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Title: Exposition by Giovanfrancesco Beccatelli from Florence on the musical Doctrines of the ancient Greeks and Romans

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Exposition by Giovanfrancesco Beccatelli from Florence on the musical Doctrines of the ancient Greeks and Romans

Harmonics is the science that aims all its speculations towards the order, quantity and quality of sounds, with regard, for instance, to the high and low, and to the nature, effects and feelings produced by the sounds themselves. It is divided into seven parts. The first one deals with the Sounds, the second one with the Intervals, the third one with the Genera, the fourth one with the Systems, the fifth one with the Tones, the sixth one with the Mutations, and, finally, the seventh, with the Melopeia. I shall these parts in order and as succinctly as possible, in order to explain the intentions and the doctrines of the Ancients. Firstly, I shall say that the voice was distinguished by the Ancients in two principal sorts. One was called continuous, and the other one discrete. The continuous one is the voice, or the sound of those voices which is produced when one talks, reads and recites. One can see perceive that the voice is now higher and now lower in these activities, albeit one cannot perceive the quality and size of said raising and lowering of the voice. Therefore, this way of using the voice has no place in music. The discrete sort of voice is the one that moves across known intervals, as it occurs in the sounds of musical instruments and also when one sings, in playing or singing any Air or Song. Aristides [book 1, page 7 in marg.] adds a third sort of voice to these two and it calls it median. This is the one with which verses and poems are recited. So, the type of voice which is suited specifically to music is the discrete, and it is distinguished by its being low or high. The passage of the voice from the low to the high register is called intension and raising of the voice, while the movement from the high to the low register is called remission or lowering of the voice. Moreover, the location or the state of the voice in any place is called tension, position or tenure of voice.

On the Sounds

A sound is the occurrence of the voice suited to music in a particular tension or position. There can be an infinite variety of tensions or positions [-2-] according to the difference of high and low register. Hence, the sounds as well can be infinite, because, just as the line could be divided into infinite segments, thus the span from the lowest to the highest sound that the ear can perceive, can be divided ad infinitum. However, since the human capacity is limited not only in man's natural voice, but in the power of musical instruments, for this reason the Ancients considered only a determined series of sounds, as many as the human voice was able to produce. By adapting that series or constitution to a higher or lower pitch, they were able to practice also all those sounds which exceeded the span of the human voice either towards the high or low register, which could be reached only by their flutes called Hypertelie and Partenie. The Hypertelie flutes, whose name means 'the most perfect ones', were the largest used in those times and, consequently, they were the lowest in pitch. The Parthenie flutes were the smaller ones in size, hence they were the highest in pitch. Their name means 'virginal' either because

they were used to express the voice of young girls, or because they were used solely by young children. The above series of sounds reached the number of sixteen, although they named eighteen, since two of those sounds were distinguished with a double name. Moreover, these sounds were ordered and distributed in some small systems, or sequences of notes, which were called Tetrachords because they were composed of four notes or sounds. Of these Tetrachords some were conjoined and other separate. The ones which had a single note in common, namely, when the highest note of one of them was the lowest of the other, were called conjoined Tetrachords, while two Tetrachords where all the four notes of one were different from the four of the other were called disjoined. The first Tetrachord in the lower register started from the second note of the aforesaid series and finished on the fifth. It was called Hypaton, which means 'of the highest', namely, 'of the highest notes'. The second Tetrachord started from the note on which the first ended, which is the fifth, and for this reason it was called conjoined to the first one. It ended on the eighth note, and it was called Meson, which means 'of the middle ones'. The third Tetrachord was separate from the aforesaid two, and it started on the ninth note and ended on the twelfth. It was called [-3-] Diezeugmenon, which means 'of the separate ones', since it is separate from the other two. The fourth Tetrachord was conjoined to the previous one, as the first two, because it started on the twelfth note and ended on the fifteenth. It was called Hyperboleon, which means 'of the exceeding', or of 'of the overflowing'. Since a sound was added between the eighth and the ninth at a later stage, the ninth became the tenth, the tenth eleventh, the eleventh became the twelfth, and so on in order. Hence, the fifteenth became the sixteenth and another Tetrachord was introduced because of the addition of this tone which extended from the eighth to the eleventh note and was called Synemmenon, which means 'of the conjoined ones', because it was conjoined to the first two. All these sounds can be observed in the following illustrated sequence with their specific names.

[Beccatelli, Exposition, 3; text: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. .15. 16. Proslambanomeno. ò Proslambanomene, Hipate hypaton. Paripate, Licaons ouero diatonos, Meson. Mese. Trite sinemmenon, Paramese. diezeugmenon, Paranete, Nete, hyperboleon]

However, in order to move on to the explanation of these names, it is necessary to know that the Ancients, when they described the notes, placed the lowest register in the high, and the high in the lowest. This means that they described them in the opposite way to ours, since we place the low notes in the lowest register in the low and the high in the high. I believe that they did so to imitate the strings as they would have been in the Lyres, Chitarae and the Pandurae, which resemble the disposition of our Lutes, [-4-] Guitars and Violins, where the low strings are placed above the high ones.

So, Proslambanomenos is the first and lowest sound of the distribution explained above. This adjective, which is masculine as opposed to all of the others which are feminine refer to the word note (corda), refers to the masculine noun sound (suono), although it can also be employed in the feminine form, as Bryennius does, hence it is called Proslambamene. However it is called, this note was understood by the Greeks as the lowest sound which could be uttered by the human voice. It was called Proslambanomenos, which means 'adopted' or 'acquired', meaning adopted or acquired sound, or Proslambanomene, which means 'added' or 'acquired note'. Henceforth we shall call all the other sounds notes, to pursue their feminine form. The second note is called Hypate Hypaton, which means 'the highest of the highest'. It is called thus not because it is of greater tension, or because it is higher than the others, but because it is placed in the higher position. In ancient times,

before Pythagoras, this was the first note. It was called highest of the highest because it was the first of the four notes of the first Tetrachord, which was called Hypaton for the same reason, namely, of the highest, since these were the first, most important and principal notes of said ordered series of sounds. For this reason Martianus Capella, followed by Boethius, explains the term Hypate as principal. The third note is called Parhypate hypaton, which means 'next to the highest of the highest', which we shall call under-highest of the highest on the basis of its ancient position. The fourth one is called Lichanos Hypaton, which means 'Index of the highest'. The index finger of the hand is called Lichanos, which was called in this way from the verb meaning to lick, or, in Latin 'lingere'. The Greek considered this finger to be the middle finger of the hand, so, since the middle finger is the third one from whichever side of the hand, therefore this note was called in this way because it is the third one of the Tetrachord. Aristides maintains that this note was called thus because the string that produced it used to be struck by that finger. However, most writers maintain that it was called index because it was the first and main indicator of the variety of the Genera, as we shall see at the appropriate point. The fifth note is the last of the first Tetrachord and the first one of the second, which is called Meson, or of the middle notes. It derives its name of Hypate Meson from this Tetrachord, [-5-] which means 'highest of the middle ones'. The other notes of this Tetrachord, namely the sixth, called Parhypate Meson, and the seventh Lichanos Meson, which means 'the middle one', can be interpreted in the way already explained. In order to proceed with the explanation of the other names, it is necessary to know how the Greeks, when they described a Tetrachord separate from the others, gave the name of Hypate, or the highest, to the first and lowest note, as it was demonstrated, and called the last one, or the highest in pitch, Nete, to distinguish it from the one that they called the highest. Nete means 'the lowest', but we shall call it the last one with regard to its position. However, since they used to call the second note Parhypate, because it was next to the Hypate, thus they used to call the third one Paranete, because it is next to the Nete. Then, when they ordered the four main Tetrachord of the series described above, in order to distinguish the ones from the other, it was decided to retain the names of the first two notes Hypate and Parhypate in the first two, and the names of the other two, Paranete and Nete in the last two Tetrachords. They invented another name for the third of the first and second Tetrachord, calling it Lichanos, and also for the last one of the second, which they called Mese. Thus, they agreed to find another name for the second note of the last two Tetrachords, and also for the first of the first one of these. To differentiate it from the Lichanos of the first Tetrachords, which is the third note after the first one, they called it Trita, since it is the third note from the last one, and thus they called the first of the first Tetrachord Paramese, which means 'next to the Mese'. Also, since the last one of the first Tetrachord derives its name not from the first Tetrachord, but from the second one, of which it is the first one, thus, in the same way conversely the first note of the last Tetrachord does not derive its name from it, but from the preceding Tetrachord, of which it is the last note. Later, when they added the first conjoined Tetrachord to the first two, which was called synemmenon for this reason, which means 'of the conjoined ones', if indeed this was not in use before the last two that I described, as there is reason to doubt, they named its notes according as they were named in the last Tetrachords. Hence, since the ninth note of the series described above, which is the second one of this synemmenon Tetrachord, which has as its first note the [-6-] Mese, it was the third from its last one, it was called Trita, which means 'third', as I said already. We can call it the third from the last one, adding to it the name of the Tetrachord, namely, Trita Synemmenon, which means 'third from last of the conjoined ones'. The following note of this Tetrachord is not the tenth of the series, but the eleventh. It is called Paranete synemmenon, which means

‘next to the lowest one’, which we can call penultimate of the conjoined ones. The last one of this Tetrachord is the twelfth of the series, which is called Nete synemmenon. This name means ‘the lowest’, and we can call it the lowest of the conjoined ones. The Tetrachord that follows the first two begins in the tenth sound, or, we could say, in the tenth note. Since this first sound of it is not in common with other Tetrachords, for this reason it was called Diezeugmenon, which translates as of the separate ones. The eleventh note is shared by the Synemmenon and Diezeugmenon Tetrachords, since it is the Trite, or third from last, of this one and the Paranete in that one. Similarly, the twelfth note is in common between those two said Tetrachords, albeit in certain distributions one finds that those notes are different, as we shall see at the end. Therefore, the eleventh note is called Trite Diezeugmenon, or third from last of the separate ones, while the twelfth is called Paranete Diezeugmenon, or penultimate of the separate ones. The thirteenth note is called Nete diezeugmenon, which means ‘last of the separate ones’. This thirteenth note is shared, since it is the last note of the Diezeugmenon and the first of the last Tetrachord called Hyperboleon, in a way to the fifth note, which is the last one of the first Tetrachord and the first of the second. The fourteenth is called Trite hyperboleon, or third from last of the exceeding or of the overflowing, which we call the highest, with regard to their position. The fourteenth note is called Paranete hyperboleon, or penultimate of the highest ones, and finally the last note is called Nete hyperboleon, which means ‘the highest of the highest ones’. Apart from having different names, the sounds were classed in different ways, namely, some were called stable, or fixed, and others mobile. The stable ones were the ones whose tension never changed. These were eight, namely the first and the last one of each Tetrachord, and the first one, called Proslambanomenos. Moreover, since the stable sound had these names Hypate Hypaton, Hypate Meson, Mese, Nete synemmenon, Paramese, Nete diezeugmenon and [-7-] Nete hyperboleon, thus, the first of the Tetrachords were called Hypatoid, and the last ones Mesoid and Netoid. The mobile sounds were ten, namely, the ones that were not stable, and, since they were the middle notes of each Tetrachord, namely the Parhypate, Lichanos, Trite and Paranete, all the second notes of the Tetrachords as well were called Parhypatoid and the third ones Lichanoid. These notes were called mobile, because they varied their tension according to the variety of the Genera, as we shall see at the appropriate point. I reserve to define them further in the Treatise of the Genera, since it seems to me that I have talked about them sufficiently.

On the Intervals.

Diastema, or Interval is the distance that runs between two sounds of different tension, or the difference between a high and a low sound. In order to illustrate the musical intervals with a secure principle, assuming that I am explaining this to someone who has good knowledge of the fifth book of Euclid, one can say nothing but what follows. Take a board long at least five Spans, and apply at one end of it two fixed bridges in such a way that the span that contained between the two bridges is divided into twelve equal parts by marking said twelve parts with parallel lines. Add to it a mobile bridge similar to the others, so that it may be moved on the board towards one or the other of the stable bridges, so that one may cover with it a larger or smaller portion of those twelve parts previously marked. Done this, lay two strings, either made of metal or gut, above the stable bridges, at the distance of a finger, or at such a distance that the mobile bridge may touch only one at a time. After tuning them at the correct tension and in unison, so that they produce a single sound as if they were just one string, we shall obtain from them the knowledge of all the most important musical intervals by using the bridge in this way.

Put the mobile bridge on which I placed one of said strings and take it to the sign of the sixth of the twelve parts in which the distance is divided. That sign will correspond to the half [-8-] of the string, and it will produce a sound corresponding to the sound of the whole string, but twice as high. The difference between the two is that interval that the Greeks call Diapason, which means ‘across all’, because it contains within itself all the simple musical intervals. We call it Octave because these sounds are the first and the eighth of the ones suitable to composing melodies. Moreover, since this interval is produced by the whole strings and by half of it, for this reason it is said that the dupla proportion from 2 to 1 is the form that produces the Diapason. Then, if one moves the mobile bridge and places it on the line that marks the eighth of the twelve parts, so that it takes up two thirds of the string, these two thirds of the string will produce a sound higher than the entire string. This sound will be very consonant and the interval is called by the Greeks Diapente, which means ‘across five’. We call it Fifth, because these sounds are the first and the fifth of the sounds suited to forming a melody, or of the ones called orderly sounds. Moreover, since the whole string is represented by the number 3 of the distance of which the two thirds are two, which means that it is in sesquialtera proportion, for this reason it is said that the sesquialtera proportion from 3 to 2 represents the Diapente. Similarly, if one takes three fourth parts with the mobile bridge, they shall produce a sound which is consonant with the sound of the entire string. We call this interval Fourth, since these sounds are, counting four sounds from one to the other of the orderly sounds. For the same reason it was called by the Greeks Dia-tessarón, which means ‘across four’. Also, since the entire string is four of that one, of which three fourths are three, consequently it is in sesquiterza proportion. For this reason it is said that the sesquiterza 4 and 3 is the form of the Diatessarón. Moreover, since the dupla, which produces the diapason through the laid out strings without the bridges, as I described, is composed of the two largest superparticular proportions, namely the sesquialtera and the sesquiterza, thus the Diapason is composed of the Diapente and of the Diatessarón, as produced by the sesquialtera and by the sesquiterza. And because the Diapente is much larger than the Diatessarón, the difference between was called Tone, which is contained within the sesquiotava proportion. In fact, if one subtracts the sesquiterza from the [-9-] sesquialtera, the proportion that remains is the sesquiotava, whose root terms are these, 9 and 8. Moreover, because taken two tones together are smaller than the sesquiterza, and three are larger, hence one knows that the Diatessarón is larger than two tones and smaller than three. That remainder, by which it exceeds the two tones, was called Limma, which means ‘remainder’. Later on it was called semitone by approximation, as it is close to half of a tone. This Limma or semitone remains in superpartiente proportion within its root terms 256 to 243. The Dia-tessarón, therefore, contains two Tones, two of the same semitones and the aforesaid limma, the Diapente contains three tones and the same semitone, while the Diapason contains five tones and two of the same semitones. Besides these main intervals, the ancient musicians considered the Ditone, which is an interval of two tones, the Trihemitone, which means of three semitones, which we call semiditone, interpreting the prefix semi as imperfect, hence semiditone means ‘imperfect Ditone’. This interval is composed of a tone and of a semitone. The tone is the aforesaid interval by which the Diapente exceeds the Diatessarón, the larger semitone called Apotome, namely, breaking or breakage, which is the interval which is left when a limma is subtracted from a tone and the limma itself, which can be called minor semitone. Moreover, the Ancients had the Chromatic Diesis, understood as one third of the tone. For this reason, it was called Diesis trientale. They also had the Enharmonic Diesis, understood as one fourth of the tone and one half of the semitone according to those who divided the tone into two equal semitones. For this reason it was called Diesis

quadrantale. Those who did not divide the tone into two halves established the Diesis according to various proportions, namely, some made it a little larger and some a little smaller, since the ancients had different measurements for all the other intervals, except for the Diatessaron, the Dia-pente and the Diapason. Nevertheless, said Enharmonic Diesis was understood by everyone as the smallest interval that the ear could perceive in singing and playing, because, just as Diesis means ‘principle of diffusion’, thus they called [-10-] the smallest interval Diesis, as the ‘principle of expansion’ and as the unit among the intervals. It is for this reason, perhaps, that Aristoxenus describes the Ditone as eight times multiple of the smallest Diesis. These are all the simple intervals used by the ancients contained within the Diapason. In fact, nothing occurs beyond the Diapason than the repetition of the same interval. These were called compounded intervals by the Ancients, and the most often referred to were the Dia-pason Dia-tessaron, or Fourth above the Octave, the Dia-pason Dia-pente, or the Fifth above the Octave and the Disdiapason, or Bisdia-pason, which is the interval of two Octaves. After we devoted ourselves to explaining the intervals, which were called Diastemi with an ancient term, it remains for us to demonstrate the proportions and differences within which they were placed by the two ancient musical schools, the one of the followers of Pythagoras and the one of the followers of Aristoxenus. The first one of these limited itself too scrupulously to the numerical proportions, while the second school was too reliant on the mere sense of Hearing, disregarding the numbers completely, and established the tone as divided into twelve equal parts. Six of these constituted the semitone, four constituted the Chromatic Diesis established by Aristoxenus as a third of the Tone, and hence called trientale, and three made up the Enharmonic Diesis, which was established as a fourth of the tone. This Diesis was taken by Aristoxenus as a measurement almost common to all its intervals, in the same relationship as the number one is to all the others. So, according to the Pythagoreans, the intervals correspond stand in the following proportions.

[Beccatelli, Exposition, 10; text: I Diesis Enarmonici sono l'uno 40, 39. l'altro, 38, I Semiditoni Cromatici, 20, 19, 18. Il Limma 256, 243. L'Apotome 2183, 2048. Il Tuono 9, 8. Il Trihemituono 32, 27. Il Ditono, 82, 64. La Dia-tessaron, 4, 3. Dia-pente, 3, 2. Diapason, 1. Dia-pasondia-tessaron, Dia-pasondia-pente, Disdia-pason]

[-11-] According to the followers of Aristoxenus, the intervals are contained within the following ratios.

[Beccatelli, Exposition, 11; text: Del tuono, duodecimi, Diesis. Semituoni. Tuoni. Il, Enarmonico, Cromatico, Semituono Tuono, Triemituono, Ditono, La Dia-tessaron, Dia-pente, Diapason, Dia-pasondia-tessaron, Dia-pasondia-pente, Disdia-pason, 3. 4. 6. 12. 2, 18. 24. 8, 30. 10, 5, 42. 14, 7, 72. 24, 12, 102. 13, 114. 38, 19, 144. 48, 24, 12. $\frac{1}{2}$]

The intervals differ according to whether they are larger or smaller, compounded or uncompounded, Consonant or dissonant, Emmeles or Ecmeles, rational and irrational, and, finally, Diatonic, Chromatic or Enharmonic. The difference between larger and smaller can be understood according to the demonstration given above. For instance the Diesis is smaller than the Semitone, the semitone is smaller than the Tone, the Tone than the Ditone, the Ditone than the Dia-tessaron, and the rest of them accordingly. The difference between compounded and uncompounded intervals consists in the fact that, if one considers an interval within its extreme sounds, as, for instance, the Dia-tessaron, which we call Do Fa, Re Sol, and Mi La, in this fashion it is called uncompounded. However, if the same Dia-tessaron is considered with the intermediate sounds that it

contains, saying Do, Re, Mi, fa instead of Do fa, Re, Mi, Fa, Sol instead of Re Sol, and similarly in the case of the other one, in this way it is called compounded. The same goes for all the other intervals. Consonant intervals differ from dissonant ones, because some produce a low and sweet compounded sound to the ear, hence they are called consonant, while others, conversely, produce such harsh mixture of sound that they offend the ear, and for this reason they are called dissonant. Consonance is defined thus by Euclid [page 8 in marg.]: “Consonance is a mixture of two sounds, one high and the other low. Dissonance, on the contrary, the rejection of two sounds to mix, which, since they refuse to mix, [-12-] they offend the ear with a certain harshness.” According to most part of ancient writers, six are the consonant intervals, namely, the Diatessaron, called specifically Symphonia, which means Consonant, the Diapente, called Parassona, which means ‘resounding next’, which can also be interpreted as ‘well-sounding’, the Diapason, called Antiphona, namely of opposed sound, and also Omophona, which means of similar sound, the Diapason diatessaron, which was also called Symphonia, the Diapason Diapente, called parassona, the Disdia-pason called antiphona or omophona. [Bryennius, book 1. chapter 5. in marg.] Similarly, all the sounds that constitute the Dia-tessaron or the Diapason Diatessaron are called Symphonies, all the ones that produce the Diapente or the Dia-pason diapente are called Paraphonoi, all the ones that produce the Diapason, the Bisdia-pason and the Trisdiapason are called Antiphonoi and Homophonoi, while the ones that are in unison, or aequisoni, are called Isotonoi, which means of the same tone. Only according to the Pythagoreans the consonant intervals are no more than five, since they deny that the diapason diatessaron is consonant, as we shall say elsewhere. Conversely, only according to the Pythagoreans the consonant intervals are no more than five, since they deny that the diapason dia-tessaron is a consonance, as we shall explain later. There were some who added a seventh one to said consonant intervals, and others who added an eighth one. These intervals are the Disdia-pason dia-tessaron and the Disdia-pason dia-pente. However, since these intervals went beyond the Dis-diapason as their largest span, they were not approved of universally. All of the other intervals, apart from those mentioned, were called dissonant, namely, all the ones that are smaller than the Dia-tessaron, together with all the others that are interposed among the aforementioned consonant ones. The difference between Emmeles and Ecmeles interval is this one. La differenza da Emmeli, à Ecmeli è questa, che tutti gli intervalli, che hanno i loro suoni situati in quelle tensioni ordinate alla modulazione, che noi dir possiamo modulativi. On the contrary, all the intervals that do not correspond to this definition would be called Ecmeles, which means disorderly or not suited to producing a melody. For instance, all of the mentioned intervals of Diesis, Semitone, Tone, Trihemitone, Ditone, Diatessaron et cetera are called Emmeles. However, should there be intervals which cover the span of three, five, or seven Diesis, or of six or eight Semitones and so forth, these would be called Ecmeles. The difference between rational intervals and irrational ones consists in the fact that, when the tensions of the sounds are known and in their exact proportions, these intervals are called rational, but when their tensions are not known, and therefore they cannot be expressed with exact proportions, they are called irrational. [-13-] The difference between Diatonic, Chromatic and Enharmonic intervals consists in the fact that some are typical of the Diatonic Genus, others of the Chromatic and others of the Enharmonic. However, this shall be explained when we deal with the Genera. What has been said so far will suffice as far as the Intervals are concerned.

On the Systems.

System is a composition or aggregate of several intervals. System are classed as larger

and smaller, consonant and dissonant, Emmeles and Ecmeles, Conjoined and disjoined, and finally according to the differences of the genera. The larger differ from the smaller one because one can find systems of three notes, called Trichords, of four notes called Tetrachords, of five notes, called Pentachords, of six notes called Hexachords, and so on up to the Largest System of fifteen Notes contained within a Disdiapason. Albeit the term Tetrachord may be applicable to any system of four notes, nevertheless the ancient used the term to mean a series of four sounds or notes disposed in such a way that, going from the low to the high register, there is a semitone between the first and the second, a tone between the second and the third and, equally, a tone from the third to the fourth. These four notes correspond to the ones, of our own, which we call Mi, Fa, sol, la. However, in order to provide some information regarding the ancient Systems, I shall say, as they maintain, that the most ancient System consisted of four Notes, because Mercury's Lyre had of four strings. These Notes correspond to the one which are marked thus with our own letters, namely, [sqb], C, D, E. which are the same as the ones of the Tetrachord. Since Terpander added three strings to Mercury's Lyre and raised the number of its strings and notes to seven. These made up two conjoined Tetrachords in the following fashion, where I mark said notes with our letters in order to be clearer.

[Beccatelli, Exposition, 13; text: Tetracordo, Meson, Hipaton, Nete, Paranete, Paramese, Mese, Licanos, Paripate, Hipate, A. G. F. E. D. C. [sqb]]

Later on Pythagoras added the eighth note to acquire the interval and consonance from the first and last note of the Diapason, although this addition is attributed to others. In this way, the System was reduced to eight notes and was called Octachord.

[-14-] Pythagoras placed this eighth note one tone below the lowest of said seven Notes. It was called Proslambanomenos, as I said in the treatise on the sounds. Subsequently, said note was removed from its low position and placed in such a way that the two Tetrachords, that had been conjoined, were separated. This system was named disjoined, as one can see in the following examples.

[Beccatelli, Exposition, 14, 1; text: Antico Sistema congiunto, disgiunto, A. G. F. E. D. C. [sqb]. Nete, Paranete, Paramese, Mese, Licanos, Paripate, Hipate, Proslambanomenos, Diezeugmenon, Meson, Trite]

However, in order to avoid being longwinded unnecessarily, I shall say that other Tetrachords were added to these, and that the System was enlarged to fifteen notes, the span of a Disdiapason. It was called the Largest System, and I shall illustrate it here according to our practice, as I did already in the illustrations placed above, namely, by placing the low register underneath and the high register above, and marking the notes with our letters to render it clearer.

[Beccatelli, Exposition, 14, 2; text: Tetracordo Hyperboleon. Diezeugmenon. Meson. Hipaton. a a. g. f. e. d. c. [sqb]. a. G. F. E. D. C. A. Tuono, Semituono, Nete hyperboleon. Paranete. Trite. Diezeugmenon. Paramese. Mese. Licanos Meson. Paripate, Hipate, hipaton. Proslambanomenos. stabile. Mobile.]

[-15-] This System was called disjoined because of the Tone that runs between the Mese and the Paramese, because of which the last Tetrachords are separated from the first one. It was also called 'Unchangeable' – which should have been unchanged, to be more precise – in order to distinguish it from the 'Conjoined and Changeable' or 'changed'

because of the addition made, as I said when I dealt with the sounds of the Synemmenon tetrachord and as I shall demonstrate. The above mentioned Tone, which exists between the Mese and the Paramese, was called Diazeusis, or Diauzetikos, which means 'separation', or 'tone of division' because it separates the aforesaid Tetrachords. The notes in which said Tetrachords were conjoined were called Sinaphe, which means 'conjunction'. The conjoined and mutable System contained only eleven notes and covered the span of a Diapasondiatessaron. Hence, it was four notes shorter than the Largest System. For this reason not only it was called imperfect by Ptolemy [Book 2. Fourth and Sixth chapter in marg.], but also useless and empty, since he called perfect only the largest System, albeit the others considered perfect only the System spanning a Diapason. Others, in order to reduce the conjoined System to the same span as the largest one, placed the hyperbolon Tetrachord above the Synemmenon, but they separated them with the tone of the Diazeusis. This tone was called high Diazeusis, while the other tone in the disjointed System was called low Diazeusis. In the same way they distinguished the Synaphe in low, medium and high, as I show in this illustration.

[Beccatelli, Exposition, 15; text: Sistema disgiunto, Congiunto, Tetracordo Hiperboleon, Diezeugmenon, Meson. Hipaton. aa. g. f. e. d. c. [sqb]. a. G. F. E. D. C. A. sinafe acuta, diazeusis grave. Media]

[-16-] They established other divisions based on the Note of the System, but, since I consider them to be useless, I believe it to be right to overlook them and to go back to discuss the differences one finds among the Systems. The consonant Systems differ from the dissonant ones in this manner. When the extreme sounds of the Systems are consonant, as the Tetrachord is, which is contained within a Diatesaron, the Pentachord, contained by the Diapente, the Octachord contained by the Diapason, the Dodecachordon contained by the Diapasondiapente and the Quindecachordon contained by Disdiapason, then they are called Consonant. Conversely, if they are contained by intervals other than the mentioned consonances, then they are called Dissonant Systems. The Emmeles Systems differ from the Ecmeles ones because, when the notes in the middle of the System are in orderly tension, they are called Emmeles, and when they are not, they are called Ecmeles. Not to be in orderly tension does not mean that they are in such tension of which one cannot understand how much the notes are high or low, since in that case their difference would fall under the category of rational and irrational ones, but it has to be understood as meaning that the notes are not made out in the way that the melody requires. For instance, according to our practice, the fifth from C to G laid out with the intermediate notes thus, C, D, E, F, G, when it is ordered thus C, B, b E, F, G, or thus C, b D, b E, # F, G, or in any other way, then it would be called Ecmele, or not suited to the melody. The difference between conjoined and disjointed systems occurs because of the Tone of the diazeusis, namely, when this tone is located among the inner sounds of the System, then the System is called disjointed; conversely, when it is not located there, the System is called conjoined. The most important Systems among the smaller ones are the Dia-tessaron, the Dia-pente and the Dia-pason, since these are the main Consonant Systems, whose different species were the only ones described by the ancients. I delay the description of said species until the end of the following Treatise of the Genera, while here I conclude the Treatise of the Systems.

On the Genera

Genus is a certain disposition of the middle sounds, or [-17-] of the middle notes of each

Tetrachord, or, we could say with Aristides, a particular division of the Tetrachord. It has been said already that the Tetrachord is a system of four notes and that the interval of a Diatessaron represented by the sesquiterza proportion is contained between the first and the last note. The Tetrachord contains three intervals. The first one at the bottom is a Semitone, while the other two are tones. These notes or sounds correspond to the notes that we call Mi, Fa, Sol, La. Therefore, the different types of Genera are based on the variation of the intervening intervals.

So, speaking in general, the Genera are three. The first one is called Diatonic, or Diatone, which means 'by tones', because it is composed more of tones than of other intervals. The second one is called Chromatic, which means 'coloured', because it is half-way between the first and the third one, in a similar way to the shades that intervene between black and white, which are called colour and colours. The third one is called Enharmonic, or 'Enarmonious', which name derives from the fact that the ancients considered it to be more noble, excellent and majestic than the others.

Some ancient writers divided these Genera in several ways, and, consequently, created different species both in the Diatonic and in the Chromatic. As to the Enharmonic, it was considered by all of a single species. These species were called Colours by virtue of the Simile mentioned above.

The Diatonic genus is the one where the Tetrachord is divided in the manner mentioned above, namely, so that the intervals in ascending are Semitone, Tone and Tone, and the opposite in descending.

The Chromatic Genus is the one where the Tetrachord is divided into two Semitones and a Trihemitone, and the opposite way in descending. Hence the uncompounded Trihemitone is called the specific interval of the Chromatic.

In the Enharmonic Genus, the Tetrachord is divided into two Diesis and a Ditone, hence in ascending it is called as Diesis, Diesis and Ditone, and in the opposite way in descending. For this reason the uncompounded Ditone is called the specific interval of the Enharmonic.

[-18-] In order to clarify this doctrine of the Genera with their own Species which, to avoid departing from the Ancients we shall call Colours, I shall adopt Aristoxenus' disposition, as it is clearer, albeit deceiving. As it was said, therefore, he considered the Tone as divided into twelve parts, of which six constituted the Semitone and three the Enharmonic Diesis. According to Aristoxenus, this Diesis is the universal measure of the Colours, as if we said that the Semitone is the double, the Tone the quadruple and the ditone the octuple of said Diesis, with the exception of the Soft Chromatic, which is measured not by the Enharmonic Diesis, but by its own particular Diesis and Semitones was measured. On this basis, we shall be able to understand all the divisions of the Tetrachord with ease through the demonstration of a single Tetrachord, since all the Tetrachords of the Largest System would have had to be structured as the first one.

[Beccatelli, Exposition; text: 3. 6. 9. 12. 15. 18. 21. 24. 30. Enarmonico, Cromatico Molle, Emiolio, Tonieo, Diatonico Molle, Sintono, Nete, Licanos, Paripate, Hipate, 22. [21. ante corr.] 21. 18. 15. 12. 4. ½.]

[-19-] Therefore, the intervals of the Enharmonic are: a quadrantal Diesis from the Hypate to the Parhypate, another quadrantal Diesis from the Parhypate to the Lichanos, and from the Lichanos to the Nete the Ditone. The intervals of the soft Chromatic are: from the Hypate to the Parhypate a triental Diesis, from the Parhypate to the Lichanos, equally, a triental Diesis, from the Lichanos to the Nete an interval which contains three Semitones and a triental Diesis. The intervals of the Hemiolic Chromatic are: from the Hypate to the

Parhypate a Hemiolic Diesis, from the Parhypate to the Lichanos a Hemiolic Diesis, from the Lichanos to the Nete an interval of seven quadrantal Dieses. The term Hemiolic has the same meaning as sesquialtero, and the aforesaid Diesis are called Hemiolic because, compared with the Enharmonic Diesis, they are in sesquialtera proportion.

The intervals of the Chromatic toniaeus are a Semitone from the Hypate to the parhypate, a semitone from the Parhypate to the Lichanos and a Trihemitone from the Lichanos to the Nete. The intervals of the soft Diatonic, namely, soft, are the Semitone from the Hypate to the Parhypate, an interval of three quadrantal Dieses from the Parhypate to the Lichanos and from the Lichanos to the Nete an interval of five quadrantal Dieses. The intervals of the Syntonic Diatonic, which means 'Intense', are the Semitone from the Hypate to the Parhypate, a tone from the Parhypate to the Lichanos and equally a Tone from the Lichanos to the Nete.

These are Aristoxenus' six colours, in which one can see that the Lichanos, of the mobile notes, is the one that moves more than the other one, namely, the Parhypate, because between the highest Lichanos, which is the one of the Syntonic Diatonic, to the most relaxed, which is the one of the Enharmonic, there occurs the distance of a Tone, while from the highest Parhypate, which is the one of the Diatonic Colours and of the Chromatic toniaeus, to the most relaxed, which is the one of the Enharmonic, there is the distance of a quadrantal Diesis. Moreover, the Lichanos is different in all six colours and the Parhypate is different only in the Hemiolic and Soft Chromatic, and in the Enharmonic. Therefore, since the Lichanos is the first one to move in the variation of the Genera, and it moves also more than the other one, hence its name is explained as Index, since it is the Index or Indicator of the Genera. Equally, since it is the first mobile note, [-20-] it is called also specifically according to the Genus in which it finds itself, namely Diatonic in the Diatonic Genus, Chromatic in the Chromatic and Enharmonic in the Enharmonic, with the distinction of the Tetrachords, where it occurs, in the following manner. The Lichanos Hypaton is called Hypaton diatonos in the Diatonic, Chromatic Hypaton in the Chromatic and Enharmonic Hypaton in the Enharmonic, which mean 'Diatonic of the highest', 'Chromatic of the highest' and Enharmonic of the highest. Equally, the Lichanos meson is called Diatonic Meson, Chromatic Meson and Enharmonic Meson, which means 'Diatonic of the Middle ones'. The Paranete, which take the place of the Lichanos in the high tetrachords, are called in the same way, namely, the ones of the synemmenon Tetrachord is called Diatonic Synemmenon, Chromatic Synemmenon and Enharmonic Synemmenon, and the same goes for the rest. It will be clear, from everything that has been shown and said, why the Hypatoides, the Mesoides and the Netoides, which are the first and the last notes of the Tetrachords are called stable, while the Parhypatoides and the Lichanoides, which are the intervening notes of the Tetrachords, are called mobile. However, because of the illustrated Genera, the Ancients devised another particular division of the Notes of the tetrachords. This consisted in the fact that when the first three notes of the Tetrachord, namely the Hypate, Parhypate and Lichanos embraced a space, or an interval, as we say, which was smaller than the one from the third to the fourth note, which occurs only in the Chromatic and Enharmonic colours, as, for instance in the Chromatic Toniaeus, where the first three Sounds cover a larger interval than in the other Chromatic colours – from the Hypate to the Parhypate there is a Semitone, and equally a Semitone from the Parhypate to the Lichanos, so that these three Notes, Hypate, Parhypate and Lichanos comprehend the interval of a Tone, so that a Trihemitone is left from the Lichanos to the Nete, which is, consequently, much larger than a tone. In this instance, the aggregate or System, as it is called, of the three sounds Hypate, Parhypate and Lichanos was called Pycnon, which could be translated in current parlance as 'Thick', so that we can state that the Thick of the aforesaid Chromatic

comprehends a Tone. The Thick of the Chromatic Hemiolic contains three quadrantal Dieses, [-2i-] the Thick of the Soft Chromatic contains two triental Dieses, while the Enharmonic Thick contains two Enharmonic Dieses, namely, quadrantal, that occupy the space of a Semitone. Therefore, besides calling the System of the three said Sounds with the term Pycnon, they also distinguished those sounds with another term derived from that one, which expressed their location. In fact, the first sounds of the Tetrachords, which are the Hypatoides, were called Barypycni, which means 'Low-Thick ones', since they are the lowest of the Thick. The second ones, which are the Parhypatoides, were called mesopycni, which 'Middle dense ones', since these sounds are the middle ones. The third ones, or Lichanoides, were called Oxypyci, which means 'High-dense', since these are the highest of the Thick. Finally, the others, which were not comprised among these sounds, such the Proslambanomenes, were called Apycni, which means 'Non-thick', as I show in the following illustration of the Chromatic System, where I mark the sounds with our own letters, to make myself clearer.

[Beccatelli, Exposition, 2i; text: aa. #f. e. #c. [sqb]. a, #F. E. #C. A, Nete, Paranete, Trite. Paramese. Mese. Licanos, Paripate, Hipate, Proslambanomenos. hyperboleon. Diezeugmenon. Meson. Netoide, e Mesoide, Licanoide. Paripatoide. Hipatoide, Apicno. Oxipicno. Baripicno. Stabile. mobile. Triemituono, Semituono, Tuono.]

[-22-] Having explained the division of the different colours of Aristoxenus, it would be logical to illustrate also the other different divisions devised by the Ancient Greeks. However, since I believe what has been said so far to be sufficient to the aim of illustrating the Doctrine of the Genera, thus I believe it to be much better to delay their explanation until the end of this Essay, in order to move on to discuss the other Items which remain. Firstly, I shall speak about the different species of the main Consonant Systems, which are the Dia-tessaron, the Dia-pente and the Dia-pason. The species of the Systems are as many as the Intervals that make them up. Since it has four Sounds, the Diatessaron contains three Intervals, hence it is of three species, namely, three different constitutions, because of the different nature of the intervening intervals. Since the Diapente has five sounds, it contains four intervals, and for this reason it is of four species, and for the same reason the Dia-pason is of seven species. In order to underline the diversity of said species, the Ancients considered a characteristic or indicative interval which would distinguish said species according to its different position. For the Diatessaron, this interval was the one that lays between the third and the fourth Note of the Tetrachord, namely between the Lichanoides and the Netoide, since they took the place of the division as the highest interval of said Systems. As to the Dia-pente and the Diapason, said interval was the Tone of the Diazeusis. As the first species of a System was designated the one that contained the characteristic interval in the first place from the top, which we would call the last place; as the second species, they regarded the one that had it in its second place, and, equally, as third, the one that has it in the third place. Thus, they arrived in order up to the last species. Among the ancient Authors, some describe these Systems as Diatonic and others as Enharmonic. This is why Meibomius [Meibomius in Aristoxenus page 16 in marg.] believed that the Enharmonic Genus was used in practice, but that for a certain time this was the only Genus practised. However, I shall discuss this matter elsewhere. Therefore, the first species of the Dia-tessaron according to the Diatonics is the one that is contained by the Hypatoides and Netoide sound, while, according to the Harmonics, it is the one contained by the Barypycni and Apycni sounds, namely, from Hypate Hypaton to Hypate Meson, or from Hypate Meson to Mese, and so forth. This species has its characteristic intervals in the first space from

the top. I stated earlier [-23-] according to the Diatonics and according to the Harmonics, taking as Diatonics those who describe the Intervals and the Systems Diatonically, and as Harmonics those who illustrate them only according to the Enharmonic Genus, as if this was the only one used by them, as they are called thus by Aristoxenus. Hence the first species of the Dia-tessaron is found in our Notes, that are Diatonic, from [sqb] to E, from E to a, and similar ones. This is what our Modern Authors call second species. The second species is the one that has the interval of the distinction in the second place and is contained by Parhypatoides Sounds - or by Mesopycni Sounds, according to the Harmonics – and it is contained between Parhypate Hypaton and Parhypate Meson, between Parhypate Meson and Trite Synemmenon, and, according to our notes, between C and F and F and b and similar ones. This one, according to Modern Authors is the third species. The third species is the one that contains the distinctive interval in the third place from the top, and it is contained by the Lichanoides or Oxypycni Sounds, hence it occurs between Paranete and Paranete, which is, in our notation, between D and G and between G and C, and others similar to these, as one shall be able to see more clearly in the following illustration described diatonically.

[Beccatelli, Exposition, 23.; text: Intervallo Caratteristico. G. F. E. D. C. [sqb]. mi. Re. Fa. do. Sol. 1. 2. 3.]

The interval of distinction for the Dia-pente and the Dia-pason, as it was said, is the Tone of the Diazeusis, or Diazeusis, hence the first species of the Dia-pente is the one that contains said interval in the first place, always meaning from the top down, and it is contained by Hypatoides Sounds, which are called Barypycni harmonically, so it occurs from Hypate meson to Paramese. The second species contains the Tone of the distinction in the second place and it is contained by Parhypatoides sounds called Mesopycni, hence it occurs from Parhypate Meson to Trite Diezeugmenon. The third species contains the Diazeusis in third place and it is contained by Lichanoides sounds called Oxypycni, therefore being found [-24-] between Lichanos Meson and Paranete Diezeugmenon. The fourth species contains the characteristic Tone in the fourth place and it is contained by Mesoides and Netoides sounds, also called Apycni and Barypycni, because it occurs between Mese and Nete Diezeugmenon, as one will be able to note from the following illustration.

[Beccatelli, Exposition, 24, 1; text: e. d. c. [sqb]. a. G. F. E. diazeusis mi. Re. Sol. Fa. do. La. 1. 2. 3. 4.]

With the same position of the Characteristic interval one demonstrates the seven species of the Diapason, hence I shall only say, for the sake of succinctness, that the first species is contained by the Hypatoides, or Barypicni, sounds, the second by the Parhypatoides, or Mesopycni, the third one by Lichanoides, or Oxypycni, the fourth one once again by the Hypatoides, or Barypycni, the fifth by the Parhypatoides and Mesopycni, the sixth by the Lichanoides and Oxypycni, and, finally, the seventh by the Mesoides and Netoides, or Apycni, as one can see more clearly from the following illustration.

[Beccatelli, Exposition, 24, 2; text: aa. g. f. e. d. c. [sqb]. a, G. F. E. D. C. A. Mi. Re. Sol. Fa. La. do. 1. 2. 3. 4. 5. 6. 7.]

[-25-] On the three species of the Dia-tessaron, the first one is contained by stable sounds, and the other two by mobile sounds. Of the four species of the Diapente, the first and the

last one are contained by stable sounds, while the second and the third one are contained by mobile sounds. Of the seven species of the Diapason, the first, the fourth and the seventh are contained by Stable Sounds, the second, the third, the fifth and the sixth by mobile sounds. The said species of these systems were ordered in different ways by our Ancients, since they considered as first species those whose lowest Note is called Re. Hence, they constructed the species of the Diatessaron on these Notes: the first one from a to d, the second one from [sqb] to E, the third one from C to F. They based those of the Diapente on these notes, namely, the first one from D to a, the second one from E to [sqb], the third one from F to C, the fourth one from G to D [[the fifth one from E]]. They based those of the Diapason on these notes: the first one from A to a, the second one from [sqb] to [sqb], the third one from C to c, the fourth one from D to d, the fifth one from E to e, the sixth one from F to f and the seventh from G to G. The very learned Zarlino would have been convinced to change the order of said species and to make first the ones whose lowest note we call Do, had not the authority of the Church and the inveterate practice convinced him otherwise. However, since this matter is not relevant to our scope, I shall return to the above mentioned ancient species. [A. 7. Ipodorian G. 6. Hypophrygian F. 5. Hypolydian E. 4. Dorian D. 3. Phrygian C. 2. Lydian [sqb]. 1. Myxolidian, Euclide pagina 15. in marg.] of the Diapason. The first of these species was called Myxolidian, the second Lydian, the third Phrygian, the fourth Dorian, the fifth Hypolydian, the sixth Hypophrygian, and the seventh Hypodorian, Locrian and Common. However, since these terms belong to the different ways to construct a melody, called by the Greeks also Tones and Tropes, which we ourselves call Tones and Modes, therefore we shall move on to discuss them.

On the Tones

The term Tones has various meanings. Firstly, it is taken to mean tension, or tenure, or position of the voice, as one would say on hearing a particular note or sounds that it is in the tone of C sol fa ut or D la sol re or any other note. Secondly, it is taken to mean interval, since it is called Tone the interval by which the Diapente exceeds the Diatessaron. The ancients defined specifically the Tone of the Diazeusis, because, considering that the Dia-tessaron -26-] spans from Hypate Meson to Mese, which is contained in the first species of the Dia-pente, which is located between Hypate Meson and Paramese, this one exceeds the aforesaid Diatessaron which falls between the Mese and Paramese by that interval that is called 'of the Diazeusis'. According to the names of our notes the interval of the tone is found between Do and Re, Re and Mi, Fa and Sol and La. Thirdly, the term Tone means 'Systematic Mode', or 'basis, constitution of a Melody', in the way that we call the Ecclesiastical Chant First, Second, Third, Fourth Tone and so on. Euclid adds another meaning to these, namely, that the Ancient interpreted this word sometime as sound, or String, like when one finds that the Cithara is called Heptatonon, or of seven Tones, because it is composed of seven Strings. In my opinion, this meaning would be more poetic than musical, were it not turn out to be identical, as in fact it is, with the first one, namely, taken to mean tension or tenure or position of the note or sound, since the seven Strings of the Cithara are nothing but seven different tensions, and, consequently, seven different notes or sounds. However, do let us go back to the third meaning, which we need to discuss now. It was believed by many very learned Authors of the past centuries that the term Tone in the meaning of mode was first used at the time of Boethius, which is untrue, because all of the Greek Music Writers without distinction call Tones and Tropes the aforesaid systems of melodies which were called Harmonies by the most ancient Writers.

Tone, therefore, is a particular position of the notes suitable to create a melody. This place, according to those who speculated better than the others on the Tones, in my opinion, extended to a Dia-pason, according to others it spanned a Disdiapason, while others established them in some within a span slightly smaller than a Diapason and in others larger than a Diapason. We shall define it thus: the Tone is an established series and system of notes through which a particular species of Harmony is composed.

According to the most ancients the tones were three, of which the first one and lower than the others was called Dorian, the highest was called Lydian and the middle one between them was called Phrygian. They were called in this way because they were the species of Harmony that were used by the Dorian, Phrygian and Lydian nations, [-27-] and they were called Tones, as Ptolemy states [Book 2, chapter 10. in marg.], because each one was at the distance of a tone from the other, namely, the first note of the Phrygian was one tone higher than the first one than the first of the Dorian, and the first one of the Lydian was one tone higher than the first one of the Phrygian. These tones were reduced later on to the number of seven and they were arranged to the seven species of the Dia-pason. [Bryennius Book 2. chapter 5 in marg.] The one that in the sequence of said species is the lowest, was ascribed to the highest of said Tones, which was the Mixolydian, so called because it was next to the Lydian. The Lydian was arranged a Semitone under the Myxolydian in the second species of the Diapente. The Phrygian was placed a Tone under the Lydian in the third species of the Diapason, and, equally, the Dorian resided a tone under the Phrygian in the fourth species of the Diapason. The Hypolydian, which means 'under the Lydian', was located a Semitone under the Dorian. It was called in this way not because it was understood to be placed under the Lydian, but because it was in correspondence to the Lydian, since it was at the distance of a Dia-tessaron from it. To the Hypolydian was assigned the fifth species of the Dia-pason. The Hypophrygian was arranged a tone under the Hypolydian, in the sixth species of the Diapason. It was called in a similar way to the Hypolydian because it corresponded to the Phrygian. Finally, the last one, which was in correspondence with the Dorian was called Hypodorian and placed a tone under the Hypophrygian in the seventh species of the Diapason. [Bryennius book 2. chapter 3. in marg.] The Notes of all these tones had the same name, namely the first one of each Tone was called Proslambanomenos, the second one Hypate, the third one Parhypate, the fourth one Lichanos, the fifth one Mese, the sixth Paramese, the seventh Paranete and the last one Nete. The Ancients considered the beginning, the middle and the end of each of these Tones. They took two notes as the beginning, namely, the Proslambanomenos and the Hypate, they took the Mese as the middle and the Nete as the end. However, in order to illustrate their order and position, the most Ancients relied mostly on the Proslambanomenos. Therefore, since the Hypodorian was the lowest mode of all, they placed its Proslambanomenos in the position of the Proslambanomenos of the Largest system, representing the lowest Note that may be expressed with the human voice. Its Mese was the Hypate Meson and its Nete was the Mese of the System. The Proslambanomenos of the Hypophrygian was the Hypate Hypaton of the System, they Hypate was in the place of the Parhypate Hypaton, the Mese was the Parhypate Meson, and the Nete was the Paramese. The Proslambanomenos of the Hypolydian was in the place of the Parhypate Hypaton, hence its Hypaton was the Lichanos Hypaton, its Mese was the Lichanos Meson and its Nete the Trita diezeugmenon. The Proslambanomenos of the Dorian, which was a Dia-tessaron higher than the one of the Hypophrygian and a semitone higher than the one of the Hypolydian, was in the place of the Lichanos Hypaton, hence its Hypate was Hypate Meson, its Mese was the Mese itself and the Nete was Paranete Diezeugmenon. The Proslambanomenos of the Phrygian, which was placed a Dia-pente above the one of the Hypodorian, a Diatessaron above the one of the

Hypophrygian, a trihemitone above the one of the Hypolydian and a tone above the one of the Dorian, was the Hypate Meson, hence its Hypate was Parhypate Meson, its Mese was paramese and its Nete was Nete diezeugmenon. The Proslambanomena of the Lydian, which was located a Diapente above the one of the Hypophrygian, a Diatessaron above the one of the Hypolydian, a Ditone above the one of the Dorian and a Tone above the one of the Phrygian, was Parhypate Meson, hence its Hypate was Lichanos Meson, its Mese was Trita diezeugmenon and its Nete was Trita Hyperboleon. Finally, the Proslambanomena of the Mixolydian, which was located a Dia-tessaron above the one of the Dorian (for which reason the Mixolydian was also called Hyperdorian, namely, 'Above-Dorian', because it corresponded to the Dorian in the same way that the Dorian corresponds to the Hypodorian) was the Lichanos Meson. Its Hypate was the Mese, its Mese was the Paranete diezeugmenon, and its nete was the paranete Hyperboleon. Hence, for these seven tones, the Location or, as we say, Passage of the Proslambanomena was from Proslambanomenos to Lichanos Meson of the System, and the passage of the Mese was from Hypate Meson to Paranete Diezeugmenon. This concept of the variation of the Tones, as well of the passage of the Proslambanomena and of the Mese, was held in great consideration by the Ancients. It must be noted how Plato in his Republic mentions [-29-] six different Harmonies, which means 'six Tones', of which the highest, according to Plato's words, are the Mixolydian and the Syntonolydian. He mentions another two what are lower than these ones, which are the Iastian and the Lydian [First book, page 21 in marg.], and finally the Phrygian and the Dorian. Aristides describes the intervals of these tones and illustrates the ancient characters that indicated their sounds. He states that the Lydian consisted of these intervals, namely, Diesis, Ditone, Diesis, Diesis, Ditone and Diesis, and that this was the perfect system, which means that it contained a Diapason. When ancient Greek and Latin authors mention the Diesis without any other specification, one must interpret it as the Enharmonic Diesis. The Dorian Tone consisted of Tone, Diesis, Diesis, Ditone, Tone, Diesis, Diesis and Ditone. This system exceeded the Diapason by a Tone. The Phrygian consisted of Tone, Diesis, Diesis, Ditone, Tone, Diesis, Diesis and Tone, and this was also the perfect system. The Iastian consisted of Diesis, Diesis, Ditone, Trihemitone and Tone, and was a Tone shorter than the full Diapason. The Mixolydian consisted of Diesis, Diesis, Tone, Tone, Diesis, Diesis and Tritone, and it was the perfect System. The Syntonolydian consisted of Diesis, Diesis, Ditone, Trihemitone and Ditone, and it corresponded also to the perfect System. The notes or characters through which they indicated the sounds contained in said Tones according to Aristides are illustrated by me in the following example. In order to show to which of our Sounds they respond at least approximately, I placed in order a section of the largest system not only accompanied by our letters which indicate the notes found on our harpsichords, but also, where they are necessary, the notes of the Enharmonic Diesis which divide the Semitones by half. I have marked them with the signs of two inverted commas crossed, which was introduced by Zarlino. One will see in this illustration that the Mixolydian and Syntonolydian are the highest Harmonies, while the Dorian and the Phrygian are the lowest ones. Therefore, there appears to be a strong connection between Plato's words and the illustration, as one can see clearly by comparing the ancient Pythagorean characters quoted by Alypius and by Aristides himself, and placed by me next to our own letters. [<.....>] of Aristoxenus the sounds of the Dorian. Since, according to the ancients, as Aristides states [page 24 in marg.], the Proslambanomena of the Dorian was the lowest Note that could be sung, I judge not without reason that said note corresponds to our lowest F F. This is why, after adding to said Note of ours the Characters of the Proslambanomena of the Dorian, on the basis of the same principle I ascribed the other Characters to the rest of our Sounds, of which I have produced only the

ones that are necessary to the above demonstration.

[-30-] [Beccatelli, Exposition, 30; text: Lidio, Dorio, Frigio Iastio, Missolidio, Sintono Lidio [nolidio ante corr.] [λ], f. G, b e. d. # c. [xi]. [sqb]. b. a. # G. # F. E, b E. D. # C. [Eta], [Beta], [Ny], [Zeta], [Iota], [My], [Omikron], [Kappa], [Rho], [Ypsilon], [Phi], [Digamma], [Omega], [Gamma] [signum]]

The reasons that they have moved me to ascribe the Proslambanomene of the Dorian to our lowest F F rather than to our gamma, which is assigned by all our Authors as the first note that can be sung, are two. Firstly, that, notwithstanding the fact that the Gamma, or the Do of low [sqb] is the first note that can be tune for the majority of men, nevertheless there are many who can sing with clear voice the lowest F F a tone below the Gamma when the sounds are placed in the tone that we call 'Corista'. The most Excellent Pier Luigi Palestina in his divine works has employed this note more than a few times. The second reason is that the intervals of the described Tones result well adjusted, since their Barypyncni and Apycni sound correspond exactly with those of our notes, which the Ancients called stable, except for the Lydian mode, which, with regard to the tone of the Diazeusis which it hold in itself, I would have transposed a Dia-tessaron higher, where all its stable notes would have matched our stable ones, [-31-] had the Characters of the lowest sounds not dissuaded me from doing so. Moreover, in these six Tones, according to Aristoxenus' doctrine, except for the Lydian and the Dorian, the constitution is not apt to produce a melody or disorderly, since, as they are all in the Enharmonic genus, Aristoxenus teaches that no other interval but the Ditone can be sung after the Thick in ascending, and above the Ditone nothing can follow but the Thick, which is the Tone of the Diazeusis. Thus, in descending the Ditone and never the tone must follow the Thick, except in the case of the Tone of the Diazeusis or other similar Tone of separation, but under said Tone nothing can follow but the Ditone. Two Thick placed immediately one after the other cannot stand. In the Enharmonic genus, two Semitones, two Tones or two Ditones cannot occur, in the Chromatic, there cannot be two Tones, two Trihemitones or the Ditone, or two Semitones in the Diatonic Genus. Aristoxenus spends the entire third book explaining this Doctrine and others similar to it, producing as fundamental reason of his entire reasoning that four Tones adjacent to each other must produce the Dia-tessaron and five Tones must add up to the Diapente. If one does not follow this, the sequence is Ecmeli, namely, disorderly and unsuitable to producing a melody. However, to return to the Essay on the Tones, I shall say that Aristoxenus, as far as one can gather from Euclid and Aristides [Euclid page 19, Aristides first book, page 23 in marg.], reduced the tones to the number of thirteen ascribing to each of them as many notes as the Largest System contains, namely, fifteen Notes within the span of a Dis-diapason, which differed one from the other only by being at a distance of a Semitone. In fact, considering the Diapason as being divided into twelve equal Semitones and comprising thirteen Sounds, e ascribed to each one of these Sounds the Proslambanomene of a Tone, and thus he constructed the System with these thirteen Tones, each of which contained fifteen notes, from the lowest to the highest. They were: the Hypodorian, the Hypoiastian, the Hypophrygian, the Hypoaeolian. The Hypolydian, the Dorian, the Iastio, the Phrygio, the Aeolian, the Lydian, the Hyperdorian, the Hyperiastian and the Hypermixolydia, also called Hyperphrygian. His Followers later added another two to these thirteen, which were called Hyperaeolian and Hyperlydian the last one, and thus they reached the number of fifteen [-32-] comprising in their span three Diapason and a tone. Hence it follows that, since that span is wider than the human voice can encompass, these Tones were not all sung in their entirety, since, according to Aristoxenus, as far as one can gather from

Theon of Smyrne who quotes certain words by Adrastus, the human voice, from the lowest note than a Man can sing perfectly to the highest that a Boy can sing, could not encompass more than a Diapason and a Diatessaron, while according to Aristides the maximum span was of two Diapason. Therefore, nor the lowest Notes of the lowest Tones or the highest notes of the highest Tones were sung by the human voice, but they were played on musical instruments. For this reason, while the most Ancients considered the Proslambanomene of the Hypodorian the lowest Note that could be sung, Aristoxenus and his followers considered it to be the Proslambanomene of the Dorian, hence the Proslambanomene of the lower Tones remained below the first Note that could be sung. This is why, while the Ancients used the Proslambanomene to distinguish the differences of the Tones, the followers of Aristoxenus compared them on the basis of their Mese in the following way.

They arranged the Mese of the Hypodorian to the tension of the Hypate Meson, hence its Proslambanomenos corresponded to a Dia-tessaron below the one of the System and its Nete was Nete Diezeugmenon. They placed the Mese of the Hypoiastian a semitone above the one of the Hypodorian and so it corresponded to the Parhypate Meson. Hence, the Proslambamene was a Ditone below the one of the System and its Nete was the Tritē Hyperboleon. The Mese of the Hypophrygian was placed a Semitone above the one of the Hypoiastian, and, consequently, a Tone above the one of the Hypodorian, hence its Proslambanomene resulted to be a Trihemitone below the one of the System and its Nete a Semitone above the Tritē Hyperboleon. The Mese of the Hypoaeolian was placed a Semitone above the one of the Hypophrygian, hence it was in the tension of the Lichanos Meson. Therefore, its Proslambanomene was a Tone below the one of the System, and its Nete was the Paranete Hyperboleon. The Mese of the Hypolydian was placed a semitone above the one of the Hypoaeolian, hence its Proslambanomene was placed a Tone below the one of the System and its Nete a Semitone above the Paranete Hyperboleon. [-33-] The Mese of the Dorian was the same Mese of the System; hence its Proslambanomene was the same Proslambanomene and the Nete the same Nete Hyperboleon. The Mese of the Iastian was a Semitone above the one of the Dorian, therefore its Proslambanomene was a Semitone above the one of the System and its Nete a Semitone above the Nete Hyperboleon. The Mese of the Phrygian was the Paramese, its Proslambanomenos was Hypate Hypaton and its Nete was a Tone above the one of the one of the Hyperboleon. The see occurs in the case of all the other Mese of the other Tones which are at the distance of a Semitone one from the other. Because of this sequence, the Dorian Mode was the one sung throughout because it was arranged on the System apt to the human voice, as Aristides [first book, page 24 in marg.] states with the following words talking about the above mentioned Tones. “And some of these are sung whole, others are not. The Dorian therefore is sung complete because our voice follows in sequence up to twelve Tones,” which corresponds to a Disdia-pason. On the following page he states [page 25 in marg.] “Three were the original modes, namely, Dorian, Phrygian and Lydian. Of these, the Dorian is apt to the lower products of the voice, the Lydian to the higher and the Phrygian to the medium ones. The remaining ones can be seen more commonly in instrumental compositions since they are elaborated in extremely long Systems.” Bryennius carries the same words at chapter eight of his first book. These words, as a consequence of the general agreement among the Ancients in reducing the first singable note to the Proslambanomene of the Hypodorian, as it has been said above in the described seven Tones – these words caused no small problems for the very erudite Meibomius, since he believed, seeing that it was reduced by them to the Proslambanomene of the Dorian, that an error had occurred in the Greek copies, as it happened on very many occasions. He did not consider, however, in my opinion that the

Tones consisting of only eight notes in the System of a Dia-pason are different from those consisting of fifteen notes in the System of a Disdiapason, as the followers of Aristoxenus built them. In fact, had they arranged the first note as the Proslambanomenos of the Hypodorian of these fifteen Tones, they would have sung only the Hypodorian complete, and, consequently, the main Tones, which are the Dorian, the Phrygian and the Lydian would have been much shorter than their actual span. This was not convenient, and for this reason I would say that the followers of Aristoxenus transposed the first Notes of the lowest Tones with great appropriateness under the Proslambanomenos of their System, so that the entirety of the System which could be sung to the main of the Tones, which was the Dorian, in the way that I described it. [Alypius Musical Introduction, Gaudentius, page 24. Bryennius, book 2, Third section in marg.] However, let us move on. The most considerable fact about these Tones is that they are all described with a uniform distribution of the Intervals, namely, that they are all illustrated as equal in the disposition of the Intervals, namely, that from the Proslambanomenos to the Hypate Hypaton of any tone, or from the first to the second note in any Genus, there was the interval of a tone; a Semitone from the Hypate to the Parhypate in the Diatonic and Chromatic Genus, and a Diesis in the Enharmonic. From the parhypate to the Lichanos a tone in the diatonic, a Semitone in the Chromatic and a Diesis in the Enharmonic; a tone from the Lichanos to the Hypate Meson in the Diatonic Genus, a Trihemitone in the Chromatic and a Ditone in the Enharmonic, and thus following on in all the Tetrachords in the same way as the distribution in any genus of the Largest System, hence there was no other difference between them than the fact that one was lower or higher than the other one. Ptolemy [Book 2, chapter 8. and 9. add. in marg.] rejected not only the vane and useless large number of Tones of the followers of Aristoxenus, but also the addition of an eighth Tone by those who practised the seven ancient Tones, which was called by them Hypermixolydian. He maintained that there could only be as many tones as the species of the Dia-pason, which means no more than seven. In fact, the species that follows after the seventh, as I have already demonstrated, is the same as the seventh, hence the Eighth tone, called Hypermixolydian, is the same as the first one. Hence one can deduce that Ptolemy thought that not only the Tones had to differ one from the other as to pitch, but must also differ in the assembling of the intervals that compose them. He confirms that they must be arranged to those species of the Diapason that were assigned to them by the ancients, namely, the Mixolydian to the first one, the Lydian to the second one, the Phrygian to the third one, the Dorian to the fourth one, the Hypolydian to the fifth one, the Hypophrygian to the sixth one and the Hypodorian to the seventh. He orders them in this way: he wants that the Mese of the Hypodorian be placed in the tension of Hypate Meson, the one of the Hypolydian in Lichanos Meon, the one of the Dorian in the Mese itself, the one of the Phrygian in the Paramese, the one of the Lydian in Trita Diezeugmenon and the one of the Mixolydian in Paranete diezeugmenon. Nevertheless, despite all this, he ascribes fifteen notes in the System of a Disdiapason [-35-] in a very different way from the one of the followers of Aristoxenus. In fact, from his Diagrams and from his many Tables expressing the proportions that run between a sound and another one, one can deduce that the Tones be sounded in those assigned different species of the Diapason, but with the same tension of the voice, so that none be higher or lower than another one, applying the fifteen notes of each tone to fifteen Sounds of the Largest System in an admirable way, which is this one. In the fifteen notes of each Tone he considers mainly eight of the middle ones or a Dia-pason placed in the middle of those fifteen notes of the Largest System [Ptolemy Chapter XI, Book 2. in marg.], as he himself explains with these words: "Therefore, take the Diapason placed in the middle positions, so to speak, of the perfect System, namely, the one that go from the one that is in the

position of the Hypate Meson up to the Nete Diezeugmenon, for this reason, because the voice likes to hover and establish itself around the middle range, because of the clear discomfort and constriction that has that relaxation or tension that goes beyond the central range.” Therefore, this Diapason, as he says, is the one that is located between the Nete Diezeugmenon and the Hypate Meson of the System. He calls this Diapason

, considering its beginning from the highest note, since its highest note is in the position of Nete Diezeugmenon. This name means ‘from the Nete’ and it means that this Diapason apo Nete is of that Species that the Ancients assigned already to each tone. Hence, it follows that the lowest Dia-pason, which occurs between the Mese and the Proslambanomenos of the System and, consequently, the one that is corresponding to this one, which occurs from mese to nete Hyperboleon, which is called on the example of the other one, namely ‘from the Mese’, it follows, I say, that this lower Diapason is of a different species from the other one. When he illustrates the proportions of the Interval which compose the species of the Diapason assigned to the tones, he demonstrates two species of Dia-pason, one called ‘from the Nete’, because composed of those notes that correspond to the position of the sounds contained between Nete Diezeugmenon and Hypate Meson of the System, and the other one called ‘from the Mese’, because it is composed of the notes comprised between the Mese and the Proslambanomenos of the System, as I shall show you in the example. [-36-] However, in order to talk about a particular Tone, I shall take as an example the Mixolydian, whose Mese has to be placed in the position of Paranete Diezeugmenon, hence its Proslambanomenon occurs in the position of Lichanos Hypaton. Hence, this highest of Tones lacks three Notes under the Proslambanomenon to fill the three low positions of the System, and it has three in excess in the high register, since these are above the sounds of the System. Therefore, Ptolemy places the three lacking notes below its Proslambanomenon, which, being homophonous with the Nete, for this reason must proceed towards the low register, while he puts the name of Nete Hyperboleon instead of Proslambanomenon reciprocally, hence he places the Name of Paranete Hyperboleon underneath it and the one of Triton Hyperboleon after it. Equally, having to progress towards the high register, he puts the name of Proslambanomenon instead of the one of Nete Hyperboleon, while Hypate Hypaton and Parhypate Hypaton follow in sequence, which is the same as we do in repeating our seven letters. The most important point is, however, that the intervals, according to the doctrine above explained, must not be arranged according to the positions of the System, but according to the positions of the Notes and of the Tones, namely, there must be the interval of a Tone from the Proslambanomenon of the specific Tone to its Hypate Hypaton, of a Semitone from its Hypate to the Parhypate, of a Tone from the Parhypate to the Lichanos, and thus following on, as it has been illustrated several times in the distribution of the Sounds and as one can see in the following examples of Ptolemy’s Tones. Hence the Doctrine is proven, that he explains in the tenth chapter of his second book, where he demonstrates, as it was said at the beginning of this discourse, namely, that from the Hypodorian to the Hypophrygian, or from the Proslambanomenon of the one to the one of the others towards the high register there is the interval of a Tone. Similarly, there is a Tone from the Hypolydian to the Hypophrygian, a Semitone from the Hypolydian to the Dorian, a Tone from the Dorian to the Phrygian, a Tone as well from the Phrygian to the Lydian, and a Semitone from the Lydian to the Mixolydian.

[-37:-] [Beccatelli, Exposition, 37; text: Hipodorio, Posizione del Sistema, Corde del Tuono, aa. g. e. d. c: [sqb]. a, G. F. E. D. C. A. Nete, Paranete, Triton, Paramese. Mese. Lichanos, Parhypate, Hypate, Proslambanomenos. hyperboleon, diezeugmenon, Meson. Hypaton. Tuono, Semituono. dd. cc. Della Diapason Specie Settima, Terza, della Nete,

Mese, Hipofrigio, sesta, seconda, Diazeuctico, Hipolidio, quinta, Prima, Dorio, quarta, Frigio, Lidio, Missolidio]

[-40-] These are the seven tones according to Ptolemy's Doctrine. This Doctrine is very suited to the true use of the Tones, as far as the human voice is concerned, since the human voice cannot exceed a Dia-pason, or a Dia-pason and a Tone at the most, when sung by the same kind of persons with the same quality and clarity. This Diapason is the one that in our System occurs between C and D or from D to d for the majority of Men. Hence, if we equate the ancient Proslambanomena, as the first note that can be sung, to our lowest F F, as I said above on the subject of the six ancient Tones mentioned by Aristides, there follows, that the Ptolemy's Diapason from the Nete is the same as ours from C to c, which I called easy to sing because of its comfortable tension of its notes for the human voice, or, referring it to our Gammaut according to Tuscan practice, said Diapason will agree with ours from D to d.

Finally, Boethius, following Bryennius, adds the eighth tone to these, saying that it had been added by Ptolemy. I have shown this to be false. Moreover, although Bryennius ascribes only eight notes to each of them, nevertheless he illustrates them with fifteen, to which I add the ancient characters extracted from Alypius, which indicate the Sounds of the Tones itself, as one can see.

[-41:-] [Beccatelli, Exposition, 41; text: Dorio, Hipolidio, Hipofrigio, Hipodorio, Lettere secondo l'antico Sistema, del nostro il Corista Toscano, Dia=pason della Nete. da me detta Cantabile, Paranete, Paramese, Mese, Licanos, Paripate [Paripata ante corr.], Hipate, Proslambanomenos, aaa. gg. ff. ee. dd. cc. [sqb]. aa. g. f. e. d. c. a. G. F. E. D. C. #, b, [Gamma], [Ny], [Eta], [My], [Ypsilon], [Phi], [Omega], [Epsilon], [omega], [Theta], [Iota], [Zeta], [Rho], [Beta], [lambda], [Omikron], [Kappa], [signum]]

[-42:-] Since I have shown you the ancient Characters, I want to stress that they had the same function for the Ancients as our musical Notes have for us. They placed two series of them in their Compositions, placing the ones that are on the left hand above, and those that are on the right below in the way that I illustrate these of the Hypodorian, thus

[Beccatelli, Exposition, 42:].

The one above were used to sing the words and the ones beneath to play their instruments, as one derives from these words of Aristides.

[First Book, page 27 in marg.] "All the letters through which every composition is written relate both to the melody and to the instruments across fifteen modes." Boethius, however, expresses it more clearly [Boethius, 4, chapter 1 in marg.] with these words: The notes that are placed before and above are the notes of the pronunciation, namely, of the words, the ones that come after and are placed underneath are the ones of the instruments." According to Meibomius, only the ones placed above were necessary for the unaccompanied compositions, since he deemed the ones below to be redundant. Finally, one should note that in the last six positions they repeated the Characters of the ones which were at the distance of a Diapason from these with the addition of the acute accent, so that they may be distinguished from the others. Here I conclude this long discussion of the Tones.

On the Mutations

Mutation, called by the Greeks *Metabole*, is the variation of what has been proposed. It takes place in several ways. The first is the mutation according to Genus, the second one according to System, the third according to Sound, the fourth according to *Melopoeia*, and the last one according to Rhythm.

The mutation according to Genus is nothing but the variation of the Genus, for instance, while one builds a composition in the Diatonic Genus, it consists in passing on to the Chromatic or Enharmonic Genus, or in one of the described Colours, as, for instance, from the intense Diatonic, to the soft Diatonic, or from the Chromatic toniaeus to the soft one or to Hemiolic, and from the latter ones to the first ones. This mutation, in order to be orderly, it must be made in the stable tones, as they are in common among all the Genera and Colours. Any other way of producing a mutation would be disorderly, namely producing an unpleasant modulation.

The Mutation according to System is nothing but the transition from the disjoined System to the conjoined, or from the conjoined to the disjoined. This [-43-] Mutation, according to Ptolemy, is achieved by the Mutation of the tones.

The Mutation by Tone is the variation of the Tones, or the transition from one to another tone. It can be orderly and disorderly. The best one is the one that occurs via the first consonances, namely the *Dia-tessaron* and the *Dia-pente*, and it consists in passing from a tone to another one which is at the distance of a *Diatessaron* or of a *Diapente* from their *Mese*, for instance, from the Dorian to the Mixolydian or from the Dorian to the Hypodorian, from the Hypodorian to the Phrygian, from the Phrygian to the Hypophrygian, from the Hypophrygian to the Lydian and so on with the others.

The other mutations that occur through non consonant Intervals and from notes not in common to said Tones are called disorderly.

The mutation through *Melopoeia* is the passage from a Mode or manner of singing to a different Mode or manner. For instance when one moves from a sustained, severe mode, replete of gravity and called *Diastaltic*, to a humble, effeminate, plangent or emotional mode called *Systaltic*, or to a mode in between the severe and the soft, namely, a peaceful and tranquil Mode said *Hesychastic*, and, similarly, the other way round.

The mutation according to Rhythm is the variation of the measure of the timing in the Compositions, which the Ancients expressed through the varied combination of the verses.

On the *Melopoeia*

Melopoeia, according to the Ancient Musicians, is the Art of composing well musical melodies and verses and to adapt these and those to the Objects, Passions and Emotions that they have to express and represent by distinguishing and separating which style of singing suits them among the three described above, whether *Diastaltic*, *Systaltic* or *Hesychastic*.

In the *Diastaltic* style the low notes and sounds were employed, hence this manner was called *Hypatoides* and *Tragic*.

The high notes and sounds were employed in the *Systaltic*, which was called *Netoides* or *Nomic*, while in the *Hesychastic* the middle notes were used; hence it was called *Mesoides* and *Dithyrambic*.

[-44-] The *Melopoeia* was varied firstly according to the Genera, from the Diatonic, to the Chromatic to the Enharmonic, secondly, according to the Systems from *Hypatoides* to *Mesoides* to *Netoides*, thirdly, according to the Tones, from the Dorian to the Phrygian, to the Lydian, fourthly according to the Modes, from *Tragic* to *Dithyrambic*, to *Nomic*, and,

finally, according to the Sentiments and Passions, from Diastaltic, to Hesychastic to Systaltic.

Many are the different parts of the Melopoeia according to the Ancients, and they are illustrated with different terms. The first ones are three, namely, Lepsis, Mixis and Chresis.

Lepsis means 'comprehension', and on its basis the Musicians discern in which group of notes, whether Hypatoides, Mesoides or Netoides, and in which genus, tone and mode the Composition must be organized.

Mixis means 'mixing, mixture' and it occurred when the same Composition employed various Genera, Tones and perhaps modes, and, consequently, a different System.

Chresis means 'the way the voice is used'. It was divided into four species, namely, Agoge, Petteia, Plohe and Tone

Agoge means 'conduct'. There are three species of it, namely, Eutheia, Anacamptusa and Peripheres. Eutheia means 'straight, direct', and in this case it indicates the passage of the voice from the low to the high register through successive Sounds, namely, ascending by step. Anacamptusa has the opposite meaning, namely, the movement of the voice from the high to the low register through adjacent sounds, namely, descending by degrees.

Peripheries means 'circumference', and, in our case, circular motion of the melody, since it means the progress of the voice that starts from a Note, or a particular position, and returns by stepwise motion either upwards or downwards returns to the same note without stopping. In other words it comprises both the eutheia and the Anacamptusa. An example of this using our Notes would be Do, Re, Mi, Fa, Sol, Fa, mi, Re, Do or La, Sol, Fa, Mi, Re, Mi, Da, Sol, La, or, as Aristides and Bryennius state, it indicates [Aristide, page 19, Bryennius, 3, chapter 10 in marg,] ascending through the Diezeugmenon Tetrachord and descending through the Synemmenon and the other way round.

[-45-] Petteia indicates the frequent repercussion of the same Sound or note, or, as other explain it, it is a varied movement of the voice, now by step, now by repercussion and sometimes by step, both towards the high register as towards the low one.

Ploche means 'bending or flexing of the voice'. It is expressed in the melody with a varied but orderly movement both towards the high and to the low register. For instance, one could illustrate it with our Notes in the following manner thus: Do, RE, Mi, Fa, Mi, Sol, Fa, La, or Do, Fa, Re, Sol, Mi, La, and also in the opposite fashion.

Tone means 'protraction of the voice', or the 'continuation of a note or a sound for several beats', or 'pronunciation of several words on the same note'.

Bryennius in the third section of his third Book presents us with other twelve names of matters pertaining to Music. Some of them apply to Singing, others to the sounds of instruments and some are in common to both. They are the following ones: Prolapsis, Ecclepsis, Prolemmatism, Ecclemmatism, Melism, Procrusis, Eccrusis Procrusm, Eccrusm, Compism, Teretism, e Diastole.

Prolepsis derives from the ascending movement of the voice from the low to the high register. This occurs in different ways, namely with or without mediation, namely, by step or by leap; by leap, when in any Tone one sings after the Proslambanomenē the following note Hypate, or, when one starts from the Hypate and moves one to the Parhypate; by leap, when from the Proslambanomenē one leaps to the Parhypate or to the Mese.

Therefore, one cannot access the Diapente by leap, because one must not go beyond the Mese in any Tone, since this one is – according to those who build their Tones of only eight notes, as Bryennius illustrates and as I have shown at the beginning of the Treatise on the Tones – the fifth note from the Proslambanomenē, since said Author states that all the species of the Melodies or Tones must be contained by their Mese. Hence, starting from the Hypate one can leap no further than a Dia-tessaron. Therefore, starting from the

Parhypate one cannot go beyond a Ditone. I believe that this Doctrine must be applied only to the beginning of the Compositions.

[-46-] Ecclepsis is the opposite of Prolepsis, namely, the passage of the voice from the high to the lower register, both stepwise and by leap. This progression, as well as the other, is limited among those Notes contained by the Mese of each tone to the Proslambanomene, hence the movement by leap that starts from the Mese cannot be wider than a Diatessaron, since one must not go lower than the Proslambanomene. Prolemmatism occurs when a middle note one or more steps higher occurs between two repetitions of the same note, as we said, with our notes Re, Mi, Re, or Re, Sol, Re, or Re, Re mi, or Re, Re, Sol.

Ecclemmatism is the opposite of Prolemmatism. This means that a middle voice is interposed by leap or by stepwise motion between two repetitions of the same note. Melism is the repercussion or repetition of the same note several time, or the act of pronouncing more syllables on the same note.

These five parts with those terms belong to vocal music, while the following, with different names, have the same function but belong to the Sounds of the Instruments. Procrusis in instrumental music is the same as Prolepsis in vocal music, since what in vocal music refers to the voices, in instrumental music refers to the instruments. Hence Procrusis is the movement of the sounds from the high to the low register both by step and by leap with the same rules with regard to the leaps as the Prolepsis and Ecclepsis. Procrusm is the same as Prolemmatism.

Eccrusm is the same as Ecclemmatism and, equally, Compism is the same as Melism, which means 'repercussion' or 'repeated pulsation' of the same Sound.

Teretism is what derives by a combination of Melism and Compism, which resembles Teretismo è quello, che nasce dal Melismo, e Compismo composti insieme, ò diciamo [-47-] the repercussion of voice produced by the singing or screeching of the Cicadas. This Teretism is shared by vocal and instrumental music.

Diastole is interpreted as Rest, as it separates what comes before from what comes after, and it is also in common between vocal and instrumental music. What suitable and worthy adaptation of these Terms to the movements of voice and Sound one may endeavor to achieve, I do not know, since they appear to me to be matter of no importance, or they might have been explained less than clearly by Bryennius, Aristides and Euclid. Nevertheless, I will say that the most erudite Doni, in his dialogue on ancient and modern Music, does not mention all of these and produces many others which, I suspect, are not remnants extracted from Ancient Greek writers, but words coined by him himself to name the different actions of voice and sound. It appears that he does not support Bryennius' interpretation in some of the above mentioned terms, since the closest he gets to that interpretation is what he says about the Compism, which he compares to what we call Trillo and Gruppo di Note. He calls melisma what we call Passaggio and he appears to refer to solfege when he explains the term Teretism. The same occurs in many other Greek terms that one can see in said book, which I omit to avoid extending myself needlessly. I will only say, as a final point, that one might derive reason to believe that the Ancients used four syllables to express with the voice the four sounds of the Tetrachord, according to what Aristides states in his second book, which were similar to the names of our Notes, since he ascribes to the Hypate the syllable α , to the Parypate the syllable β , to the Lichanos the syllable γ , and thus, by repeating them, to the other similar notes, and the syllable δ to the Mese and to the Proslambanomene. However, I have seen no Author that hints to this in any way, except for some Fragments quoted by Meibomius in his annotations to the mentioned text of Aristides, where the syllable α is assigned to the Proslambanomene instead of the syllable δ . Here I conclude the explanation of the

proposed seven Parts of the Science of Harmonics.

[-48-] Demonstrations of the Ancient Divisions

In order to demonstrate all the ancient Divisions of the System, which can be demonstrated by Geometric analogy, or, to be more precise, geometrically, after prolonged reflection I have become convinced that there are no means more useful so that they may be well known to anyone than what I have described at page 7, namely by imagining an instrument with a single string called by the Greeks monochord, although, in that passage I described an instrument with two strings in order to make the distinction between the sounds easier to grasp by anyone who made this operation. Regarding the numbers which illustrate the proportions that run from number to number, I considered the most beautiful and clear method to be the one employed by Ptolemy, who divides the Diapason in 60 particles. Although all the ascribed proportions cannot be illustrated all precisely with this Method, or, as we are used to say, 'within a hair', we shall disregard the very small discrepancy of a few particles, since it is very small, and we shall do what he does. Let us imagine a given string divided into 120 units or minutes, of which the sixtieth, which divides the String in two halves will produce the sound of the Diapason above the sound produced by the String in its entirety. Therefore, the sounds of the Intervals that compose the Diapason are contained from said sixtieth point to the one hundred and twentieth, which produce the extreme sounds of the Diapason. Therefore, the line marked A, is half of the String and the divisions marked on it are the points on which, if we place the mobile bridge, will produce the sounds that I marked with our letters in front of the first line. Here one will be able to see clearly the variety and difference of the mobile sounds of the Tetrachords according to the different divisions of them as researched by various Authors. The extreme sounds of the Tetrachords according to all the authors are in sesquiterza proportion $\frac{4}{3}$ and the Tone from A to [sqb] is in sesquiottava proportion $\frac{9}{8}$. One will be able to see at the bottom of each division the proportions of their Tetrachords.

[-49:-] [Beccatelli, Exposition, 49; text: Divisioni Diatoniche, Antica, Di Archita, Didimo, Tolomeo, minore Seconda, Sintono. Molle Eguale, a. 60. G. 67. 30, 66. 40. 68. 34. F. 75. 5, 77. 9, 75. 76. 31. 73. 20. E. 80. D. 90. 88. 53. 91. 25, C. 101. 15. 102. 52. 108. 100. 101. 35. 97. 47. [sqb]. 106. 40. A. 120. $\frac{9}{8}$. $\frac{256}{243}$. $\frac{4}{3}$. $\frac{8}{7}$. $\frac{28}{27}$. $\frac{10}{9}$. $\frac{16}{15}$. $\frac{21}{20}$. $\frac{11}{10}$. $\frac{12}{11}$.]

Ptolemy provides five Diatonic colours. The first one is called Diatonic Diatoneus, the Second Diatonic Toniaeus (called Entonon by Bryennius) the third one called Syntonic or Intense, the fourth one called soft and the fifth one called Equal.

I have omitted the first one, as it is the same as the ancient division attributed to Pythagoras and provided by many authors even in our time. I have omitted also the second because it is the same as Archytas'.

[-50-] [Beccatelli, Exposition, 50; text: Divisioni Cromatiche, Antica. Di Archita. Di Eratostene. Di Didimo. Di Tolomeo. Sintono, Molle, a. 60. #, 71. 15. 7. 72. 70. F. 15. 56. 77. 9. 76. 75. 22. E. 80. 95. 94, 49. 96. 93. 20. C. 102. 15. 32. 20. 101. 100. 49. 52. [sqb]. 106. 40. A. 120. $\frac{19}{16}$. $\frac{8i}{76}$. $\frac{256}{243}$. $\frac{4}{3}$, $\frac{32}{27}$. 293. 224. $\frac{28}{27}$. $\frac{6}{5}$. $\frac{19}{18}$. $\frac{20}{19}$. $\frac{25}{24}$. $\frac{16}{15}$, $\frac{7}{6}$. $\frac{12}{11}$, $\frac{22}{21}$, $\frac{25}{14}$, $\frac{28}{27}$]

[-51;-] [Beccatelli, Exposition, 51; text: Divisioni Enarmoniche, Antica. Di Archita.

Eratostene. Didimo. Tolomeo. a. 60. F. 76. 56. 76. 75. X. 77. 58. 9. 30. 36. C. 101. 15. 100. 28. 27. x. 105. 57, 102. 52, 104. 20. 103. 21, [sqb]. 106. 40. A. 120. 19./16. 81./76. 256./295. 4./3. 32./17. 293./224. 28./27. 6./5. 19./18. 20./19. 25./24. 16./15. 7./6. 12./11. 22./21. 15./14.]

These Genera and Colours lack Aristoxenus divisions because they cannot be demonstrated geometrically since they are completely irrational. In the way in which they can be demonstrated, they have been demonstrated already at page 18. The same occurs happens with regard to the rediscovered true division, since it is much more irrational than those. Hence, there is no other way to demonstrate it than to divide it into parts as it was done in the divisions of Aristoxenus. It is now time to discuss it, [-52-] therefore it is necessary, in order not to omit anything that might contribute to its understanding, to go back to its first principles and also to the opinions themselves of the Ancients. Therefore, I shall state what follows. Pythagoras, Prince and Chief of the most ancient School of Musicians maintained the proportions of the intervals to be contained uniquely in the proportions of the numbers. Hence, having speculated that Sound is related to the movements or undulations produced by the resounding bodies in the air, since the more frequent and close together are those vibrations, the more acute is the sound that they produce, while, conversely, the slower and infrequent they are, the lower is the sound that they transmit, on the basis of this first basic principle investigated the concept of the consonant and dissonant Intervals, which are produced, the latter, by the more remote, and the former by the closes union of unequal vibrations produced by unequal bodies, which we shall define as produced by unequal strings, which, consequently, have the numbers of their proportion contained within their own numbers. As one derives from one of the wonderful discoveries of the great Galileo, thanks to whom we deduce that the famous inversion of the Consonances through the sound and weight of the hammers, described by very serious Authors and attributed to Pythagoras, to be a pleasant but very inaccurate little tale, as I will demonstrate with more reasons, God willing, in a work that I plan to write. So, Pythagoras established that the proportions of the Consonances were limited to the number four and that they did not exceed it in their radical terms. He allowed no other proportions except those of the multiplex and superparticular Genus. Therefore, since in that number one finds the Dupla, the Tripla and the Quadrupla in the multiplex genus, which produce the Di-pason, the Dia-pason-dia-pente and the Diatessaron, hence he did accepted as consonant only the five intervals, namely, the Diatessaron, the Dia-pente, the Dia-pason, the dia-pason Dia-pente and the Disdia-pason, rejecting for excessive scruple, or rather, superstition the Dia-pason dia-tessaron, because produced by a proportion exceeding the number four and because it belongs to the [-53-] multiplex superpartiens genus, since it is in Dupla Superbipartiente terza, namely contained within these numbers, 8 and 13.

Later on, Aristoxenus, who headed the large school of his followers, disregarded the overcautious opinion of the Pythagoreans and the precision of the numbers and considered that only the ear was the adequate Judge to distinguish any Musical Sound. He did not think, or, rather, he did not worry about considering the faulty nature of our Senses, that at the most can produce an approximation of the truth, but hardly truth itself. He did this perhaps to avoid considering the smallest differences that the Ear itself does not perceive, according to that axiom that states that 'what is small is considered of no importance'. Therefore, he considered the Tone as divided into twelve parts in abstract, of which the Semitone occupied six, or half of the Tone itself; that the Diatessaron contained two Tones and a half, the Dia-pente three Tones and a half, and the Dia-pason six tones, as it has been shown. He also maintained that the Intervals that are consonant within the

moreover, having extracted from the Sesquiterza, which is the form of the Dia-tessarion, the Sesquiquarta, what is left is contained by the sesquiquintadecima proportion, which is within these terms, 16 and 15, for this reason, he stated that the two Tones of each Tetrachord are different, namely, one is larger and the other is smaller, because one is in sesquiottava proportion and the other one in sesquinona, while the Semitone is in sesquiquintadecima. Also, since two proportions of sesquiquintadecima exceed the sesquiottavo Tone, from this was clear that the Semitone contained in the Tetrachords was not smaller, in any case, than one half of the Tone, but larger. Moreover, seeing that the sesquiquinta, which represents the consonant Semiditone is composed of a sesquiottava and a sesquidecimaquinta, he determined that the division of Ptolemy's Syntonic, since it contains in many places said intervals in the described proportions, was the one that came closest to the proportions of the true musical intervals, putting into practice all the ones that are produced by the Harmonic Proportionality, as one can see from the following example, where I place as many notes as it is necessary for such a demonstration.

[-56-] [Beccatelli, Exposition, 56; text: Disposizione del Sistema secondo la Divisione del Diatonico. Sintono di Tolomeo, 2078. 320. 360. 3024. 432. 480. 540. 576. 640. 780. 768. 864. e. d. c. [sqb]. a. G. F. E. D. C. A. b 224, 360. 405. 432. Tetracordo Diezeugmenon, Sinemmenon, Meson, Hipaton. Nete, Paranete, Trite, Paramese, Mese. Licanos, Paripate, Hipate, Proslambanomenos.]

[-57-] In the illustration presented above one will be able to see all the Dia-pason between similar letters in their proportion - except the one between D and d of the Synemmenon Tetrachord. The difference between the d of the Synemmenon and the d of the Diezeugmenon, namely, that very small interval between said two Notes is called Comma. It is represented by the Sesquiottantesima proportion, namely, between these terms, 81 and 80. Similarly, one shall be able to note the Dia-pente between A and E, C and G, E and [sqb], between F and c and between G and d of the Diezeugmenon, and between other similar notes, the Dia-tessarion among all the ones contained in the conjoined Tetrachord, and the consonant major Hexachord between C and a, D and [sqb], G and e and between F and d of the Synemmenon, the minor Hexachord between A and F, [sqb] and G, E and c. The consonant Ditone is found between C and E, F and a, G and [sqb] and similar, while the consonant Semiditone occurs between A and C, [sqb] and D, e and G, a and c, [sqb] and d of the Diezeugmenon and others similar to them. From these notions clarified and published by the above mentioned Giuseppe Zarlino derived the consequence that many used to believe – if they do not still – that the Tone can be larger and smaller and that the distribution used in singing and playing is ordered according to the System above illustrated. Those who think thus do not consider, besides the obstacle of the unequal Tones, that in this division there are two separate notes called d, and that the Dia-pente between D and a lacks its exact proportion, and, consequently, the Diatessarion from A to D, and similar ones. These obstacles and these and other differences have drawn many theorists to say and print many wrong and careless observations on these particular matters. The above mentioned Author considered all these evidence carefully with profound speculation and considered in the first place that the sonorous proportions, namely, the ones produced by consonant intervals, exceeded the narrow terms of the Pythagoreans and extended up to the number six in the two genera Multiplex and Superparticular, since they were all found within this series of numbers, namely, 1, 2, 3, 4, 5, 6. In fact, 2 and 1, 4 and 1, 6 and 1, being in Dupla proportion represent the Dia-pason; 3 and 2 and 6 and 4 represent the Diapente; 4 and 3 represents the Diatessarion; 5 and 4 represents the Ditone, or major third, while 6 and 5 represents

the Semiditone, or minor third. The same proportions [-58-] of sesquiquarta and sesquiquinta are the proportion by which the two Hexachords, major and minor, are consonant because they contain said proportions with the smaller extremity of the Diapason. However, since this is one of my discoveries, I am saving it to demonstrate it elsewhere, because there is no need to introduce or to add as proof of these the first Cubic number, since the illustrated series of the number six is sufficient, as it expresses the first five differences of a continuous Harmonic proportionality, since the first difference shows the Dupla, the second the Sesquialtera, the third the Sesquiterza, the fourth the Sesquiquarta and the fifth the Sesquiquinta. The sequence of this Analogy is expressed thus, 1, 1/2, 1/3, 1/4, 1/5, or in these terms, as one can see more clearly: 60, 30, 20, 15, 12, 10. However, everything that I said here and elsewhere of these proportions as representing consonant intervals has to be understood only of said intervals, or, rather, or of the Sounds that constitute said intervals when they are extracted from the strings through the measurement of their length. In fact, where they extracted according to weights attached to equal Strings, the proportions are inverted and doubled: inverted because the larger number or the heavier weight produces the higher sounds, since it produces a greater tension; doubled, because, if we use the weight, we shall need a distance that contains two Duple, which means a Quadrupla, while the measuring system produces a Dupla, or Diapason. Thus, what we derive from the measure of the Sesquialtera, which is the same as saying a Tripla Sesquiquarta, and what measure the Sesquiterza gives us, which produces the Diapason, this we will derive from the Supersettima ninth partens through the weight. If we investigate these sounds using the weight of the same sonorous bodies, such as metals, the proportions shall be the same, but not inverted, because the heavier the body, the lower the sound. If we consider them through the bore of the pipes of an organ, the proportions are much greater, but they are difficult to establish precisely. Nevertheless, approximately speaking, the bore that produce the Diapason are in Sestupla proportion, those of the Diapente in Tripla proportion and those of the Diatessaron in dupla proportion. However, going back to Zarlino, [-59:-] secondly, he had the idea to remove the difference of the Comma between the d of the Synemmenon and the d of the Diezeugmenon and to reduce a little the larger Tones while increasing the smaller one, and thus eliminate the discrepancy that occurs between the Ptolomy's Syntonic and the distribution of the Sounds in which singers sing and the most perfect instruments are played. Therefore, with this operation he produced his last Investigations on this important matter. Vincenzo Galilei with little thoughtfulness attacked Zarlino in many matters, wanting to prove himself to be more diligent, insightful, and exact than Zarlino, although he was not able to make any better advances on said division. I said with little thoughtfulness, because, aside the fact that he did not possess, in my opinion, that capital of scientific knowledge that he needed to correct such a learned and deserving Author, it appears true, sadly, and it has been only recently verified that he had been at least in part a pupil of his, which in the past I was not prepared to believe, on account of the respect that everyone must have towards one's teachers. From the investigations of Francesco Nigetti from Florence, Teacher of my revered Teacher, I have discovered the Tone divided into five equal parts, of which the larger semitone contains three and the smaller two. He did demonstrate this through a Harpsichord commissioned by himself with five keyboards, in which it is noted as inventor of such distribution Nicola Vicentino. However, I have not been able yet to acquire the Work and the Writings of this Vicentino, in order to ascertain the truth about this discovery, which, I believe, must have been the work of said Nigetti in good part, since he was a good mathematician. Be this as it may, we are indebted greatly firstly to Zarlino who laid the first foundations, then to Vicentino, if indeed this discovery is his,

and finally to Nigetti, who, as far as I know, demonstrated it with his Doctrine and in practice.

Therefore, the tones are all the same and they are smaller than a Sesquiottava and larger than a Sesquinona. However, since in the superparticular Intervals no proportional middle can be found rationally, hence it is not possible to demonstrate how large the interval of a Tone is. It is true, however, that thanks to some investigations and subtle experiments devised to discover the different harpsichord tunings according to our distribution and the [-60-] Pythagorean one, where the Third and the Sixth are very dissonant, one discovers that the Sesquiottavo Tone remains divided into thirty-seven parts with arithmetical proportion. In fact, while tuning according to our distribution, so that the Thirds and the Sixth are consonant, since it is necessary to make the Fifths a little narrower than their perfection, I realized that seven of those differences constituted a fifth of our Tone. Hence, it emerges as proven that our Tone is divided into thirty-five parts and that the reduction which we adopt in the fifth is nothing more than one of those thirty-seven parts of the sesquiottavo Tone. Hence, it follows that this division cannot be demonstrated, but with Arithmetic progression. With this progression, in order to compare the ancient distributions with ours, I demonstrate also the ancient distributions in the following Tetrachords with the numbers that indicate the thirty-seven parts of the Sesquiottavo Tone, of which thirty-seven constitute our Tone.

[Beccatelli, Exposition, 60; text: Antica. Di Tolomeo. Didimo. Aristosseno. Nostra. Nete. Licanos Paripate. Hipate 37. 16. 34 $\frac{1}{2}$, 37. 20 $\frac{1}{2}$. 32 $\frac{1}{2}$. 36. 18. 38. 35. 21]

With this demonstration I complete the explanation of the divisions of the System, with which, I believe to have completed the explanation of the Music of the Ancients, according to the doctrine of those Ancient Authors who have dealt with this Discipline and who have survived to our knowledge.