

Author: Doni, Giovanni Battista

Title: Discourse on the consonances dedicated to Father Marin Mersenne

Original title: Discorso Sopra le Consonanze Al Padre Marino Mersenne

Source: Florence, Biblioteca Marucelliana, MS A. CCXCII. 4. f.<1r>-<30v>

[<f.1r>-] Discourse on the consonances dedicated to Father Marin Mersenne

The greatest advantage that I believe to have gained from the travels on which I embarked on different occasions is the acquaintance and the friendship of learned persons that I acquired more thanks to their courtesy than because of any personal merit of mine. Since, among all these people, I have always felt singular regard for Your Reverence because of your immense expertise in mathematics and because you have adorned music to the highest degree with so many of your beautiful demonstrations and experiments, I have deemed it a great honour and a fortune that I made to that reign to have wormed myself into your good graces in the last two trips, and, since you forwarded me so many down-payments by sending me so kindly some of the fruits of your most noble studies and many extended letters on the most beautiful subject of this discipline, to which I have replied in the best fashion that my work engagements have allowed me to do, I believed that I should make the world and posterity aware of them by publishing this discourse in which I have laid out in a conversational manner some of my ideas about the most important and noblest topic of the musical discipline, which is the one concerning the consonances. Since Your Reverence has collected so many and so wonderful speculations in this field, what was let for me but to collect in a small bundle a few of my own observations almost collecting ears here and there? [<f.1v>-] Therefore, so that I may proceed with some order in this discourse, let us see first what consonance is, [because the shortness of this discourse does not allow to research, as the world appears to require, if consonances exist. add. in marg.] So, first of all I say that consonance (which corresponds to the Greek [symphonia]) is a suave union of two different sounds in the high or in the low register, or, as Boethius says: *Consonance is a mixture of high and low sounds that hit the ear in a sweet and orderly fashion.* [[Therefore, if the sounds are two, like, for instance, the proslambanomenos A and the mese a, this consonance shall be simple, but if they are three or more it will be compound. In other words, it shall be a cluster of several consonances, as in the case where two will sound in the high register, the nete diezeugmenon and]] I mentioned two sounds to exclude the combination of several consonances, which occurs when three or more completely different notes are heard and they answer each other with various encounters of consonances. This is called *multiplex concentus* in Latin and [polyphonia] in Greek. [[As to the density of the consonances, it is very well known that]] [[However, not all the authors agree about the number]] [[But with regard to]] However, almost all music theorists agree on the definition of consonance, but they do not agree as to the number of consonances, as some consider their number to be greater and others smaller. Modern practical musicians, [[(with whom also Your Reverence agrees as well)] thinking perhaps that in this way they enrich music, count the unison as a consonance, but they are very wrong, because the unison is rather the origin and principle [<f.2r>-] of the consonance than a consonance in itself, as the unit is the origin and principle of number rather than a number as such. Besides, where there is no difference of pitch, the definition of consonance cannot be applied. It follows then that consonances are numbered normally as seven, in this order: the first one is the diapason, nowadays called the octave; the second one is the diapente, or the fifth; the third one is the diatessaron or the fourth; the fourth one is the ditone or the major third; the fifth one is the trihemitonium, also called semiditone or minor third; the sixth is the major sixth or major hexachord; and finally the last one is the minor sixth or minor hexachord. Thus, the number of the consonances corresponds to the number of the different notes of the diapason, because the octave is nothing but a repetition of the first, the ninth of the second, the tenth of the third etcetera. Consequently, the consonances that lay beyond the octave are not regarded as different from the ones contained within it and they are called repeated, as everyone who has even a limited knowledge of music knows. Also, it is very well know that the octave is derived from the dupla

proportion, the fifth from the sesquialtera, the fourth from the sesquiterza, the major third from the sesquiquarta, the minor third from the sesquiquinta, the major sixth from the supertriptiente three and the minor sixth from the supertriptiente five, while only the first one of those seven proportions is multiplex, [-<f.2v>-] the following four are superparticular and the last two are superpartiens. Moreover, the most beautiful and pleasant consonances derive from the simplest proportions, which are those that are easier to grasp by our intellect and imagination. Now, albeit this number is so reasonable and well established, there have been some who, because of their excessive subtlety, have excluded the diapason from this group the diapason, which they considered to be an aequisonance rather than a consonance because of its great simplicity and because of the unity of its terms. They based this on saying (I believe) that it is closer to the unison than to the other consonances, namely, to the diapente, which follows it in the sequence. On the other hand, others who proceed with a method that is too imprecise, exclude the diatessaron from the consonances. I shall refer to them later, but first one must know that the ancient theorists, who considered everything with great accuracy of vocabulary and methodological subtlety, divided the consonances into three classes or degrees. They called the first ones antiphonae [antiphonous], which I translate into Latin as aequisonae rather than obsonae, as in Gaza's translation, because that prefix [anti] does not indicate opposition in this instance, but equivalence or similarity, which is connected to the term Homer used to describe the heroes, namely, [antitheous]. Such consonances are the diapason and its repeated ones, which were called thus because of that [-<f.3r>-] unity of their terms already mentioned that makes them sound like a single sound. They classed as second ones the paraphonae [paraphonous] (which I call Penaequisonae in latin) where that prefix [para] indicates proximity rather than difference, although sometimes it corresponds to the word praeter in Latin. They grouped under this definition the diapente and its compound intervals, because the sweetness of this consonance is such that it approaches the diapason in connecting its terms and sounds in a tuneful combination. The summary of these names is antiphony, paraphony, et symphony, ae<q>uisonance, penaequisonance (allow me to call it thus) and consonance, which are followed by homophony and unisonance. Aristotle and the writers of his age used these terms, but Ptolemy and the more recent one called unisonance isotony and aequisonance homophony. However, regardless of how they are called, the fact that those famous and classical authors used the term [Symphonia] in a general and in a specific sense (nor it is strange that no language, however rich it may be, has as many words as there are objects and concepts) can provide us with a reasonable motive to count [-<f.3v>-] the octave or aequisonance among the consonances as well without need for so many distinctions, especially because nobody excludes from their number the fifth or Penaequisonance, although it is not a consonance if one takes this word in the most restrictive meaning. It was an interesting whim that prompted Johannes de Muris (as Vostra Potestà relates in the fourth book of Your *Harmonics*) to increase the number of the consonances that he dared to count among them, apart from many others, the major twenty-third, which is the trisdiapason with the addition of one tone, because its proportion is the multiplex noncupla or from 9 to 1, albeit he excludes the major seventeenth, which, apart from the fact that it is one of the most pleasing to the ear, it is represented by a multiplex proportion, as that one is, but one that is even simpler and nobler, namely, the quintupla 5/1. But because this is the produce of that barbaric and ignorant century (in which, nevertheless, modern practice has rooted itself) and its reasons are absolutely irrelevant, what was said shall suffice. The controversy surrounding the fourth lays on a rather stronger foundation, since on one hand the fourth is banned by practical musicians, on the other it is admitted as a rule [-<4r>-] by music theorists. I said as a rule rather than universally because there are some who agree with practical musicians in this respect, but they are few and either not very renowned or belonging to those centuries so unrefined. I shall say something about this controversy because it does not appear difficult to resolve, although it was dealt with very learnedly by Andrea Papius in a booklet that he wrote specifically entitled *Pro Diatessaron, siue de consonantijs*, printed in Antwerp, [by Salinas, book 2, chapter 9 add. in marg.] by Zarlino himself in the third part, chapter five of the *Institutioni* and by Vostra Potestà in your Latin and French works. Those who believe the fourth to be a dissonance rely principally on the authority of the first

composers of counterpoints. I call them first meaning most ancient, such as Franco de Colonia, who describes it as rather harsh and rather unsuited to compositions for two voices. The others rely instead on the authority of all the ancient philosophers and theorists (who all class the Diatessaron among the consonances) and on several and important reasons, to which I shall refer in brief, as it suits our instinct. As to the authorities, it is certain that all the ancient theorists agree on this matter, but every modern writer of some worth, such as Zarlino, Salinas, Gallilei and similar ones, places it among the most perfect consonances, [-<f.4v>-] although they appear to me to be really excessive in this judgement. I shall not mention all of these great scholars in order to adhere my vow of brevity, so anyone can see them quoted in the aforesaid chapter of Zarlino's work and by Andreas Papius, also mentioned above, although many others could be added to the list. Let us spare ourself this effort, since we can answer the question of those who ask who are the ancient authors who place the fourth among the consonances with a single word. In fact, it is enough to say that those are all those who wrote about music either *ex professo* or in passing. As to the reason for this, many and very important ones can be adduced in favour of this view. I shall put forward some of them briefly. First of all, mathematical reasoning supports this. In fact, if consonant intervals are those that spring from the most simple and comprehensible proportions, and, if the sesquialtera, that produces the diapente, and thesesquiquarta, that produces the ditone, are capable to render those intervals consonant, why should the poor sesquiterza be placed in such a worse position (albeit it is halfway between those two) that it cannot produce a consonant interval? Secondly, no interval can be added to a consonance to produce another consonance, [-<f.5r>-] either in the low or high register, but this is practised in the case of the fourth, therefore it must not be considered as a dissonance. The most principal proof of this is found by reviewing all the dissonant intervals, namely, seconds, sevenths, false fifths, tritones etcetera, none of whom is employed in addition to the octave, fifth, thirds, sixths, etcetera, either in singing or playing. The most secondary reason is illustrated by practice itself, as the fourth is employed above the fifth between the extremes of a diapason, and not only it sounds agreeable, but it produces perhaps the best combination of three notes that can be found. Similarly, it is used together with the third between the extremes of the sixth and it produces a very sweet combination of sounds. Nor it is relevant to say that, if the fourth is sounded beneath the fifth, it produces a poor result and it does not satisfy the ear. In fact, there is a difference between saying that an interval is consonant or dissonant and saying that it is or it is not placed correctly, as there is a difference between [symphonia] and [eysymphonia]. The fourth placed under the fifth does not produce a good effect because it is not in its correct place and in conformity with mathematical principles, as Zarlino demonstrates learnedly showing that the primary and most perfect consonances are more suited to the lower register in conformity with the order of numbers laid out in their natural order. This does not derive from the fact that the [-<f.5v>-] fourth can never be used in the low register and it has to be supported, so to speak, all the time (practical musicians normally say covered) by another consonance. In fact, just as its place is above rather than below the fifth, and, similarly, above rather than below the minor third, thus, when it is coupled with the ditone or major third, its place is below rather than above it. This is demonstrated not only by mathematical reasons, but the experience of the ear itself confirms it, because it renders the composition sweeter when it is placed under instead of above. I find it really strange how our practical musicians ascribe so much importance to the ear and to what pleases it, [[and they cannot open their mouth without saying that music is made for pleasure]] (which they say to be the aim of music) but, despite all this and against the ear and experience itself, they avoid introducing the fourth in the lower position in their vocal compositions to avoid departing from the precepts of their teachers. In fact, in the case of many instruments, such as on the lyre and on the guitar, that consonance is heard in the lower register and it satisfies the ear to a high degree. This is a further proof that it is, in truth, not only a consonance, but that it is used as a consonance [-<f.6r>-] in the same ways as the others are used, and that it is not true what some say, namely, that it requires certain scaffolds to support it and to be 'saved', as they are used to saying. I confess, however, that when one moves to it from separate and distant intervals, one hears some harshness. From this, to sum up, one finds that it is a rather harsh consonance, or, better, a weak and flighty one, [(as Aristoxenus, quoted by Plutarch himself in the

second book of the *Quaestiones conviviales*, ninth Question calls it [amydrotaton]) add. in marg.], but one does not find that it is a dissonance. Consequently, it is not used in two parts with good reason, particularly because there are other consonance that can be used instead of it. Nevertheless, to speak freely, in certain places where the sense of the words appears to tolerate some harshness or some other sound out of the ordinary, I would say that it can be used sometimes without syncopations and other similar corrections, but within stepwise motion and at a speed that is not too slow. A third proof consists of this true fact. When two notes of an instrument are tuned as a perfect fourth, they produce an extremely sweet combination of sounds that is nowhere near any dissonance. In fourth place, all the dissonant intervals are very difficult to tune, unless they are very close to each other. This is proven in the case of the sevenths, ninth, false fourths, false fifths etcetera. However, the fourth is tuned with the greatest possible ease. Fifthly, as the octave is divided in three ways, firstly into a fifth [-<f.6v>-] and a fourth, secondly into a major and minor sixth and thirdly into a minor third and a major sixth, it is not logical that, if both of the intervals of the last two divisions, which are more imperfect ad secondary distributions by nature and origin, are accepted as consonances, the same should not be done in the first division, which is the most perfect of all. Moreover, as to some authorities who mention Zarlino and Papius as approved authors who employed the fourth as a consonance in certain passages of their compositions, I do not rely on them a great deal. In fact, if it is a consonance, I do not believe that this should be certified by the fact that it was used as such on certain occasions, and because of the rarity of these examples [Nor do we lack evidence to such an extent that we should resort to the example adduced by Zarlino and Salinas, who state that they have heard, one in Venice and the other one in Naples, the fourth used in the low part of the chants sung by the Greeks and it sounded very pleasant to them and to others who were present, particularly because either the fourth occurred beneath a fifth (which I do not believe, because it would have not pleased them much) or it was under the third, which produces a very good effect, as we can see nowadays in our musical instruments. add. in marg.] I believe to have proved abundantly that to consider the fourth as a dissonance is something that carries too much of the flavour of the barbarity of the past centuries. Those who say that it is half-way between consonances and dissonances do not satisfy me, as they believe, as they saying goes, to be salvaging both the goat and the cabbages. In fact, it is plain that a consonance is better and more perfect than another one, while some dissonances are worse and more unpleasant, others less so, but I cannot believe that one could find something that is of middle quality and indifferent [in our case. add. in marg.]. Nor do I believe that it can be accepted, as some say, that it is a consonance in theory, and a dissonance in practice, because, apart from the fact that [-<f. 7r>-] theory and practice are not otherwise contrary to each other, I also believe that it has been proven sufficiently that it is used by practical musicians just a consonance. The following controversy surrounds the thirds and the sixths. It is usually taught in music schools that they were not known or employed by the ancients, albeit Salinas (a writer who can make us doubt whether he had greater wisdom of judgement or depth of erudition) believed differently. Salinas states expressly in the second book, chapter XI that *people always used these consonances, both in singing as in the compositions that are played on instruments*. [Why am I quoting Salinas? This was also the opinion of Maillard, and of Pontus de Tyard and Johannes Froschius, quoted by Maillard himself at chapter thirteen of the first part. All three of them were learned and judicious writers, but there are perhaps others whom I cannot remember at the moment. As far as this is concerned, add. in marg.] I am sure that they were correct and that all the others utterly wrong. [[I shall strive to prove this, as much as I can, with the aid of reason]] Although many will deem this to be a great paradox, nevertheless, if one ponders carefully the motivations that I am about to put forward (although they do not attain the rigour of mathematical demonstrations) I hope that everyone of mature judgement will agree with me. Firstly, in certain divisions of the tetrachords, such as in Archytas' (a very ancient author) enharmonic division and in the chromatic one of Didymus, one finds (as I show more diffusely in the *Treatise on the Enharmonic* [-<f.7v>-] *Genus*) these proportions  $5/4$  and  $6/5$ , which represent the major and minor third, in the third interval. Now, since those divisions are the most beautiful and easy to practice of all, as it is much easier to find the consonant intervals than the dissonant ones, and since

those two music theorist enjoyed the greatest esteem in those centuries, who would ever be able to doubt that they do not correspond to the ones used in practice? Moreover, even if that species of enharmonic that has in third place the dissonant ditone  $81/64$  consisting of two major tones had been used in practice, as some believe, but with scant plausibility, how could it be that it never occurred to them, at least sometimes and by mistake, to tune the third and fourth note of the tetrachord as a consonant ditone  $5/4$ ? And how could it be that, after realising its sweetness, they did not embrace it then instead of the dissonant interval and dared then to adopt it also in their regular and diatonic performances? All the more so, since they knew how to use dissonance as one gathers from Seneca, where he describes the luxurious theatres and the variety of instruments used at his time, which prompted composers to write ensemble compositions. He states in the eighty-fourth Letter: *In our public performances, at the beginning, there are more [-<f.8r>-] singers than there used to be spectators in the theatre once, since the large number of them fills all the roads, the seats of the audience are surrounded by trumpeters, from the the stage resounds with every sort of wind instrument, and a consonant sound is created from dissonant ones*, The same information can be gathered from a passage by Plutarch that I mentioned in the aforesaid *Treatise on the Enharmonic Genus*. Moreover, such large number of notes contained in the ancient instruments would have been redundant and unused, if only the consonances that they call perfect were used. The simikon had thirty-five strings, as Athenaeus reports; the epigonion, invented by Epigonus of Ambracia, had forty. Epigonius was the first to play with both hands without a plectrum, therefore it is inevitable that he would pluck several strings at once, as one can see in certain bas-reliefs representing some women playing with both hands. Consequently, it is inevitable that a variety of consonances were produced and heard. As Tertullian reports, in passage quoted by me in the *Compendio*, the ancient organ had an extremely large number of notes, while the cithara itself had a large number of strings in his times, as he states himself, which would have been of little use if the performance were so lacking and deficient. Moreover, [-<f.8v>-] almost all the variety of music springs from these consonances called imperfect, which are responsible for the energy and efficacy stirring the feelings. In fact, the minor consonances, which are tearful and sad, create music of that character, while the major consonances, being cheerful and spirited, produce the opposite effect. In short, the ditone and the major sixth suit diastaltic music and the semiditone and the minor sixth suit systaltic music, while the fourths and the fifths are more appropriate for the music that we call hesychastic and of serious character. How did the ancients manage to render their compositions so emotional and effective, as very serious authors report that they did, without employing these consonances? Also, if the barbarian nations that cultivate some sort of singing and playing use them in their performances, how could it be plausible that the Greeks and the Romans, who were skilled and perceptive in all their occupations, did not have knowledge of them? Some one may ask the reason why, if the ancients were acquainted with the sixths and the thirds as consonances, they do not class them as such, but all the writers agree in considering the diatessaron as the last and smallest consonance. In particular, one reads in the book of the *Harmonic Elements* that all the intervals contained within the diatessaron [-<f.9r>-] are dissonant. I believe that we should not find this strange. In fact, of the thousands of books on music that had been written before the dissolution of the Roman empire only one has been preserved to our times. Of the books that were written, we have none that deals with practical music expressly. In fact, if we had the complete works of Aristoxenus or a few of Didymus', I am convinced that we would be clear that this is clearly true. However, some shall say that it is rather telling that none of the ones that have survived mentions the consonant thirds and sixth. However, this is of no great importance, because almost all the writers that survive followed the principles and the precepts of the Pythagoreans in music, despite the fact that many other different schools arose later on within this discipline, as Porphyry teaches us in his commentary on Ptolemy. This is a consequence of the great authority held by Pythagoras and by his followers among music practitioners (although they were more concerned with speculative than practical music) because they were the first ones who discovered its secrets and who wrote about them. We see that the same occurs nowadays because, since Aristotle's doctrine is accepted so universally in philosophy, even those who attack him and create new [-<f.9v>-] schools

use his methods and vocabulary for the most part. Moreover, why should we not believe that the ancients used the thirds and the sixths as consonances because they did not describe them as such, if modern practical musicians, as we said above, act in the same way with regard to the diatessaron by not including it among the consonances, although they use it in practice as a consonance? I add that, as Salinas observed, there are some passages in the works of the ancient writers where it appears that they were inclined to accept even the imperfect intervals among the consonances, although they did not dare state it openly. Moreover, if I were asked why the Pythagoreans did not accept the secondary consonances called imperfect, I shall say that this originated from their extreme and superstitious cult of simplicity and from the supreme veneration that they had towards the number four, called by them [tetraktys]. Therefore, they did not accept as consonances, or perhaps they did not consider worthy to be called in this way, any other but the ones contained within said number produced by the first three species of multiplex proportion and by the first two of superparticular proportion, to indicate that, although they knew that every interval added to the diapason maintains the same nature and quality, nevertheless they did not accept them as consonances, [-<f.10r>-] not even in the case of the diapason-diatessaron called eleventh nowadays, because its proportion is neither multiplex or superparticular but superpartiens between      and      . Ptolemy is at great pains to demonstrate their error, although theirs was rather a kind of obstinate attitude and a peculiar way of expressing themselves, rather than ignorance. The habit of calling consonances only the first ones (and perhaps the only ones known by Pythagoras) stemmed from this and it became common among music theorists, although it is likely his followers were acquainted with the others as well. [[Also, since we can believe that the practical musicians of that time called these pleasant combinations or encounters of notes with a specific word, I would deem it plausible that they would have called them [synnkordias], or another similar word, because they were usually hit together with the true consonances.]] We can add also another reason why they did not recognise the thirds and the sixths as consonances, which is that they were convinced that they were singing and playing in the Diatonic Ditoniaeus, which proceeds through two larger tones and a limma, where, as a matter of fact, the thirds and the sixths are heard as dissonant in practice by the ear and they are recognised as such on the basis of mathematical calculations, as in the Discourse      I have shown at greater length. [Others believe, as does add. in marg.] Zarlino in the prologue of his *Dimostrazioni* hat the ancients did not hear such consonances in their appropriate positions, therefore, they did not produce a pleasant effect, and, since they did not do so, they did not accept them as consonances. In truth, this is hardly plausible. In fact, to say that the ancient system did not exceed seven voices or notes is ambiguous. In fact, if they mean to say that the written and divided system in every note with specific note names did not exceed that limit, they are correct, however, [-<f.10v>-] if they believe that the artificial system of the instruments does not exceed beyond this number, they are wrong, as I said above. Even if they did not have this sort of instruments, they would have able to experience this by joining very low and very high notes with other medium ones of different pitches. Moreover, although the system spanning a disdiapason dipente, or two octaves and fifth, is required for the largest harmony that contains all the consonances and it is represented by the number six (where the two thirds are placed among the last notes towards the high register, where they sound better, in truth, than in any other position) nevertheless, if they are placed among the terms of a single octave or of two octaves in such a way that the major third occupies the lower place, the minor the middle and the fourth is place above, they will produce such a pleasant harmony that it will suffice to let them all be known as good consonances, even if someone had not thought about it previously. Moreover, if it is the case that the ancients never experienced these consonances in the most excellent accompaniment, which occurs when they are placed in their appropriate positions in an ensemble of six parts, why would they not have been able to test them between two single notes or between two voices? Their sweetness and gracefulness can be heard manifestly thus, especially [-<f.11r>-] in the ditone, in which case what Signor Galilei says of the fifth is perfectly appropriate, namely, that it appears to kiss and bite at the same by tempering its sweetness with a squirt of acidity, or, as we say, it resembles the wine that has a sweet and spicy taste at the same time, while the diapason is merely sweet and the major sixth purely spicy.

Therefore, Zarlino's opinion on this matter becomes entirely implausible in my eyes. Another explanation, which I contemplated several times, seems to me to be closer to the truth. This is it. In so many centuries when music flourished and was cultivated by very subtle and perceptive persons with an infinite array of experiments and theoretical speculations, the ancients were in a position to be able to observe that all the intervals that occur between the two thirds, sesquiquarta and sesquiquinta, [and, equally, between the two sixths, major and minor add. in marg.] appear to be or are consonant. In other words, they could see that any part of the minor semitone  $25/24$  (which is the difference of the aforesaid thirds or sixths added to the minor or subtracted from the major) alters it by making it more cheerful or more sad, but does not change it from being consonant to being dissonant. It is not difficult to prove this with a practical experiment. In fact, if two strings laid out on the canon and tuned at the interval of a minor or major third are plucked [-<f.11v>-] and one of the small bridges is pushed little by little until the opposite consonance is heard, or if the same is done on a violin by holding one string (another instrument with strings tuned to a third will do) and, by pushing the finger in the same way backwards and forwards, one arrives at the terms of the opposite third, one shall heard clearly that the two strings sound and unite gracefully in all the combinations that are found within the span and distance of said  $25/24$  semitone. These combinations (because of the property of every continuous quantity to be divided into infinite parts) are infinite, although the audible differences can be reduced to a small number. This is a fundamental property of this sort of consonances called imperfect, because the same does not occur in the others, since the octaves, the fifths and the fourths become dissonant from consonant even if they enlarged or reduced only slightly. Also, if the alteration is small, as in the case of modern instruments, it can be tolerated and it pleases the ears. However, if it is rather considerable (as in the case of a comma or half a comma) it will sound too unpleasant. The ancients, therefore, observed this property of the thirds and of the sixths and, more importantly, they [-<f.12r.>-] used some of these in practice, such as, for instance, the superbipartiente nona  $11/9$  (in the Ptolemy's equable syntonic) which is produced by the sesquidecima  $11/10$ , which is the fraction that expresses the interval from the parhypate F to the lichanos G, and by the sesquinona  $10/9$ , which is the fraction that expresses the interval from the lichanos G to the mese a, and it is reduced from the sesquiquarta or exact major third by the interval  $33/32$ . The ancients deduced from this the instability and uncertainty of these thirds and sixths and they took this as a pretext, at least in appearance, to avoid calling and treating them as consonances, despite the fact that they used them in their compositions and ensembles. In fact, they would have done better had they considered the thirds as consonances absolutely (not to speak of the sixths for now, as they are almost a consequence of the thirds) since reason and sensual perception appear go hand in hand, as far as the thirds are concerned. Personally, I believe that we would find that they were regarded as such by many in reality (if a larger number of the works written by ancient music theorists had come down to us) and practised accordingly, if any remnant of those ancient compositions were to be found nowadays. Be this as it may, I will speak clearly and say (even if I were to lose favour completely in the eyes of the contrapuntists of our day) that it is easier to forgive the ancients because they considered [-<f.12v>-] thirds and sixths as dissonances than they are forgiven for considering the fourth a dissonance. If I am not mistaken, everyone who proceeds from the standpoint of reason and is not welded to one's own opinions will agree with me., [especially, one has the patience to ponder those other reasons as well. It is so necessary that the notes should proceed in groups of four according to the sesquiterza proportion (apart from where the tritone occurs) because, if this did not happen, everything would be in disarray. In fact, all the melodies are supported by these two cornerstones, namely, the Diapente and the Diatessaron. This does not occur in the case of the thirds. In fact, even if a harmony does not have any sesquiquarta or sesquiquinta, nevertheless some melodies can be found within it and some composition can be built on them, whether the thirds are of a middle size instead of the others, as it occurs in this species of the diatonic:

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 12v; text: 15/14, 56/49, 49/45],

where one shall never find in any place the exact major or minor third, or they are not even of a middle size, but dissonant, as in the diatonic diatonaeus. They will concede perhaps that the use of the sesquiterza is more necessary, as far the melody is concerned, than the use of the sequiquarta and sesquiquinta, but not with regard to counterpoint and ensemble composition. Here is the demonstration of this. In polyphonic compositions nothing good can be done without the fourth or sesquiterza, but one can do without the two thirds or the sesquiquarta and the sesquiquinta. For instance, I change into them the  $\frac{1}{2}$  that occurs between Mi and Sol and the  $\frac{1}{3}$  that occurs between Sol and Mi in ascending in the aforesaid division. Therefore, the fourth is more necessary than they think also in contrapuntal practice, and the two common thirds are much less necessary than they thought. Therefore, Maillard, in the chapter quoted above, said that they are not otherwise necessary to harmony, since they were not accepted as essential parts of it, but as something that adorns, replenishes and co-ordinates music, or, as Froschius wrote, something that connects and joins together the perfect consonances. Moreover, I want to show that the fourth is used as a consonance where one would not be able to use the thirds. When composers write a fugal passage at the fourth either between a voice and an instrument or between the voices unaccompanied, what do they do if not an accord or consonance of the kind that the Greeks call [kata synnekhan], as we gather from *Plato*, which means by succession, or *secundum prius et posterius*? However, leaving aside this sort of consonance, since it is plausible that, as ancient musicians used the major, minor and middle-sized thirds and sixths, they called these pleasant encounters or combinations of sounds which were perhaps considered half-way between the true consonances and the dissonances, it is probable, perhaps that they called them [synkhordias], because they could be (or used to be) struck only together with the true consonances, or that they called them with another appropriate term. add. in marg. et infra lineas] I shall add now something with regard to these middle-sized consonances, since up to now they have hardly been known and considered. Albeit, as we said, all the intervals, or middle thirds, that occur between the sesquiquarta and the sesquiquinta can be accepted as consonant, since they cause union of their terms in which consonance consists, nevertheless, since all faculties abhor what is infinite and indeterminate, and because one hears that those result more redounding and harmonious than it is possible to represent them with certain and precise numbers, especially of simpler and more perfect proportion (although in general they are all superpartiens) all the ones that have to be considered are the ones produced by one of the divisions of the tetrachord (which creates the variety of the genera and the species of the colours) that is useful and viable, distinguished by the name of the inventor or by our current use, as it is the case in our  $\frac{56}{45}$ , which originates from the true enharmonic division, and in the above mentioned  $\frac{11}{9}$  which is produced by the equable diatonic. [-<f.13r>-] However, since all the intervals that cannot be heard as distinct must be considered as the same one, I believe that, from a practical point of view, all these medium-sized thirds, and their respective sixths, must be reduced to one, and that in future musicians must define three different thirds and three different sixths and adopt them according to their need and according to the species that they will be handling. As to whether they should be classed together with the other consonances or otherwise, I will leave this decision to more learned and more highly regarded persons, since, as for me, I have so little ambition of being held as the inventor of new consonances, that I would be more inclined to decide against it, because of the great variety that they possess. However, I believe that those musicians who shall refuse to employ them will not be able to avoid being blamed with profound obstinacy and shall consider them dissonances, as the disposition of the numbers and the evidence of the senses highlights them so clearly among the other intervals. This is the case, specifically, of our  $\frac{56}{45}$ , which has so many peculiarities conditions. In truth, one cannot deny that music is enriched by it, since this kind of third partakes both of the brusque and spirited of the major third and of the sweetness and languidness of the minor one, to such an extent that [-<f.13v>-] every expert singer who is used to it will be able to distinguish them with ease. You will be able to see their possible application in my *Treatise on the Enharmonic Genus*. However, I seem to hear that some oppose this novelty by saying that many other thirds can be ascribed to this role,



as, for instance, one consisting of two smaller tones, the ancient ditone composed of two larger tones  $\langle 81/64 \rangle$ , one consisting of the smaller tone and of the larger semitone, one consisting of the larger tone and of the semitone that some call the largest represented by this proportion  $27/28$  [[as from b to raised C sol re ut]] and other similar ones.

However, it is easy to answer this question. In fact, either they shall be of medium size and shall be represented by a proportion between  $6/5$  and  $5/4$  (or larger than the smaller and smaller than the larger third) and, therefore, they shall be consonant, or they shall be larger than the sesquiquinta or smaller than the sesquiquarta, and, in this case, they shall be dissonant. Thus, they say that the third consisting of two smaller tones is really median and consonant, since it is different from the sesquiquarta because it is reduced only by a comma, while the ancient ditone is dissonant, although it exceeds the sesquiquarta itself by a single comma. Equally, they say that the one composed of a smaller tone and a larger semitone, which is a sesquiquinta reduced by [-<f.14r>-] a comma, just as the one that consists of the larger tone and smaller semitone is much more dissonant and removed from the sesquiquinta because it is smaller by the interval  $128/125$ , considered by modern theorist to be the enharmonic diesis. However, the one that is composed of the larger tone and the semitone  $27/25$  is consonant, since it is nothing but the sesquiquinta enlarged by a comma. Hence, it will be possible to call it not only a middle-sized third, but, if one wants, an enlarged smaller third, because it is closer to it than to the larger third. This occurs also in the case of the superbipartiente nona  $11/9$ . Conversely, our  $56/45$  and also the one that consists of two smaller tones could be also called a larger diminished third, because they are closer to the major than to the minor third. Some ask why it is not possible to proceed beyond the sesquiquinta with the same sequence of superparticular proportions, since it is known clearly that the sesquisepta  $7/6$ , which is next to it, is dissonant. Salinas discussed the matter with great subtlety and insight, as he used to do, [at chapter fourteenth of the second book add. in marg.] so it will be possible to refer to him. Instead, I want to put forward a new observation of mine on the quality of the consonances and of other intervals, so that it may be pondered more closely and judged by someone who [-<f.14v>-] has the most exquisite ear and the most refined judgement. Therefore, I noticed that the different quality that is heard not only among consonant intervals, but also among dissonant ones, derives not only from the five kinds of proportion (multiplex, superparticular, superpartiens, multiplex superparticular and multiplex superpartiens) but also by other special and less well known differences. Everyone knows that the most perfect and united consonances, such as the octave and its compound ones spring from the multiplex proportions, that the ones that are most pleasant to the ear, such as the fifth and the two thirds, derive from the superparticular proportions, while the most imperfect and unpleasant. such as the sixths, are produced by the superpartienti. It is not so well known, however, that the ones that have a greater odd number are the most perfect and masculine, according to doctrine of the Pythagoreans who considered the odd number as masculine and most perfect, as one can see in the case of the diapente  $3/2$  and of the ditone  $5/4$ . The opposite occurs in the case of the diatessaron and of the semitone, that are more imperfect and have as their numerator an even number, namely,  $4/3$  and  $6/5$ . The former, as the aforesaid ditone  $5/4$ , are also cheerful by nature, or crude, as in the case of the major sixth  $5/3$ , while the latter are sad, such as the minor third  $6/5$ , or even languid, as the minor third  $8/5$ . Moreover, one can ascertain [with the help of the monochord add. in marg.] that the [-<f.15r>-] intervals that follow the series of the proportion  $6/5$ , such as  $7/6$ ,  $8/7$  etcetera, partake of a certain quality of sound that they share with the previous intervals, which consists in the fact that, although they are not consonant, nevertheless they are somewhat attractive. This feature is all the more evident the closer they are. One can also see that the sesquisepta  $7/6$  is somewhat harsh, the sesquiseptima  $8/7$  has a languid character. Equally, if one takes another series of proportions, namely, the one of the superpartiens, from the first one,  $5/3$ , which represents the major sixth and continues  $7/5$ ,  $9/7$  etcetera, we shall find that they are all rather harsh and they share a certain particular quality of sound, leaving always aside the ones that are not contained between the two thirds, such as  $11/9$  or between the two sixths, that shall appear to be always sweet and tuneful. Similarly, if we start from another beginning, namely, from the sesquitripartiente quarta  $8/5$ , which represents the minor sixth and it is the first one of the superpartiens proportions with an even

number as their numerator, followed by 10/7, 12/9 and so on, we shall find that they all partake of the same quality, which is a certain languid character. As to the sequence of the consonances based on their perfection, whether understood or sensibly perceived as such, I refer to what Father Mersenne writes in the book *de consonantijs*, where he discusses them in a way that is no less erudite than insightful. [-<f.15v>-] As to myself, since I would have no problem in placing the fourth after the two thirds, thus I would not dare to state if it should be placed before the two sixths or not. In fact (talking with regard to the ear) when I hear the fourth tuned appropriately, on one hand it appears to me to be more pleasant than the major sixth, when they are taken in isolation; on the other hand, if they are considered in a composition for two parts, it seems to me that the sixth produces a better result. Nobody should find it strange that I prefer the third to the fourth, although the fourth precedes it in sequence and it is represented by a more perfect proportion, because it is clear that the fourth is less pleasant to the ear than the third. A more adequate reason than this one cannot be adduced, in my opinion, than to say that, since every consonance has its corresponding one in relation to the diapason, from whose division they derive, and since they are coupled almost in a certain conjugal harmony, the less perfect is almost a completion and accidental companion to the principal and nobler one. Therefore, since the diapente itself derives such great perfection from the diapason, only a small amount of perfection can be left for its companion, the diatessaron. In the second division or partition of the octave, the smaller the portion of perfection that the major third takes for itself, the larger the portion that is left to the minor sixth, thus there is less disparity between them [(the same is considered valid between the minor third and the major sixth) add. in marg.] than between the fifth and the fourth. I say this to prevent anyone to be drawn on this basis to [-<f.16r>-] state by certain definition that the sixths are more perfect than the fourth. In fact, should this conclusion be reached, it would be necessary that the whole sound of the octave divided into third and sixth should be as sweet and harmonious as the one of the fourth and of the fifth, but there is much to be said against this opinion. One may also have the doubt that the twelfth is more perfect and melodious than the fifth and the tenth more than the third. However, since Vostra Potestà has dealt with this matter with such great diligence and erudition, I have nothing to add to it. [However, I do want to note in passing, since it is a matter that belongs to practical music, that, since the fifth requires to be placed under the fourth and the fourth under the major third and above the minor one, if the fifth is accompanied by two sixths, it is easy to recognise both experimentally and mathematically that its place is below the major and below the minor one. Hence one can see that the thirds have the same proportion with the fourth that the sixths have with the fifth. It is true, however, that the first of these three accompaniments sounds worse than all the others when it is reversed, namely, when the fourth is placed under the fifth; the second one is more tolerable and it occurs when the fourth is under the minor third or above the major one, while the less unpleasant of all is the third one, where the fifth is placed under the minor sixth or above the major one. add. in marg.] As to the reasons behind the consonances, three can be adduced, in my opinion, one is metaphysical, the second physical and the third mathematical. I shall discuss them briefly. The metaphysical reason is this one. All things conform more or less to each other, or, we could say, they are closer or further removed from each other. Now, if the eternal a divine providence did not establish the progression from the unison to the octave as if from the centre to the circumference or from the number one to the number ten, that within these terms one would find other consonant combinations or relationships, and that the same combinations or relationships would be found repeated above the octave and its compounds, the consequence would have been that the further removed the notes were from the unison, the more they would sound dissonant, unpleasant and out of proportion with each other. This would have [-<f.16v>-] eliminated any foundation of music and harmony. But, on the contrary, the supreme wisdom ordered since eternity the nature of the sounds in such a way that, almost mirroring its divinity, just as the intellect cannot, moving from the unit towards the trinity, not return to consider that most simple unity in a circular fashion, similarly, the progression of harmonic relationships cannot depart from the unison without returning in a circular fashion to the unison itself from time to time, through the encounters of the diapason and of its compound intervals. From this so many other beautiful speculations and correspondences derive

that it would be too long to describe them. The physical reason consists in this pleasant union of sounds that are carried orderly to the eardrum through the circular waves of the percussion of the air, which are similar to the ones that can be seen in the water. The more these waves are commensurable with each other (this depends from the number of those reciprocal impulses or vibrations created by the percussion of the sonorous bodies) the more perfect and pleasant the sound of the consonances. Signor Gallilei demonstrates this fact in the first dialogue of his *Discourses and Demonstrations on the mechanics and local movements*, by using a number of pendula of proportionate lengths suspended from a nail in a way that is quite different from the method used by Vostra Potestà, namely, via the vibrations produced by the higher or lower strings themselves. Nevertheless, these demonstrations [-<f.17r>-] do not satisfy my intellect entirely. In fact, in the precise instant when the percussion occurs or, at least, the sounds are heard, the ear and the intellect separate the consonant from the dissonant, and discern the sweetness of the former and the unpleasantness of the latter. Nevertheless, that instant or moment precedes in the natural order that relationship or commensurability that the vibrations of the sonorous bodies have with each other or the resonance of the air. Therefore, it seems necessary to look for some other physical principle more intrinsic to consonance and dissonance. The mathematical reason, however, is very well known because it derives from the proportions that the sonorous bodies, and, consequently the sounds themselves, have with each other, whether they consist in the quality, as Theophrastus, quoted [by Porphyry in his comment to Ptolemy's Harmonics add. in marg.], maintains, or in the quantity, as Ptolemy himself preferred. Although these proportions or relationships are founded on the continuous quantity (whether according to length, width, mass or weight) nevertheless, since they are measured and demonstrated with the aid of numbers and because are closely related to said vibrations, they appear to be connected with discrete quantity. In order to satisfy the curiosity of those who enjoy musical comparisons, when they are appropriate, and to highlight the great correspondence that the degrees of harmony have with the beings, all remains for us to do is to make a comparison laying out all the notes or intervals in six degrees and showing the analogy that they have with all things, both in general (in how many degrees they are distributed) and in the individual case (one with another one). First of all, the unison, that is the first degree of the notes, corresponds to God. In fact, just as God is the single and true origin of all things and is infinitely more perfect than they are, thus the unison is the origin of all the intervals and almost infinitely removed from them, since, the distance between unit and number is in some way infinite. Secondly, the aequisonance is compared to the angels. In fact, just that they are closer to divine perfection than any other creature, to the point that some of those are called gods in the holy scripture (*I said: You are all Gods and Ego dixi Dij estis et filij excelsi omnes*) thus the aequisonant intervals approach the perfection of the unison more than any other one, and very often are considered as unisons. Thirdly, the penaequisoni correspond to man, because they, as man does, they are very close to the aequisonant when they are tuned. Similarly, human nature approaches the nature of angels through the intellect and the soul that can be separated from the body that it inhabits, so that the royal prophet declared: *You created him little less than* [-<f.18r>-] *an angel*. Nevertheless, since an angel is pure spirit, while man is a composite of spirit and body, thus it appears that aequisonance is a simple sound, while the penaequisonance displays more manifestly its composition of a low element, which corresponds to the body, and a high one that corresponds to the spirit because of its lightness and speed. Fourthly, the intervals specifically called consonant correspond to animals and living beings not endowed with reason, both because of the correspondence of their position in the order of creation and because those intervals are identified merely according to the genus, while the living beings not endowed with reason, that are usually called animals, are separate prescinding, as Logics say, from those endowed with reason. Fifthly, the interval that can be sung, called emmeles by the Greeks, such as the Tone, Semitone etcetera, can be compared to vegetables and plants, not only because their correspondence on the scale of creation, but also because the consonant intervals are composed of them, in the same way as the vegetables and their faculty are integral parts of animals. Also, just as there are certain plants that are half-way to being animals, like sponges (these are called in Greek [zoophyta]) similarly many

are not sure if certain intervals that can be sung are consonant or dissonant. Sixthly and finally, the intervals that cannot be sung and are called *ecmeles* in Greek, are specifically the ones that consist in hollow proportions that cannot [-<f.18v>-] be expressed with numbers. These correspond to the lowest class of beings, namely material and inanimate objects, not only because they are the most imperfect of all, but also because they can be divided only in one way, that is quantitatively. For instance, a length of reed can be divided into two reeds, as in the case of those intervals that can be divided only materially on the basis of proportional halving and geometrically, but not arithmetically, while those that can be sung admit more than one division, as they admit the both the geometric and harmonic one. For instance, a *sesquinona* divides into the *sesquidecima quinta* and the *sesquivigesimaquinta*, just as the vegetables admit the physical division as well as the organic one. In fact, a tree trunk which is made of a single reed can be divided into two half-reeds, and also into bark, marrow, fibres etcetera. I want to mention, as an addition to this discourse, an extravagant opinion held by some who believe that, if two dissonant notes divided harmonically by a third one are sounded together, they would produce a pleasant and harmonious combination of sounds, to the point that they shall become consonant. They believe that the alternate union of the two extreme terms with the middle one is so effective that it has the power to connect the extreme notes in a consonant union. This explanation, however, is of little importance. In fact, if we want to argue this case as we would the fact that the compound interval resulting of two fifths (which is [a major ninth divided into two fifths, although it has the median term that is connected with the extreme terms in a proportion as perfect as the *sesquialter*]) does not sound consonant, because the extremes do not have a harmonic proportion between them sufficient to produce a consonance, as one can see in these terms of the major ninth halved geometrically and divided into two fifths 9. 6. 4., thus it is not rational that the same terms harmonically divided, for instance, thus:

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 18v, 1; text: [[117]], [[72]], CXVII. LXXII. LII. 45, 20, differenza]

must be consonant with each other because of that union, albeit different, that they have with the middle term, as they lack the above mentioned condition, namely, to have a ratio between them that produces the consonance. Therefore, let this proportion of *dupla sesquiquarta*  $9/4$  be divided as one likes, it shall always produce three dissonant notes because it is dissonant. Conversely, if a consonant ratio, as, for instance the *sesquialtera* is divided harmonically as in this case:

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 18v, 2; text: 15, 12, 10, F, A, C]

where a fifth is divided into the major third in the lower register and the minor third in the high register add. in marg.] [-<f.19r>-] this will increase its combination of sounds or perfection of consonance by rendering it more pleasant, and, to express this with a Greek term, one shall add the prefix *eu* to the word *symphony*, to create the word *eusymphony*. Therefore, if the progress is even, we can imagine at the most that a dissonant interval, if harmonically divided, must become considerably less unpleasant to the ear, but not consonant. If someone wants to clarify this experimentally (as for myself, I would not deem it worthy to test it) one shall be able to do this easily in the case of the *quadruple sesquialtera*  $9/2$ , which is the major sixteenth, consisting of two octaves and a larger tone, harmonically divided by another note, with these numbers:

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 19r, 1; text: LXXXIX, XXXVI, XXII, 63, 14 differentia],

which, in practical terms and using the common musical notes, is found within these notes C, # f, d,

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 19r, 2],

which contain an eleventh enlarged by an enharmonic diesis  $32/33$  in the lower portion and a major sixth diminished by the same amount in the higher part. Now, since the largest term of this proportion is the number 99, one can divide the monochord firstly into five parts and then into ten and the extreme of these into ten small parts. If we leave one of these parts aside, we shall obtain the number required. The other two can be obtained easily from two other equal strings tuned to the unison, by marking the points where these sections occur so that anyone will be able to note their effect by employing a corresponding number of bridges. [-<f.20r>-] Now, since some believe to be able to demonstrate that nowadays the Diatonic ascribed to Aristoxenus is sung and played in string and plucked instruments because of a certain conjecture that they gather from a duo by Adriano, which, at first sight, ends on a seventh, I want us to examine in some depth how the matter stands, although this argument is so weak and, to be honest, so impertinent and silly, that any person endowed with average intelligence and with some expertise of music theory will be able to detect its falsehood easily. Nevertheless, at least in order to avoid that those of simple mind should be fooled, as experience taught me that it is the case, it will not out of place to digress somewhat. The duo by Adriano is the following one. I have written it out in score so that it will be easier to observe its progress and all of its intervals both vertically and horizontally.

#### Duo by Adriano

There is no doubt that Adriano's intention was not that the parts in their actual singing should rest on a seventh, nor that, for instance, at bar twenty-one they should strike together an interval as dissonant as the tetratone, or augmented fifth. However, its conclusion has been the subject of an extensive and varied controversy in the past century, and speculations and mysterious myths have been built around it that I do not believe that ever entered Adriano's mind. Artusi reports of a letter by a certain Giovanni Spadaro written from Bologna to Pietro Aron in which, after a long and unrefined discourse, the author concludes that the composition does not end on a seventh but on an octave enlarged by a comma. However, since this entire doctrine is based on utterly false principles (such as on how the perfect tuning is practised, that the diatonic diatonaeus is used and that the comma is the difference between the smaller and larger semitone, facts that have been refuted sufficiently) [-<f.20v>-] there is no need to waste any more time. Artusi's dealing with this matter is interestingly capricious. In fact, since he did not know who was right of those who argued about what species of diatonic is practised nowadays, but he recognised that Adriano must not have believed that he was using Ptolemy Syntonic, according to which this composition would not end on the octave, because Fogliano was the first one who put forward this doctrine, nevertheless he classes Adriano as a follower of Aristoxenus, although this new pseudo-aristoxenic doctrine (or supposedly harking back to Aristoxenus) was hardly known or discussed in those times. As far as one sees, this doctrine was discovered later on by Carlo Valgulio from Brescia, a great expert of the Greek language who translated the pamphlet entitled *On music* by Plutarch, and to a greater extent by our own Gallilei. Suffice it to say that Artusi, who does not disagree with anyone, continues by saying that, 'although modern theorists believe that the diatonic species sung and played currently is Ptolemy's syntonic, nevertheless some shall believe that it is the one of Aristoxenus, of which Messer Adriano provides the evidence with this composition.' A great demonstration, for sure. However, let us see how he proceeds. He states, therefore, that the tenor, when it enters at bar twenty-one, instead of C so<l> fa ut with the b flat, the note that is written, sounds the note b fa [sqb] mi, which he presumes to be an equal and higher semitone of the previous b fa, last note of bar twenty, which, according to this theory is the same as the C sol fa ut lowered with the b sign. Moreover, he wants that the following note F fa ut should be changed to E la mi, so that said tenor should fall by a fifth, and, consequently, the first note [-<f.21r>-] of this bar 21 should sound a minor sixth under the soprano and the second note a tenth. Let us concede to him that this occurs in the notes, to avoid useless complications. Nevertheless, someone might say that the first note should not be tuned as a b fa, as the previous one, or, even if it is tuned as [sqb] mi, one should descend by a fourth to F fa ut with the sharp, rather than by a fifth to E la mi. In fact, if the only reason to do so is to maintain the semitones equal, why should it not be possible to jump by a fourth as by a fifth, especially because in that way of tuning one shall not depart so much from the notation? However,

the truth is also that all this alteration derives from the difficulty of tuning such strange and unusual intervals, such as the leap of a semidiapente that falls between said two notes, especially with the addition of the harshness of the tetratone that one hears in the counterpoint and of the other intervals that follow, namely, the tritone and three consecutive ninths. The voice in fact abhors them and it is attracted by those that are easier and more consonant. Thus, one can consider certain that, when the soprano is held the tenor really sings the note [sqb] mi instead of the diminished C sol fa ut, then a fifth under the soprano and finally three tenths in succession etcetera, so that the first and the second part conclude on a perfect octave rather than on a seventh. If this is so, it is certain that this composition was written to be sung rather than to be played, of whichever type they may be. Therefore, I found it very strange that Artusi in the first place, and then several others had it performed on viols. In fact, apart from the fact that nowadays the difference of the semitones on string instruments themselves, even if they were identical on the viols, I cannot see how the end of this duo could be played in a way that is different from the way in which it is written. In fact, if [-<f.21v>-] we take the ninth note of the tenor that is a high e la mi and we suppose that it is sung exact, as it is necessary, since it is not preceded by any strange interval that pushes or alters the intonation, it is certain that the last note of this part, as it is marked as a lower E la mi, will be at the distance of an octave precisely. Now, since the intervals contained within these terms, however they divide into unequal or equal, rational or irrational, larger or smaller semitones, and however one wants, they cannot enlarge or reduce said interval or distance of a diapason, it follows necessarily that, if it is sung exact, namely, as it is written, the extreme parts shall remain at the interval of a seventh, because the soprano ends on D la sol re. Moreover, since it is virtually impossible to sing the duo as it is written just with the voices, I admit to the fact that they shall end in an octave. However, as to the instruments, if it is played on them, since one can find also the C with the flat sign b by altering the Enharmonic [sqb] mi a tiny bit, there is no doubt that it shall be tuned as it is written. The same shall occur in an ordinary harpsichord and on the viols, except for those notes that cannot be found, such as said C sol fa ut with the flat sign b, which, however, cannot and must not prevent the fact that the preceding or ensuing notes that can be found in the instruments should be played as they are, such as in the case of the F fa ut with the flat sign b that follows. Therefore, it seems to me a laughable experiment the one undertaken by one of these practical musicians (to what end, it is uncertain) who had this composition played on two viols, not as it is written, but as it is altered when it is sung by the voices. As to Artusi, we can say that he acted as someone who, in order to show that the angle of a building was a right angle, rather than obtuse or acute, employed a Lesbian set square, which was made of lead and could be enlarged or reduced as one wanted. We can also draw these conclusion as completely certain, namely, that Adriano had no other aim in writing this duo than to compose by sheer whim and eccentricity a composition that cannot be sung in the way it is written. [-<f.22r>-]

To sum up, and to provide a general rule to know the significance of the position of the frets in this sort of instruments, one can see that in the first three semitones the alternate sequence of a major, a minor and a major semitone is observed almost everywhere, as I mentioned above in passing. Then in the fourth one, one can discern greater variation than in all of the others, and it appears to be put forward to provoke controversy in this division. In fact, although it is placed instead of a major semitone, nevertheless in some instruments it comes very close to the equal semitone, since it often has to have the function of the minor semitone as it occurs in the lute on the sixth string where it forms the semitone b [sqb], although that semitone in the perfect tuning is closer to the medium-sized semitone, since it is represented by the proportion 135/129, which is a comma larger than the minor and sesquigesimo quarto semitone. However, in the other four successive notes, because it falls between the sharp sign # and the flat sign b, very often it is used for one or the other, and this produces the imperfections mentioned above. It is true, however, that it is closer to the major than to the minor, so that one hears a very enlarged tone between the second and the fourth fret. Moreover, in the necks of cetera that are better divided, it appears to be not very far from the third one, so much so that the makers of such instruments are aware of this (but only confusedly and from a practical point of view) and, as a rule, they do without this fret at least in the high register, so that in

the fourth that falls between E la mi and a la mi re according to different tunings one notes no inconvenience arising from two adjacent major semitones which occur between the second and the third and the third and the fourth, corresponding to the notes # F, G, b A, [[which is it is something I am surprised that it was not observed before. As to the other following semitones, they seem to proceed with the alternate sequence of a minor and a major etcetera. However, if anyone]] or [sqb], C b, where, in the high register, they appear to have wanted to eliminate any chance to create that augmented tone from the second to the fourth fret, were it available. Therefore, since the first and thinner string of the cetera is D la sol re (when it is played as an open string) and the third fret F lacks the fourth one, there is no F fa ut raised as a chromatic note [-<f.22v>-] nor the lowered G sol re ut, as a note not well laid out. The lack of this fret would be very uncomfortable in the second note C sol fa ut, because the minor and diatonic E la mi would fall on that fret, were it not found on the first string, because it is not further removed from the second one than one tone. I am surprised that all these matters have not been noted until now. The rest of the semitones that follow appear to proceed alternately in the sequence of a minor, a major etcetera. [-<f.23r>-] However, if we choose to tune the open strings to the third keyboard of the instrument which is tuned to the choral tone of Rome and to the Phrygian tone (which is what we did in the violone that I had made for Vostra Signoria Illustrissima [[Signor Pietro della Valle]] as it was more comfortable and quicker to do) the first advantage that we shall enjoy is that, since this tone is half-way between the Dorian and the Lydian (to which the Hypodorian is related) we shall be able to do the same with a smaller number of keys because we shall not encounter in it the notes marked thus [signum] or thus [signum] b; on the contrary, the ordinary sharp (#) and flat (b) signs shall suffice, and, consequently, the addition of a single key for every sound, which shall divide every major semitone into its minor and into the diesis, or difference between them. Moreover, the strings shall result also of proportionate thickness and the notes of appropriate depth if we tune the first note A la mi re a semiditone under the first one of the harpsichord, as it was done in said instrument, because we shall be able to take the fourth note D as the lowest one of the Phrygian system, the third one C as the lowest of the Dorian and the second one [sqb] [sqb] as the one of the Hypolydian, while the first one is left as hardly essential and redundant, with the advantage of increased facility of use, since it is rather difficult to employ it together with the other ones with regard to the great span of the notes, and because one shall be able to play the ordinary bass notes used in normal pieces just with the four or five notes above it. This is proof of the fact that thus the violone shall not be more difficult than ordinary instruments but easier, except for that small difficulty that arises from the distance of the frets. However, this will be easier to understand with the aid of the following illustration (Second tuning etcetera

In this distribution the tone is divided into three parts, as in the harpsichords that are called 'broken', with this same sequence of one diesis of smallest size (for instance # C, b D) interposed between two minor semitones. This disposition progresses across all the tones [-<f.23v>-] and in the major semitones of the fundamental tone (for instance E, F) which are divided into two parts. The minor semitone always comes first followed by the diesis, which observation, although it belongs to the field of theory, nevertheless is very useful as in the practice of playing and of finding all the notes with ease when one plays, if the practical musician is not completely devoid of the knowledge of theory. However, the tone is divided into four parts in its first distribution, in such a way that one encounters firstly the minor undivided semitone, then another semitone divided firstly by the smallest diesis, then by the smallest diesis and finally by the diaschisma, with another smallest diesis to finish. If one adds to these divisions the one of the first minor semitone contained within the head of the fretboard and the first fret, dividing it with the diaschisma towards the low term or head of the fretboard and with the diesis towards the high term (which is done by taking in the major semitone G, b A the minor from the term b A towards the low register and creating the note or fret [signum] G) the result will be a tone divided into five parts, which is the last and smallest division of any use that can be created in music instruments. [However, if someone decided to adjust this choral tone of Rome to the Dorian tone instead of the Phrygian (as most illustrious Vostra Signoria had his harpsichord maker do in his tri-harmonic harpsichord) this shall be done without changing the name of the notes or the clefs, because, in order to play in the tone of the

choral tone and of the Dorian keyboard, one shall play (just as in the previous illustration) starting the tuning from the letter A etcetera. However, if one wants to play in the Phrygian tone, one will change only the name of the clefs and shall place F fa ut as the first note, G sol re ut as the second etcetera, laying out the tuning of the four mobile notes C, D, F, G and raising them by one semitone. Thus, with this small alteration the same instrument will be able to play one and the other of those tones naturally, but separately add. in marg.] This will not work in the case of compositions built on a combination of tones. When they are played it will be best to use an instrument tuned to the Phrygian tone starting from F fa ut etcetera, to avoid having to add a third key, in which case the Dorian or Hypodorian melody will be played with four flat sighs, and its lowest term shall be the first note that in that tone touches A la mi re, its cadential note. As for the Phrygian or Hypophrygian, it will descend no further than natural G sol re ut, which is also the principal note of that tone. [-<f.24r>] There would be also a different, new and appropriate way to tune this type of violone, which I want to explain for the benefit of the public allowing expert players to express their judgement on it, as I do willingly in everyone of my inventions, and entrusting it to experience itself, as I have no time to do practical demonstrations of everything. In this tuning the intervals between the two notes grow continually from the low register to the high one. In fact, I place the second note a semitone higher than the first one, the third one a tone above the second one, the fourth a minor third above the third, the fifth a major third above the fourth, the sixths a fourth above the fifth, and finally the seventh a fifth above the sixth, as I believe that seven strings would be sufficient, although who has the curiosity to allow the tritone as well will be able to add the eighth string tuning it a diapente above the seventh, or seven semitones and the third one at the distance of said tritone, or six semitones from the sixth. Therefore, if shall be possible for the first to be [sqb] mi, or E la mi if the progression is via b flat, as one can see from the following illustration, where every sort of consonance is found between two median notes of another one, since the first one and the third one produce a third, the second and the fourth one produce a fourth, the third and the fifth a fifth, the fourth and the sixth a sixth, and finally the fifth and the seventh an octave. This distribution has this advantage, namely, that the [-<f.24v>-] thickest strings are the less often practised, while the thinner ones, as it is really appropriate, are made proportionally shorter with their frets, in the style of the harp. So that one may play across the entire surface and in order to make the entire fretboard more easy and faster to reach, we could lay out the frets so that they end with a gradual slope up to those inclusive notes where they are used in conjunction also with the cuts that one see marked here. However, I note that in the example placed here the tone is divided into three parts to avoid cluttering the fretboard with too many frets and divisions. Therefore, one shall not be able to play the Lydian or the Hypolydian on it. Nevertheless, there shall be such a variety of tones that enormous variety will be heard in the music. The tuning is participated as in the other distributions and it shall accompany very exactly the tuning of harpsichords and organs, although it seems to me that its principal use may be applied also to the tenor and treble viol so that they may play madrigals and other such compositions (that according to this renown practice may proceed through different tone) together with the violone described above, that shall play the bass part. In fact, there is no doubt that said violone shall turn out to be very easy to play, especially if the frets that sound the notes marked with this sign [signum] b (which belongs to the Lydian founded on the Dorian) are removed. Moreover, it will be possible to build the body of the instrument according to usual practice in the customary way without changing anything apart from some strings and the frets.

[-<f.25r>-] [Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 25r; text: Figura, L' Accordo et cetera]

[-<f.25v>-] All is left for me to do to complete this discourse is to explain another sort of instrument that better than anyone else can accompany itself with the aforesaid pan-harmonic violone and from which music can derive wonderful perfection. This instrument is the di-harmonic violin, which is easy to make, is very useful and is very easy to play. In fact, with just a slight alteration, it will be



able to produce an immense variety of tones and shall be able to accompany itself not only with the aforesaid violone and with the di-harmonic and tri-harmonic harpsichords, but also with the di-harmonic viols and with any sort of instruments that are employed on particular occasions. But, because these sixth tones etcetera [-<f.27r>-] <aliqua desunt>

Aside from the aforesaid coupling of two tones or systems in the violin, there are also other useful and viable ways, which I omit for reasons of brevity and to allow space to others to invent new ones. However, there is one disposition that I cannot omit, which perhaps will please some more than the aforesaid, as it approaches the di-harmonic and tri-harmonic harpsichords that were built recently, on which the Dorian and Phrygian are the harmonies expressed by natural notes, while the Iastian and the Aeolian ones require accidentals. Following this model, therefore, we can couple together on the violin the Dorian system with the Phrygian (rather than with the Iastian) and maintain the due distance of one tone, so that we shall have, in a similar way, two natural harmonies and two that are laid out with accidentals, since it shall be possible to play the Iastian harmony in the Dorian tone and the Aeolian in the Phrygian. This second method has the advantage that it can avail itself of the same tablature used in the aforesaid harpsichords, although it shall have to be altered first in relation to the Phrygian and to the Iastian, as that one shall have to be notated with accidentals and this one without, which is the opposite of what happens in the tablature for harpsichord. In fact, in that case the Dorian is notated with natural notes and the Eolian with accidentals, with the exception that in the first way, when the Aeolian is played within the Iastian, it will be written with four sharps (#) and in the second way, when it is played within the Phrygian, it will be notated with five flat signs (b). Moreover, one could and should apply some distinction in the tension of the strings in this second method, which will produce a better result than the first one, by tensing the ones of the Phrygian not only to make it more spirited, but to avoid them being too thin in relation to the tone, so that they are of the same measure and facilitate the playing

[[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 27r; text: Dorio Corista, Iastio più alto del, mezzo tuon<o>, unisoni, [[Frigio]], [[Eolio]]]

This other advantage shall also be produced, namely, that the two systems shall be tuned together with greater ease, since it will be sufficient to tune the third note of the Phrygian under the *canto* or first note of the Dorian. add. in marg.] On the other hand, the disadvantage will be that it shall be rather harder [-<f.27v>-] to create the accidental tones (Iastian and Aeolian) in playing (since this requires five flat signs) compared with the first method, where the Phrygian and Aeolian are created respectively in the Dorian and in the Iastian with the addition of four sharp signs. However, so that these two dispositions may be better understood, we shall add here the tablature of both with nine notes in each of them. In the natural systems these notes are contained within the two fifths enclosed within the three open strings beyond which it is possible to continue the melody upwards at least on the *canto*, which is the thinnest string.

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 27v; text: Primo Modo, Sistema Dorio, Tuono Frigio, Iastio, Eolio, [[Iastio]], unisoni, Secondo, [[Sistema]], [[Frigio]]]

It is necessary to make a few observations on this illustration. Firstly, that the black notes indicate the open strings, the square ones indicates the cadential notes of each tone, while the clefs placed at the end after the deductions have the sole purpose to allow the player to read said deductions naturally using the usual syllables Vt, re mi fa sol la.

[-<f.28r>-] Also, since some players have become attracted to this new style of music which derives from the tri-harmonic harpsichord, they have expressed the desire of a theorbo with three fingerboards that would enable them to accompany those metabolic melodies (the first one of them to have them built was Signor Bartolomeo Niccolini, who, with his deep and most graceful voice and excellent musicianship captivates the soul of his listeners and restores the example of the ancient melodies that accompanied epic poems) for this reason I deemed it appropriate to discuss

them at some length. The theorbos that I had built contain as a rule three systems, namely the Hypolydian at the top, the Dorian (and choral tone) in the middle and the Phrygian at the bottom, with as many necks that become proportionately smaller and are united to the same body. They are placed so far apart that the left hand touching the frets up and down the necks can easily reach everywhere. The principal tuning of each system is the common one of six strings between one A la mi re and the other one that with the [sqb] mi ascends to a ninth in the third string, with this difference nevertheless, that the Phrygian system is two tones higher than the Dorian and the Hypolydian lower than the Dorian by two semitones. The Hypolydian has three *contrabbassi*, which are b E, F, G, the Dorian has four of them, which are D, E, F, G and the Phrygian has five, which are C, D, E, F, G. In this way, as each tone is created in a single system with its own frets, strings and the addition of the *contrabbassi*. All three of them turn out to be of suitable distance and proportion between each other as they start from the cardinal notes, as the E la mi with the flat sign is in the Hypolydian, while the Dorian starts on D la sol re. This very ingenious invention is due to Signor Pietro della Valle and it produces a great ease in playing without the need for the player to learn this instrument afresh, since the principal strings are played entirely in the same way and they are placed in the same clefs. As to tuning these three systems, [-<f.28v>-] there are several methods, but this seems to me to be the easiest and quickest, because it consists of tuning two open strings and then tuning the G sol re ut of the Phrygian with the [sqb] of the Dorian in unison. If then onw eants to the the Hypolydian, the its F fa ut must answer the [sqb] mi of the Phrygian. The other strings shall be tuned according to these. As for the rest, I observe two points. Firstly, that the strings of the Dorian must be moderate

tense, the ones of the Hypolydian rather less so and the ones of the Phrygian more than all the others, as I showed in the *Compendio* on the subject of the di-harmonic viols. Secondly, although the neck of the Hypolydian, since it is longer has frets more spaced out than the Dorian, and the ones of the Dorian shall be more space out than the ones of the Phrygian, which difference may cause some difficulty, nevertheless, if the composer shall observe the in the high register the same appropriate distance and ending of the systems that is found in the lower register, the distance between frets will result balanced in some way, since the Hypolydian neck will be touched in the highest region, the Phrygian in the lowest one and the Dorian one in the middle one. However, should someone prefers that each system should have a variety of clefs and the same number of *contrabbassi*, namely four, which will be much better for sure, one shall be able to alter proportionately the other two tones without changing the Dorian at all, but maintaining the same tuning or distance, on the understanding that all the extra effort involved will be assigned to memory rather than to the work of the hand itself. I shall provide an example of this in the tuning of the lute, which, without any doubt, is more beautiful, more orderly and more rich in consonances than the one of the thiorbo. In fact, if it turns out to be uncomfortable on this instrument with three necks, because the strings are doubled, either they could be laid singly or, instead of it, one could employ the tuning of the Mandola, a kind of smaller lute, which is very comfortable, well ordered and with only four sets of strings it contains a wider system than the thiorbo's because it contains a fifth in the low register, a fourth in the middle and a major third at the top. As to its shape, one can build it as large or small as one wants. Here are the three tunings of the lute.

[-<f.29r>-] [[Ego Ioannes Baptista Donius praesentem copiam seu exemplar diligenter ad uerbum contuli cum eo quod insertum est libro Authentico Actorum Consistorialium, eique omnino [[aequi]] conuenire cognoui. In cuius rei fidem ex officio requisitus mea manu idem subscripsi meumque sigillum apposui]]

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, r; text: Ipolidio, Frigio [Dorio ante corr.], Dorio, B b, E b, A, c, f, b, [sqb], A, e, a, #, C. d, g, G]

The diligent Reader shall note a few details here. Firstly, that the ordinary disposition or tuning is applied to the Phrygian system because it is more suited to it than to the others. Secondly, as to the

disposition of the frets in the Dorian, it is exactly the same since its open strings require the major semitone rather than the minor one to be in the first place, since in the natural system b fa follows A la mi re, E la mi with the flat sign (b) follows D la sol re rather than D la sol re with the sharp sign (#) etcetera, but the opposite occurs in the Hypolydian (as one can see from the straightness of its first fret) because all of the six open strings require that the minor semitone instead of the major one should follow the [sqb] mi, the natural E la mi after the b fa, the natural E la mi after the one lowered with the flat sign (b) etcetera. In the Phrygian, since it is of median character between the Dorian and the Hypolydian, and it embraces the Lydian in this respect, thus some of its strings require the minor semitone (the first three from the bottom, which it shares with the Hypolydian) and the other three above the major semitone, in which it resembles the Dorian. Therefore, it will be possible to add a short [-<f.29v>-] cut in the middle in order to place two different frets in it. In this way the consonances of the lute will be much improved and there will be no added difficulty for the player because there will be no need to alter the other frets in this way. Moreover, although some combinations of sounds will be worse, this shall be balanced by the fact that other consonances shall be improved in a way that is not usual in the ordinary division, as these are:

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 29v, 1; text: i, 2, 4],

which correspond to these notes in the first bar:

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 29v, 2].

Nor there shall be any need to use false ones as the one in the second bar, which I also noted [[in a French song on these words *C'est toy bell' Antoinett*]] in some French tablature with these letters and figures in the Italian fashion:

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 29v, 3; text: d, f, g, 3, 6, 5],

where one can see the raised sixth fret which is a D la sol re instead of the lowered e la mi, which produces a false octave. The practitioners of this sort of string instruments shall be able to know from this, apart from what I said specifically in another discourse, that they are not as perfect as they are considered to be. Secondly, one shall be able to realise from this division that what I said elsewhere, namely that the chromatic is more suited to the Lydian (and, consequently, Hypolydian) harmony than to the others, because its first fret forms the minor and chromatic semitone, while the enharmonic is more suited to the Dorian harmony and the Diatonic to the Phrygian. [-<f.30r>-] Thirdly, if one wanted a greater variety of tuning in the three systems, among the ones that could be used those that are closer to the ordinary and are contained within systems of equal size are the ones that appear to me to be more suited, such as the second and third of the following three, which differ from the first and ordinary one because one of them has three consecutive fourth in the low register and the other has them one at the top, in a similar way as to what happens in a viol consort. This is the method that ensures the highest number possible of open strings, ordinary clefs and the principal notes of each tone. Among these tones the Dorian in the two middle strings will have to start with a minor semitone, while the other two are divided as shown above. [signum]

[Doni, Discourse on the consonances dedicated to Father Marin Mersenne, 30r, 1; text: [signum], Frigio, Dorio, Ipolidio, G, C, F, a, d, g, A, c, e, B b, f, , b, 4, 3]

Fourthly, should anyone require some other particular form that suits this sort of tri-harmonic instruments, they shall be able to employ the follow in which is close to the one of the Spanish guitar but with a larger body and with a lower part more convex than straight, which being less wide in the middle turns out to be very comfortable in order to reach all the strings. Since the necks

are of equal width at one end and they are less wide towards the body of the instrument (which is also larger on top than beneath) and they have peg-boxes that are smooth and without cartoccio, they contribute to render the form of the instrument more pleasant and the instrument more sonorous, lighter and easier to handle, as well as a wider space for the left hand and increased ease for the right hand in plucking the strings at the bottom, as everyone will be able to see. [The body of the instrument must also be built larger and longer not only to balance the instrument better, but also to make the sound of the *contrabbassi* fuller and more similar to the one produced by the main strings. The sound of the *contrabbassi* in our current thiorbos and archlutes does not please the ear very much. This is caused by the excessive length of the necks since the sound of those notes is not very full and strong, as it is known, but rather dry and of a different quality compared to the sound produced that more partake of the resonance produced by the body of the instrument add. In marg.] [ <f.30v>] As to its name, it will be possible to call it a *chitarrone*, leaving aside other more extravagant names, which is perhaps rather suited to it than to the theorbo because of its shape. The theorbo can make do with its own name, but, if one is interested in its origin, one should read what Alessandro Piccinini writes in a book of lute tablature of his. However, should anyone prefer a more capricious name, he shall be able to call this instrument a Cerberus jokingly and ironically, alluding to the shape of that mythical infernal dog which had three heads and a single body, and in a figurative way, since just as the barking of that animal was unpleasant and frightening, equally pleasant and sweet shall be the harmony of this instrument. [-<f.30v>-] Moreover, although those three heads were of different size and dimension and, consequently, of different sound, nevertheless, since there is no order or harmony in hell (since harmony derives entirely from paradise) we must presume that not only they did not produce any consonance with each other, but that they produced the most strange and dissonant intervals of the universe, which the Greeks called *ecmeles*, which the expert musician and citharede will try to shun as much as possible by tuning these three harmonies perfectly with each other, to avoid being considered himself an infernal Cerberus.