will never be incommensurable, as it happens in the continuous quantities, because the scholars of Geometry demonstrate that the Diameter of a square is incommensurable and has no proportion at all with its sides. One must know that the consonant also derives unison, the apt to singing from the consonant and from the apt to singing the unsingable, as we see by measuring one with the other, because when a sound deviates from another by a proportionate distance of a tone, it becomes consonant, since an interval with another one measures the difference between the Diapente and the Diatessaron, the Semitone measures the difference between the Diatessaron and the Ditone and the smaller Semitone the difference between the Ditone and the Semiditone. However the difference between two intervals apt to singing, as between the Tone and the larger Semitone, is unsingable.

[-<202>-] We illustrate better which ones are the intervals apt to singing and the Harmonic [Emmeleis] and their proportions are explained briefly.

However, since someone may be surprised that I placed as unsingable interval the difference between the larger Semitone and the smaller one which is called diesis, knowing that the Diesis belongs to the Enharmonic melodies, which, consequently, are apt to be sung, it will be necessary to be a little more precise in this respect. One must know that the qualification of consonance apt to singing and unsingable are given not only to the intervals, but also to the notes and sounds which contain the intervals. Therefore, Ptolemy says that the equisonant notes are composed of the consonant, the consonant of the apt to singing, and the apt to singing of the Unsingable ones. Moreover, it is fair to say that just as the second are removed from the proportion and similarity to the first ones, the third ones from the second ones and the fourth ones from the third ones. I derive this as well from Ptolemy's words, namely, that the differences between notes which are not in unison must be measured according to their proximity to the equal proportion. Therefore, according to the harmonic ratio, the eighth note shall be closest to the first one than to the second one. However, this requires deeper consideration. Nevertheless, I keep to within our remit and I state that that diesis it is truly unsingable and cannot be pitched because of its small size, albeit it is possible that it may be distinguished by the ear on a string divided with the Canon. However, the ancient Enharmonic Diesis, [-<203>-] which can be sung, was larger, because its size was about half a larger Semitone. Nevertheless, one must be aware that those words [emmeles] and [ekmeles] do not mean exactly apt to singing and unsingable, because they derive from the word [melos], in its meaning of 'member which sings'. Therefore, this will be explained better with a comparison taken from the human body, in which we can say that the sections of the fingers are like the notes apt to singing and divided in the Enharmonic system, the fingers are like the ones of the Chromatic and the hands and the muscles are like the one of the Diatonic, while the bones and the flesh [and the

nerves add. supra lin.] are like the major and minor consonances, which, added together produce a perfect system. However, we can say that the cartilages, which are not main parts but only binding elements, as the lime is compared to the stones of a building, represent the ones which are called specifically [emmeleis] by the ancients and that they may have borrowed the term from this. Moreover, in this sense all the intervals which are created by subtraction to form another interval Harmonic and apt to singing. I define as Harmonic intervals all the different ones which can be used in a musical System, therefore the above mentioned smallest diesis of modern theorists diatona shall be [emmeles], but not [melodike] o apt to singing. Thus, if we take a separate comma to add it now to the other one, such interval shall not be apt to singing in itself, but [emmeles] in marg.] Moreover, the Rational intervals are more far-reaching because all the [Emmeleis] are Rational, but the opposite is not true. Therefore, Rational intervals are the one which are found from the difference between two [Emmeleis]. Therefore the Comma is [Emmeles], as it is the difference between the larger and the smaller Comma, but it is only Rational as it is the difference the smaller Semitone and the smallest Diesis. Therefore, being an interval apt to singing and being an [emmeles] interval are two separate things, as an interval apt to singing can be irrational, as it happens when one divides the interval of a Tone into two equal parts Geometrically, namely with a line of median proportion, as Zarlino teaches, [-<204>-] as harmonically this cannot be done, because those semitones will be apt to singing, but not properly [emmeleis], at least according to Ptolemy's method and in rigorous terms. However, one half of a smaller Semitone, which is called Diaschisma (which the Pythagoreans called limma and was larger) will not be even [emmeles], because it is not rational, but audible, and one half of the comma, which is called schisma (while the comma is itself different) shall not be [emmeles] nor rational nor audible. In order to explain this matter of the Comma, this term, which comes from [kopto], meaning to cut or to divide, translates as fissum into Latin and a portion in Italian, meant the difference from the apotome to the limma placed in a proportion which is rather larger than the modern comma or Toniaeus, which is the difference between the larger between the larger Tone and the smaller represented by the sesquiottagesima proportion $81/80$, and it is also the difference between our smaller semitone and the ancient limma. The word Schisma is derived from the verb [schizo], which means to cut. The word diaschisma has the same origin with the addition of the preposition [dia] with means 'through'.

[-<205>-] Recapitulation of all the small Harmonic intervals with their table

Therefore, starting from the smallest one, we have already seen what the Schisma is and the Diaschisma, which, according to Zarlino, are rational intervals, because they do not have between them a known and which can expressed in numbers, but they can be divided only geometrically with a median line. The reason of this is that no music theorist has bothered to divide them with numbers, deeming this a useless effort. This interval can be divided but not into equal parts, because the comma itself can be divided into two unequal Schismata, but nobody used it because it is useless and one could carry on ad infinitum, because every interval can be divided into two smaller one by taking the middle number, when it is contained exactly. When the Denominator and the Numerator differ by a number, one has to double both and take the number in between them, because the smaller interval will be contained between the larger number and the middle one, and the larger one between the middle one and the smaller one, as, for instance, in this proportion, [$82/20$ add. infra lin.] which

represents two commas. It can be divided into a larger comma, between 81 and 80 and a smaller one between 82 and 81. However, if I want to divide the comma into two parts, I double both numbers and I obtain 162 and 160, in the middle of which I place the middle number 161. Thus, I have a larger schisma in this proportion 161/160 and a smaller one in this other one 162/161, and in this way I can divide all of the intervals. [-<206>-] Therefore it is certain that one can find several sorts of Semitones and Tones, because 'the names are according to one's will'. However, one must not alter indiscriminately the names which were used, as we can see, by the ancients with such appropriateness. Where it is needed, we can create new ones following their example. Therefore, although the ancients called tone only the sesquiottavo one, nevertheless, the sesquinono as well was accepted and called tone with good reason. However, when one says simply Tone, one shall refer always to the noble one and sesquiottavo by antonomasia. However, I would not call Tone a sesquisettimo, but I shall follow very willingly Zarlino and the others who have recorded several sorts of semitones found in some Harmonic systems. He places up to five sorts at chapter two of the fourth book of the Supplementi. It will be good to explain them as I shall have to mention them.

He calls smallest semitone the sesquivalentiquattresimo, which is found in potency or in actuality in the Chromatic notes marked with the sign #, called diesis nowadays. I would call it Smaller instead, because another one, even smaller expressed by this proportion 28/27 is used in the Diatonic Tonianus, which deserves the title of smallest. Then, there is also the smaller Semitone, which I would call limma instead, since it is the same as the Pythagorean limma and is contained within these numbers 256/243. He places the middle one which is contained between 135 and 125 as third and is found between the note [sqb] mi and b fa. This is nothing but a smaller semitone augmented by a comma. As fourth, he places the one which is [-<207>-] really the larger Semitone, albeit those who came before Fogliano and Zarlino believed it to be smaller, thinking that it was the ancient limma. This is found between the mi and fa in the Diatonic and common System in proportion sesquidecimaquinta. Lastly, he places the Semitone that he calls largest between 27 and 28, which is a larger semitone augmented by a comma. As to the Diesis, it is necessary to place at least three types of them aside from the one of Aristoxenus also called the equal one. In fact, there is the smallest, which is the difference between the larger Semitone and the smaller one, which is called Enharmonic by modern theorists, although it is not used specifically in the Enharmonic melodies, but is used to perfect the Diatonic and Chromatic melodies, so that it is used in the perfect Instruments in order to find from both of them the extremes of the larger and smaller Semitone. However, the larger and smaller Diesis are the ones which are used to produce the smaller intervals in the Enharmonic Tetrachord and they are derived also from the larger Semitone, which is divided differently according to the precepts of one or the other of the ancient theorists. Nevertheless we shall name larger Diesis the sesquivalentisettesima and smaller the sesquivalentinquesima. These are the most well known smaller intervals and the ones that have individual names, because the others identified just from the names of their proportions. I leave aside the Prisma, the stereoprisma and the Mondereo's Ectome.

[-<208>] Table of the enlarged small and pure intervals

[Doni, On the Genera and the Modes, 208; text: Schisma la meta del comma, maggiore 161/160, minore 162/161, Comma moderno o Tonio 81/80, Comma Pitagorico]

Diaschisma is half of the limma; also of the smaller Semitone, which is interpreted as that one, and also for two commas: the larger one measuring $41/42$ and the smaller $41/40$.

Smallest Diesis is the difference between the larger Semitone and the smaller one.

Smaller Diesis is the smaller half of the larger Semitone, and it measures $36/35$.

Larger Diesis is the larger half of the larger Semitone, and it measures $28/27$.

Smaller Semitone is the smaller half of the smaller Tone, and it measures $25/24$.

Larger Semitone is the larger half of the smaller Tone, and a limma augmented by a comma, as well as the difference between the larger fourth and the larger third. It measures $16/15$.

Middle half Semitone is the Minor Semitone augmented by a comma and measuring $135/128$.

Limma is the difference between a fourth and two larger tones.

Apotome is the difference between a larger Tone and a limma and a larger Semitone augmented by a comma, or largest Semitone. It measures $27/25$.

Smaller tone, or sesquinono is the difference between the fourth and the smaller third.

Larger Tone, or sesquiottavo is the difference between the fifth and the fourth.

[<209>-] On the other larger Intervals, dissonant and consonant, and on the proportion which constitute the consonances.

Since the larger and consonant intervals are constituted, at least materially, and are defined through numbers, we wanted to mention first those, because the consonant ones seem to us to come first because of their nature. Among these there is the octave, which, as we said, is closer to the number one than all of the other intervals are. However, now we shall change our topic, since, having started from the most perfect ones, we shall come to the less perfect, namely, the ones that are found in actuality within the Diatonic, Chromatic and Enharmonic System only principally or accidentally. The Diapason, the most excellent of all their intervals, is like the [to pan] or the one that contains everything in music. It is born of the dupla proportion, because, if two strings of equal tension, but one twice as long than the other, are played, they will form the Diapason, nowadays called octave. [<210>-] The Diapente or fifth of hemiolic proportion or sesquialtera $3/2$ and the Diatessaron or fourth of sesquiterza proportion, called in Greek [epitrita] $4/3$ is born from the Division of the octave. It is worth noting that the dupla is not created by playing the two proportions, as the octave is constituted from the fifth and the fourth, but a proportion which represents the difference between them is obtained by multiplying the denominator of one by the Numerator of the other, which is something of considerable interest. In fact, one obtains nine by multiplying three and three, and by multiplying two and four, one obtains eight, which are the radical numbers of the sesquiottava, or larger Tone, which is the difference between the fifth and the fourth. The same one can observe in the radical numbers of the two thirds, of which the larger part is in sesquiquarta proportion ($5/4$) and the smaller one in sesquiquinta ($6/5$), and they divide the fifth in the same way that the fifth and the fourth divided the octave. These are the simple consonances, which are found contained in the number six, which was highly regarded by musicians. All the consonances are contained orderly within the number six, which was the most highly regarded among musicians, because, when one lays out the number orderly, one finds all the consonances within it, starting by the number one, which is an element of the consonances, as the number one is of the numbers.

[Doni, On the Genera and the Modes, 210; text: 1, 2, 3, 4, 5, 6, unisono, dupla octava, sesquialtera quinta, sesquiterza quarta, sesquiquarta Ditono, sesquiquinta semiditono]

[<211>-] The two sixth (which are compounded consonances, to be precise) are the next in sequence. The smaller contains a fourth and a minor third between these numbers and the larger one contains a fourth and a larger third between these. Leaving aside the compound intervals beyond the octave, because they are not part of the present topic, I come to the compounded intervals and dissonances contained within the octave. The Tritone, commonly called false fourth, contains two larger tones and a smaller one between these numbers and between the notes F fa ut and [sqb] mi, always going upwards from the low register to the high. The Semidiapente, which is more adequate and pure, would be called in Latin Paradiapente is its opposite interval. It contains a fourth and a larger Semitone. Therefore, it could also be called Diatessaron Semitonium, and, commonly, false Fifth, which is contained within these numbers and between the notes [sqb] mi and f fa ut. The Diapente Ditonus, or major Seventh contains a fourth and a major third or a Tritone and a fourth within the proportion and between the notes F fa ut and E la mi. The Diapente Trihemitonium or minor Seventh contains a fifth and a minor third, or two fourths, hence it could also be called disdiatessaron (as the ninth is called Disdiapente). It is found within these numbers and within these notes, E la mi and D la so re. These are the ordinary numbers of the diapason with the tone or major second, and the semitone or minor second. The extraordinary and accidental are these: the one called semidiatessaron (and perhaps better, Paradiatessaron) and minor fourth. It is found between F fa ut and C# sol fa ut, which is raised with the diesis upwards, and it is nothing but a Diatessaron reduced by a smaller Semitone; the Tetratone, or interval [<212>-] of four Tones, which lays between F fa ut and the same C# a ut with a diesis, and the Pentatone, namely interval of five Tones, which is found between the same F fa ut ad D# la sol re with a diesis, albeit it does not amount to five compounded tones, but only four and two Semitones, one larger and the other one smaller, as it is known. [<213>-] One must consider two other sorts of accidental intervals because they are found (albeit divided) in many modern compositions. One is constituted of a fourth augmented by a smaller semitone. This could be called Hyperdiatessaron, and it is found between the notes [sqb] mi and E# la mi raised with a diesis. Equally, one finds a Hyperdiapente or augmented fifth between A la mi re and the same E# la mi raised. Moreover, we find the paradiapason or the octave reduced by a smaller semitone, as between C# and C or between [sqb] and b fa going upwards, and the Hyperdiapason or octave augmented by a minor Semitone, as between b fa and [sqb] above or C and C# upwards. Thus, one is the Diapason Semitonium or minor ninth, as from E la mi and F fa ut going upwards, and the other is the Hyperdiapason. One must note as well the Hyperditonus called minor fourth, which is found, for instance, between C' and F fa ut going upwards and contains one tone and two larger Semitones and the Paraditonus, which contains a smaller Tone and a larger semitone, as from G sol re to b fa, or a smaller one, as from G sol re to A# la mi raised with the diesis. One can also find the diminished Semiditone, as between G sol re and A la mi re, which contains a smaller tone and a larger semitone, or between G sol re ut and A# la mi re raised with a diesis, which contains a smaller tone and a smaller Semitone, or a larger tone and a smaller semitone, as between A la mi re and [sqb]#. The paradiatessaron can be constitute also by a ditone and a smaller semitone, as between C sol fa ut and E# la mi raised, while the Hyperdiatessaron can be formed of two larger Tones and a larger

semitone, as it is found naturally between [-<214>-] A la mi re and F fa ut on the perfect Instrument. Similarly, the Paradiapente will be constituted by a smaller Semitone instead of a larger comma
, where one shall place a smaller Semitone instead of a larger one. [-<215>-] This will suffice as to the larger and better known intervals which are contained within the Octave. Here is their table:

Consonances:

Diapason of dupla proportion 2/1. Octave.

Diapente of sesquialtera proportion 3/2. Fifth.

Diatessaron of sesquiterza proportion 4/3. Fourth.

Ditone of sesquiquarta proportion . Major Third.

Trihemitone (also called Semiditone) of sesquiquinta proportion 6/5.

Diatessaron Ditonus (also called major sixth) of proportion.

Diatessaron trihemiditono (also called minor sixth) of proportion.

Dissonances:

Tritonius of proportion , also called false Fourth

Pseudodiapente or Semidiapente of proportion , also called false Fifth.

Diapente Ditonus of proportion , also called minor seventh.

Accidental Intervals

Pseudodiatessaron or Semidiatessaron of minor Fourth

Tetratonus, four tones.

Pentatonus, five tones.

Interualli accientali

[-<216>-] On the perfection of the consonances and what proportion contain them.
[On the proportions in marg.]

It is not my intention, at the moment, to investigate the position owed to the Diatessaron among the consonances (since to place it among the consonances as practical musicians did before Zarlino is something which smacks of the barbarity typical of the century when this was done) nor whether the minor sixth is more perfect than the major one, and similar matter which require a larger treatise. However, since we shall have to mention the multiplex, superparticular proportions and so on, it will be appropriate to say something about this. Therefore, I state, leaving aside what proportion is and other similar elementary notions, that the simple numerical proportions are of three sorts, namely, Multiplex, Superparticular and Superpartienti, while the compounded ones are of two sorts, Multiplex Superparticular and Multiplex Superpartienti. All of these are considered comparing the larger number and the smaller one, because if one starts from the smaller, as many sorts of proportions are born, or rather the same one in inverter order. These are indicated by the prefix sub, or under. For instance, the proportion from 2 to 1 is a multiplex proportion, while the proportion from 1 to 2 is submultiplex, et cetera. The multiplex proportion is the one where the larger number contains the smaller one more than once entirely, namely there is nothing left over, as in the case of the dupla, which contains the smaller number twice, the tripla three times, the quadrupla four times and so on, thus: 2/1, 3/1, 4/1. The superparticular proportion occurs when the larger number contains the smaller one only once, and it also contains a part of it, which is called fractional (aliquota). The fractional part, therefore, is the one that produces its whole once it is multiplied as many times as it is needed. For instance the number two is fractional

part of the number six [-<217>-] because it constitutes it by being multiplied three times. It is called thus because, multiplied a certain number of times (Aliquoties), it produces its whole. The part that is not fractional (aliquota) and that some call aliquanta is the one that multiplied as many times as one wants does not produce its whole exactly, but either more or less. For instance the number two is not a fractional (aliquota) part of the number five, because, if it is multiplied twice, it produces the number four, and, if it is multiplied three times, it produces the number six. Therefore, the superparticular proportion occurs when the larger number contains the smaller one and also a fractional part of it, as the sesquialtera or $\frac{3}{2}$ does, which the best Latin authors call Sescupla and the Greeks call hemiolia, because the number three contains the number two once and its half, which is the number one, which is fractional part of the number two, since it is of one number, and, equally, the sesquiterza $\frac{4}{3}$, the sesquiquarta $\frac{5}{4}$, et cetera. Instead, the superpartiente proportion is the one where the larger number contains the smaller one and a part of it which is not fractional, as in the case of $\frac{5}{3}$, because the number five contains the number three once and two thirds of it. Now, this Sort of proportion is found between two numbers which are prime with each other, namely, when the proportion between them cannot be reduced to numbers which are antecedent and smaller than those, since it is contained in the radical terms and one number and there is not a common number that can measure one and the other number. Its species, as the numbers themselves, are infinite because it is called Superbipartiente when the difference is two, Supertripartiente when it is three, and so on. When the number two is in proportion with the number three, it is called superpartiente terza, as in the case of $\frac{5}{3}$, because the number five contains the number three once and what is left over is two, and thus, between seven and 5, $\frac{7}{5}$ is called Superbipartiente quinta, between 7 and 4, $\frac{7}{4}$ is Supertripartiente quarta et cetera. The fourth species is the multiplex superparticular which is constituted by the first and second species and it is created when the larger number contains [-<218>-] the smaller one more than once and more than some fractional part of it. For instance, this occurs between 5 and 2, which is the dupla sesquialtera, the number five contains the number two twice and half of the two, which is one. Equally, one can see this in the tripla sesquialtera $\frac{7}{2}$, because the number seven contains the number two three and half of it, which is one. Finally, the fifth species, which is created from the second and from the third one, is called Multiplex superpartiente, which occurs between two numbers of which the larger contains the smaller more than once, as well as a non-fractional (non aliquota) part of it. This occurs in the dupla superbipartienteterza $\frac{8}{3}$, because the number eight contains the number three twice and two thirds of it. I will not report the opinions which pertain to the proportions and which the music Theorist must know, namely, how to reduce them to their smallest numbers, how to add them, subtract them, et cetera, because this is not within our remit, and there is no dearth of authors who explain this part very diligently, among whom are Boethius, Zarlino and Salinas. I shall say only that the most beautiful proportions are the simple ones and the ones contained within small numbers and are represented by smaller terms, because, just as they are grasped more easily by the imagination and by the intellect, equally, they produce the most beautiful and perfect consonances in terms of Sounds, because the Diapason, the Disdiapason, Trisdiapason, et cetera, all derive from the multiplex proportions, the Diapason from the Dupla, the Disdiapason from the quadrupla, the Trisdiapason from the sextupla. The Diapente, Diatessaron, Ditone and Semiditone, which are simple consonances and are part of the Diapason, derive from Superparticular proportions, while the two sixth, which are really compounded consonances, derive from superpartienti proportions.

The larger

As to the compound intervals (which are simple consonances added to the diapason and repeater), the first and most perfect will be the Diapason Diapente, which derives from a multiplex proportion, namely the tripla, while the others derive from superpartienti proportion, as the Diapason Diatessaron, which follows, within the proportion $\frac{8}{3}$ dupla superpartiente terza, [-<219>-] which, for this reason was not accepted by the Pythagoreans, who accept only the most pure and simple ones, disregarding the fact that experience shows that some proportions which depart from that simplicity are proven to be consonant, as this one and the one which represents the sixths. There follow the Multiplex compounded consonances, which, since they depart even further from the simple ones will be more imperfect and represented by stranger proportions. These are the sixths above the octave, such as the major thirteenth, namely a major third above the octave, which is in proportion $\frac{13}{8}$, and the minor thirteenth, which is a minor sixth above the octave, of proportion $\frac{13}{9}$. Therefore, in order to reduce the consonance under their species, we can be happy, for now, with this Division, if we explain some simple ones, like the Diapason Diapente, the Diatessaron Ditone Semiditone (albeit the three last ones can also be called simple and indivisible, the Diapente simple and divisible, and the Diapason simple and subdivisible, but I will omit this, to avoid extending myself too much). Secondly, we shall place the multiples ones such as the Disdiapason, Trisdiapason et cetera. In the fourth place we shall place their Compound intervals, namely, the Diapason Diapente, the Diapason Diatessaron, the Diapason Ditonus and the Diapason Semiditonus, which can embrace the same difference. In the third place we shall place the two sixths which are composed both of a fourth and a third, the major of the major third, and the minor of the minor third. In the fifth place we shall put the over-compounded, namely the two Sixths above the Diapason or above the Disdiapason, since there is no need to distinguish them by calling them compounded multiplex.

[-<220>-] On the Divisions of the Diapason.

Now, I want to say in how many times one can divided the octave into its main divisions, albeit it is something more interesting than useful. Nevertheless, I do not want to leave it out, because one can understand better the difference between Intervals which are considered by essence or accidentally in the study of harmony thanks to it, and because I find that this topic has not been discussed in a distinct manner otherwise. [[Firstly, I state that the main divisions of the octave are these, Diapason. Some are more general and others more particular. Therefore, we shall start from]] Firstly, one must know that an [antiphona] consonance added to another [antiphona] produces an [antiphona] consonance. If these are added together, the result is an [antiphona] consonance, and that these constitute the ones which are called multiplex. Moreover, one must be aware that the more they are multiplied by each other, the more they depart from the unison, which is placed by practical theorists among the consonances, and the more they are divided, the more they approach the unison. However, because of the specific property of continuous quantity, one can never reach the unison in this way, which is understood according to physical and mathematical rigour, although one calls it morally a larger interval even if, dividing it into smaller intervals, one shall not reach a point that one will not be able to divide it in practice, as far as we can en parte nostra, and no difference of sound will be apparent, hence it will appear to be an unison. However, I shall leave this aside. If one adds together two paraequisonae consonances or consonae, the result is not a

consonant interval, as two diapente added together produce a ninth, which is a very dissonant interval and two Ditone a Tetratone, which is itself extremely dissonant. [-<221>-] If one adds together two or more consonances of the same form, except for the aequisonae, the result is not a consonance, as if one adds two or three fourths, thirds, et cetera. From the union of a paraequisona and a consona, there comes a consonance full of sound, which is the diapason, and from the union of another paraequisona (a ditone with another consona, a diatessaron) there comes also a consonant, which is a major sixth. However, one cannot add a paraequisona with a consona in a different way because the compound intervals are taken as the simple ones. Two consonae, taken individually, can only be followed by a consona when the Diatessaron is added to the Semiditone, which produces the minor sixth. Therefore, the two sixths are like a bastardised Diapason because they unite two consonances binding them in a harmonic matrimony, so to speak, as the Diapason does. However, it is very well known now that the result of the union of a consonant interval and of a dissonant one is sometimes a consonance and sometimes a dissonance, as a consonance is formed sometimes from the union of some dissonant intervals, as from a larger tone and a minor Ditone. However, it is not so well known that two or more Irrational intervals, simple or compound, cannot produce a Rational or [Emmeles] interval, and, even less, a consonance. It is common knowledge, however, that the [Emmeleis] are constituted of Rational intervals and the consonances from the [Emmeleis] ones.

[-<222>-] [[However, to illustrate the main divisions of the diapason, I state that some are more general than others and other more particular. We shall start from those. Now, it is not necessary to discuss the Division of the Diapason, except for the one which divides it into two or three intervals. Therefore, I state that the Division is either Rational or Irrational. It is Irrational when the diapason is divided into two intervals what cannot be demonstrated with numbers.]] [[The division of the Diapason, as of all the other musical intervals can be done in two ways, Geometrically or physically and Harmonically, or Arithmetically, as each species can be called in two ways. Physical or Geometric division is the one that divides the interval of two sounds by dividing a string, which shall be played, into parts, either equal or unequal. Harmonic division is the one that uses numbers rather than a pencil]] The Geometric division is done in this way. We take two strings which produce a different sound, because they are of different length. The difference between the larger and the smaller is divided geometrically into proportional parts. In this way, if one takes a proportional middle line, one can divide the tone and every other interval into two equal parts. The Harmonic Division is done in this way. We take two strings which are also different in sound because of their different length. We consider the proportion of the larger one with the smaller one. If the proportion is Rational is known through some numbers with a median proportion to be applied to a middle note which produces a middle sound, in this way one cannot divide the tone nor any other interval into two parts or equal intervals from the supermultiplex onwards. On this basis, [-<223>-] I say that some of the divisions of the Diapason are more general and others more particular. Firstly, one should start from the general ones. Therefore, I say that the Division can be Rational or Irrational. The irrational occurs when it cannot be demonstrated absolutely with numbers when it can be distinguished between two sounds by the ear, [[which is called aptly physical division]], or when one places another one through a string of middle length (this will be the geometric division) which will produce two intervals not only dissonant but also irrational, dividing it for instance into a fifth augmented by a comma on top and into a fourth equally reduced,

or when it will be done with very strange numbers, namely, distant superpartienti, as in the case of dividing this dupla $100/50$, which represents the Diapason, into two intervals $100/97$ and $97/50$. The Rational Division is of two sorts, Harmonic and not Harmonic. The Harmonic one is the one made into two intervals which are [emmeleis] and which are apt to singing, as in a larger Semitone and in the rest, which is a major seventh, namely into these two proportions $16/15$ and $9/8$. The non-harmonic is the one which is made into two intervals that are not used in any sort of harmony, as into a comma and into the remainder. The Harmonic has two species, one consonant, as when it divides the octave into Diapente and Diatessaron, and one Dissonant, as into larger Semitone and major Seventh, or into a Tone and a minor Seventh. Nevertheless, the consonance, if one wants to divide the Diapason into three parts as well, can be of two types, namely into Disymphona, as the division into Diapente and Diatessaron is called, and Trisympfona, when the diapente is divided into two Thirds, and each of these is either Enharmonic, namely with well placed consonances and with good proportions, or Parharmonic, which happens when the consonances are ordered in a way that is not so perfect. For instance the Disymphona Division is Enharmonic when the Diapente is under the Diatessaron and Parharmonic in the opposite case, while, equally, the Trisympfona is Enharmonic when the fifth into which it is divided is in the low register, and, when the fourth is in the middle, the ditone is above it and the semiditone is below it, while it is Parharmonic in any other way.