DIALOGO DELLA MUSICA ANTICA ET DELLA MODERNA
OF VINCENZO GALILEI:
TRANSLATION AND COMMENTARY

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By

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Strozzi: Are there other causes, therefore, which impede the music and singing of today from producing in the hearers those affections which the ancient music produced?

Bardi: There are many others, just as I have told you. All their rules are contrary to these.

Strozzi: May it not burden you to tell me another particular, so that I may escape from this ignorance and also my inability to respond to the practical musicians of today who claim that the music of the ancients, in comparison with theirs, was a joke to be ridiculed. The amazement which they caused with this [attitude] in the souls and minds of men resulted or evolved only because they were insensitive and boorish. Since they were proud of it, they afterwards were very ostentatious in their books.
Bardi: See how rash these men are who laugh at the effects which a thing creates although they do not understand its function, nor its nature and qualities, nor how these things could be employed. What better argument do you require to convince them than the miracles—to give them that name—which this music accomplished. Such miracles have been told to us by the worthiest, most famous writers, outside of the music profession, which the world has ever seen. Let us abandon this, however, and proceed to another reasonable, clear example, which will be this. It is certain, from what I have been able to collect from different sources, that the manner used today, of singing several melodies together, has not been in use more than a hundred and fifty years. If anyone [actually] wanted to find an authoritative example of this modern practice which is that old, I am not certain that one could be found. All the better practical musicians of our times agree in believing and saying that from that time until the present, [music] has
attained the highest [state of] perfection that man could possibly imagine.

Even since the death of Cipriano Rore, a truly unrivalled musician in this practice of counterpoint, it has gone into decline rather than into advancement. Now if music has reached that excellent state which they claim in a little more than one hundred years of practice by people who are ordinarily of little or no value; who will not tell where and of whom they were born, so to

\[\text{Cipriano Rore, a remarkable practical musician.}\]

Reasons why the art of music has retained a good aspect.

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\[1\] Gustave Reese, *Music in the Renaissance* (New York, 1959), p. 370. "Cipriano de Rore (1516-1565), a native of the Low Countries (probably Antwerp) despite his Italianized name, was one of the finest composers among Willaert's pupils in Venice." Ibid., p. 332. "That Rore was looked upon as a model and guide is shown by the publication in score of his collected madrigals a 4 as late as 1577. This edition, presenting one of the earliest printed scores . . ., was unquestionably designed for study purposes, since practical editions were published in separate part-books." Galilei's frequent mention of Rore in the *Dialogo* seems to indicate a healthy regard for that composer as a true exponent of counterpoint, as opposed to his obvious disdain of other practical contrapuntists.
speak; who have no possessions, or very few; and who cannot even read without difficulty; how much more stupendous and wonderful it must have been among the Greeks and Romans. There, music lasted for many, many centuries in the custody of the sagest, most scientific, most judicious, richest men [and] the bravest rulers and greatest military leaders the world has ever known. It was a most shameful and ignorant thing, as one can comprehend in part from the example of Themistocles and from what Polybius\(^3\) the Historian tells us, for any nobleman of any station to be without that sort of music.

\(^2\)Nepote, Cornelio, \textit{Vidas De Los Ilustres Capitanes} (Universidad Nacional Automa de Mexico, 1947), p. 9. "The biographies \textit{De excellentibus ducibus} were attributed during the Middle Ages to Aemilius Probus. Some manuscripts insert at the end of the same an epigram in which a person so-called dedicates the work to Emperor Theodosius. However, Probus was only a copyist, according to the more authorized critics." Thus, the Aemilius Probus cited by Galilei was actually Cornelio Nepote (Cornelius Nepos). The life of Themistocles by Nepos contains no reference to the musical incident in question, but it is possible that Galilei intended to cite Plutarch.
of music which was suitable for him.
Those who for some reason did not play
the lyre were not ignorant of the aulos.
From this resulted that very trite Greek
proverb which said, "If not a citharo-
dist, at least an aulete." One can learn
a great deal from [the fact] that these
[Greeks] concerned themselves with music
and loved it very much, although some have
said that they were dedicated to work more
than to play. Although they were besieged
in his Life of Themistocles. "Thus it
came about that in after life, at enter-
tainments of a so-called liberal and po-
lite nature when he was taunted by men
of reputed culture, he was forced to de-
fend himself rather rudely, saying that
tuning the lyre and handling the harp
were no accomplishments of his, but ra-
ther taking a city that was small and in-
glorious and making it glorious and
great." Plutarch, Themistocles and Aris-
tides, translated by Bernadotte Perrin
(New York, 1901), p. 74f.

3 Polybius, The Histories, translated
by W. R. Paton (London and New York, 1922),
p. 349. "For the practice of music, I
mean real music, is beneficial to all men."

4 Zarlino, Le Istitutioni harmoniche
(Venice, 1558), p. 62. There is no refer-
ence in this chapter attesting that the
Greeks did not love music nor that they
were dedicated to work more than to play.
by the numerous army of Xerxes, they would never forego any of their public feasts in which all kinds of music were practiced. This situation many times gave Xerxes occasion to wonder, since he knew for certain (in a manner of speaking) that [the Greeks] were dying of want and hunger, and [yet] they were seen and heard day and night dancing, singing, and playing. But why do I go on expending many words about that?!

It happens that Aristotle himself, a most unusual philosopher, commands expressly in the books of the Republic [sic.] that young boys, because they do not have to learn facts as men are [obliged to do], should greatly apply themselves to the study of music, not

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5Xerxes, (ca. 519-465 B.C.) was a Persian king who attempted the conquest of Greece in one of the so-called Pelo-ponnesian wars.

that of the theater, which is made to satisfy the rabble--this is almost the same situation as ours--but that which is suitable for born noblemen. This is true [music], not false, which is handed down only to teach them to take honest pleasure in it with dignity and reason. The fruit which is gathered from it is divided into three kinds. The first kind refers to erudition and discipline. The second refers to cleansing the mind by giving vent to it and mollifying it. The harmonies and melodies have this quality in proportion to these passions; sometimes the opposite is true. The third kind, then, says [Aristotle], is an efficacious means to spend one's life cheerfully in repose and tranquility, at which time a truce is made with the many serious cares which have assailed the spirits. In addition, it is divided, together with the others, into moral, active, and something which is suited to fill the spirits with divine fervor. The moral one was the Dorian, the active was the Phrygian, and the one which
filled the mind with divine fervor was the Lydian. The philosopher [Aristotle] claimed that the two last kinds of harmony, were hated and were not used, and he, moreover, was suited as much as anyone to give judgement. Today, not only do the heads of the republic and the senators not sing in this way, but even gentlemen who are private citizens are ashamed to do so. With regard to the importance and stimulus which pertains to professors of [music], since they are close to nobles, or under a prince who loves and values it, it would be equally vain and impertinent [for them] to seek to demonstrate it. It is a subject which is only broached when one greatly wishes to show that the ancient Greeks and Romans devoted more work and study to [music] than that which is done today, and that they surpassed the men of our times in every art and science. It happens that every book on any important subject which we have was originally composed and written by them. Notwithstanding all the consummate excellence of the modern music practice, one does not
hear or see today the least sign of those things which ancient [music] achieved. One does not even read that it achieved such things fifty or a hundred years ago when it was not so common and familiar to men. Neither its novelty, therefore, nor its excellence has ever had the power with our practicing contemporaries to produce any of those virtuous, useful, convenient effects which ancient [music] produced. Whereupon one necessarily concludes that either music or human nature has been changed from its original state, but what the music of the ancients was, and what that of today is, and how such a change could take place, this will be demonstrated in its place.

Strozzi: I am greatly pleased to hear these novelties which you are seeking to prove to me with such meaningful and vital arguments. Whenever you wish, I will willingly hear all that you may wish to add in this regard, but do not spoil the order you have proposed to me for discussing these matters.
Bardi: If this pleases you, it pleases me equally, or more so, since I have gone over it sufficiently beforehand. Therefore, I will not have to repeat the same thing many times. Accordingly, let us ascertain how much of the proposed material we can actually discern, without fearing (since our sole aim is public benefit) those aspersions which may pursue us, because we dared to be the first to break this hard, deep, spacious ice. Nevertheless, take note! If the usage of music—i.e., now the true music which, according to Polybius,\textsuperscript{7} is beneficial to all men, and not that which, in the opinion of Ephorus,\textsuperscript{8} was invented to ridicule and deceive them—if the practice of music, I say, was

\textsuperscript{7}See p. 470 above.

\textsuperscript{8}Athenaeus, \textit{The Deipnosophists}, 6 vols., translated by Charles Burton Gullick (London and New York, 1928), II, 375, citing Polybius, \textit{The Histories}, IV, xx, 5-21. "One must not accept it as fact that music was introduced among men for purposes of deceit and quackery, as Ephorus asserts that it was." Ephorus was a Greek historian whose extant works consist of mere fragments.
introduced to men for the reason and purpose which all the learned mutually proclaim, that is, if it evolved mainly to express the conceptions of the mind with greater efficacy in celebrating the praises of the gods, the genii, and the heroes—just as the origin of our [music] for several voices may be partially comprehended by ecclesiastical canti fermi and plain songs—and, secondarily, to impress them with equal force upon the minds of mortals for their benefit and convenience, it will then be clear that the rules observed by modern contrapuntists as inviolable laws, in addition to those which they use by choice and to flaunt their knowledge, will all be in direct opposition to the perfection of the best, truest harmonies and melodies. It will not be too difficult to demonstrate and prove this to them, for when they remember all that has been said up

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9 Genii supposedly signify supernatural beings that can take human or animal form and influence human affairs.
to now concerning this matter, they will forsake their personal interests, envy, malpractice, and ignorance. As a basis of this subject, then, I shall briefly touch upon only two topics as principal and important, promising to clarify them thoroughly a little later. I say, therefore, that the nature of a low sound is different from that of a high one, and the nature of a middle sound is different from both of these others.¹⁰ I say also that fast movement has one quality, slow motion has another, and intermediate movement is far away from either one.

Now if these two principles are true, which they definitely are, one can easily ascertain from them—since there is only

one truth—that singing in consonance in the manner which our practicing contemporaries use is an impertinence, because consonance is none other than a mixture of high and low sound which—as you already know—strikes the ear inoffensively, either with delight, or very sweetly. For if such contrariety of affection is found between the extreme pitches of simple consonances, how very much more diverse in nature the replicates and composite [consonances] will be, because of the greater distance of the extremes. How greatly different, also, from these

Singing in consonance is an impertinence, and Zarlino, on the contrary, says that without it harmony is imperfect. In the Institutioni, part 1, chapter 16, and part 2, chapter 49. The diverse nature of the consonances.

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11 Zarlino, Le Istitutioni harmoniche (Venice, 1558), p. 28. Speaking of the formation of consonances through the proportions, Zarlino states, "we will come to reason first concerning the things which are needful to the understanding of the proportions, and afterwards we shall see how they are put into use, for without knowing of them, it would be impossible to have any comprehension of music." Ibid., p. 143. In reference to the various genera of harmony, he mentions "the ancients, who more readily sought to vary their modulations than to attain the perfect usage of harmony through the acquisition of all the consonances."
consonances will be those which have been extended and compounded many times! These, since they are farther from their original state, are less pure, less understood by the sense, and less comprehended by the intellect. Nevertheless, our practicing contemporaries proceed so industriously to seek them out on both the artificial and the natural instruments. And if the diapason and the diapente are exactly as we have claimed, and the extreme sounds of each of these intervals are perfectly combined, especially those of the smallest multiple interval, which through their mutual conformity seem almost the same, being united into a single term, how much more will the extremes of the imperfect consonances be different in nature, and how much more so will the dissonances be with which their songs are so replete? Now if such a diversity is found between only two parts which sound a single interval, whether it is simple or compound, how much greater will [this diversity]
be when there are four, or six, or more intervals, often composite and dissimilar in nature, all sung together at the same time? This, for the most part, is what the contrapuntists of today customarily use in their compositions, to the greater ruin of true music. After these impediments, which are caused by the diversity of sounds and the variety of voices, let us append those which result from the inequality of the movement of the parts. These are of primary importance. There, the soprano part frequently moves very little, due to the slowness of the notes, while, on the contrary, the bass part flies by means of its fast notes, and the tenor and contralto parts proceed walking at a moderate pace. Or, indeed, if one of these last two is flying, the bass proceeds slowly, while the soprano scarcely moves at all.¹² Thus, insofar as the

¹²The preceding statements concerning the parts are a paraphrase of similar lines in Girolamo Mei's Discorso sopra la musica antica e moderna (Venice, 1602). See Claude Falcèca, Girolamo Mei, Letters on Ancient and Modern Music (Dallas, 1960),
nature of movement and sound of one of the parts would attract the listener, the other part, as its contrary, would repel him. The effect would be much more pronounced when each part was accompanied by words conformed to its sound and motion. This is not unlike a column placed evenly upon its base. If anyone, in order to topple it, should attach two or more equal ropes to its capital, and should cause these ropes to be pulled in opposite directions from an equal distance with equal force, all the labor expended there would not budge it an inch from its place, unless, perhaps, the column itself was disabled through its own inherent defect, because the force on one side would resist the opposing force. If someone else should attack it with the same implements and the very same forces, pulling from one side only, it would not be surprising,

as far as I am concerned, if all that force together were sufficient to make it fall. Let us add to the above-mentioned impediments the observances of those who, in order to make their fugues [i.e. imitations] direct or reverse, whichever they decide, have deprived them of that sort of harmony which they hold in such esteem, which is that the low part must lack neither the third nor the fifth or, sometimes, instead of the fifth, the sixth, or even the replicates, when at least four parts are being sung at the same time. They have, in order to observe that rule, introduced a diversity of rests, that is, pauses. They have not cared at all that while one of these parts is singing the beginning of the words, whether they are in prose or in poetry, another [part] sings not only

13Gioseffo Zarlino, The Art of Counterpoint, translated by Guy A. Marco and Claude V. Palisca (New Haven and London, 1968), p. 124. "Rests were adopted also for the sake of ornament. With them parts could enter one after another in fugue or consequence, as we..."
the middle or the end of the same thing, but the beginning or the middle, and sometimes the end of another verse or conception, entering many times against every sense of propriety, in addition to replying the same thing four to six times, that is, the syllables of the very same word, one in the sky, the other on earth, and if there are more, in the abyss. They say that that is well done as an imitation of conceptions, of words, and of parts. They protract one of these syllables for a long time, for twenty or more different notes, in the course of which they sometimes imitate shall see, procedures that give a composition an artful and pleasing effect. To have the voices constantly singing together would be cloying to the listener as well as boring to the singers. It is good to have two sing at one time, then three, then four, and sometimes all together, if the work is for many voices. The full choir is particularly good at the end, for it is necessary that all the parts sing and finish together. Compositions are all the more beautiful and pleasant because of this variety."

14 Galilei's reference to chapter fifty-three, part three of Zarlino's Istitutioni is erroneous. It should read chapter fifty, part three.
the chirping of birds and another time the barking of dogs.\textsuperscript{15} This thing is the cause of so much imperfection! It is probably not our business to discuss how much force is expended with an affection in order to produce a similar one in the hearer. Since none \[\text{of them}\] has ever produced \[\text{such an affection}\] in the minds of the listeners, our practicing contemporary contrapuntists have received—as I have said—among their many confused rules (even as a fatal law) that it is not permitted in any way to place two or more perfect consonances of the same proportion and species one after the other. By means of the observance of this rule, they have invented, without any purpose, devoid of every reason and \[\text{without any}\] correlation with the natural movement of the voice, many

\[15\text{See "Contrapunto bestiale alla mente" from Il Festino by Adriano Banchieri (b. 1567). In this witty piece, four upper voices portray a dog, a cat, an owl, and a cuckoo while the bass sings a cantus firmus.}\]
different kinds of notes which were inappropriate to express conceptions, in order that they might observe the precept [in question] more easily. They did this for no other purpose than because [perfect consonances] did not have, by means of their similarity, as much power to distract a person with different affections as the imperfect [consonances] and the dissonances had, on the contrary, with regard to the disproportion of their extremes. They conceded that these things were done to please the contrapuntist, not noticing how much they deserved to be considered clods and idiots for approving this particular alone. [This is not true of] those who instituted these laws, which were made with the greatest of judgement because of the purpose for which their authors intended them, but [it is true of] these who up to now have used and also approved them in a different way from that [intended] purpose, not caring at all to know their origin or why they should be
observed, placing [in them] their undoubting faith, without even having hope of improving them. They have gone along with the majority and, as the proverb says, have "joined in the outcry without understanding the reason as well". And what is worse, they continually have proceeded, and still proceed with all their force and knowledge seeking, every time they speak of their conceptions when singing, that one does not gather [from them] any sense or construction. On the contrary, not a word is ever understood, almost as if they are ashamed, not of being men, but reasoning animals, wondering, even laughing, as you already said, at knowing of the ancient musicians and of the marvellous effects which they produced in different areas, wanting to measure the perfect, learned science of those [ancient men] with their confused ignorance. If I am not deceived, the current manner of composing and singing many melodies together was derived from Where the rules of the contrapuntists were derived.
the stringed instruments similar to the epigoneion and the simikion or from those very instruments. Since that particular number of strings was strung upon such instruments in the manner and disposition which has been demonstrated above, the cithara players of those times began—either in order to exceed those who sang to the cithara in some fashion or in order to avoid the obligation of continually having a singer nearby for the purpose of perfecting the melody which his voice and their instrument together made—they began, I say, with the small amount of knowledge which they possessed concerning music and without respect for the laws of Terpander\(^\text{16}\) or for those of any

\(^{16}\) Gustave Reese, *Music in the Middle Ages* (New York, 1940), p. 71. "The earliest definite figure to emerge from the dim musical past personified by the mythical Olympus is the kithara-player Terpander of Lesbos (ca. 657 B.C.). He is regarded as the founder of Greek classical music and is credited, among other things, with having increased the section of the kitharodic 'nomos' to the hallowed number of seven."

Why playing in consonance was introduced.
other approved and authoritative legislator, to investigate a way in which they could somehow delight the ear with the simple sound of the instrument without the aid of [singers]. They judged that the diversity of the consonances and the harmonies would be an effective method to implement this scheme. [This usage] had not been approved in the past (for the purpose mentioned) by anyone of rational intellect, but [it] had been abhorred greatly and with just cause, since it was known very well that consonance had the power to produce discord in hearers whose minds were well-ordered. In this instance, the philosopher [i.e. Aristotle] reasons in this manner:

But when the artificial erudition of musical instruments is removed, and artificial music is designated as that which serves spectacles, then whoever applies himself to these is not forced therein for any virtuous goal, but to give pleasure to the listener. This pleasure, moreover, is vilely accomplished. We affirm, therefore,
that such practices are not for free men, but for servile, mechanistic artisans.17

Since Aristotle had said a little before that [time] that the affectional harmonies ought to be used for discipline, and the active and the abstract should be heard by means of others who sing and play them, in order that one might remain at leisure, relax the mind, and be calmed down from business affairs, nonetheless, the cithara players, necessitated by the above-mentioned obligation, proceeded to investigate it because of the indisposition of their [own] voices. By means of this defect, they found themselves deprived of the most noble, most important, most principal parts of music, which are the conceptions of the mind expressed by means of the words, and not by the harmony of the parts, as our practicing.

contemporaries say and believe. These men have captivated reason as the slave of their appetites. One does not find among the Greeks that the poets and the musicians existed as the servants of practical composers and singers. Similarly, it has never been the custom for precious jewels to adapt themselves and serve gold, but only the opposite. Thus, since the cithara players wished to compensate for their defect, they introduced upon the artificial instruments this method of playing several melodies together in consonance. When they had practiced these for a long time, always keeping the prescribed goal in sight, they began, through long experience, to recognize in them what displeased, what generated annoyance, and, finally, what delighted the ear. In order to have a larger, more spacious field, they introduced for this purpose not only the use of imperfect consonances (which they discreetly called imperfect in order to make it seem that they actually were imperfect consonances and dissonances into modern counterpoint.)

Singers, players, and contrapuntists are servants and instruments of true music. Example.
consonances) but also [the use of] dissonances, seeing that with only the five consonances which the ancient musicians would consider (those called perfect today) the matter became tedious and unwieldy. From the use of these imperfect consonances was derived the mutation of the species of the diatonic ditoniaion, which came first, almost in the same way as the intense syntonic [was derived], whose mutation necessarily caused (for the reasons which have been stated above, particularly concerning its badly-tempered harmonies) both the method and the custom of singing to be changed, with regard to the largeness and smallness of the intervals. When the species of the diatonic ditoniaion, which was so highly reputed, and which had truly been ordered by Nature, was used in its simplicity, it was serious,
manly, and stable, while, on the contrary, the intense syntonic, due to its inconstancy, is ridiculous, effeminate, and fickle to the extent that from the severe matron it formerly was, Music has become today a lascivious (in order not to say brazen) mistress. The poets are no less guilty of this defect than the contrapuntists. Thus, it happens that the music of today is despised and deprecated by the intelligent and, on the contrary, esteemed by the common fool, because he willingly practices those things suited to himself. Those contrapuntists, however, are not fit to reprove him, although they would

The music of today is a miraculous thing, and that of the ancients was a miserable thing, according to Zarlino in chapters 1 and 4 of the 2nd part of the Institutioni. Why the music of today is deprecated by the intelligent and esteemed by the vulgar.

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19 Zarlino, Institutioni, p. 58. "I say, therefore, that although music in our times has attained such a level and perfection of harmony, with regard to the use of all those consonances which can be found, some of which were not under consideration by the ancients and although one sees that hardly anything new can be added, yet there is no doubt that at the beginning (as happened in the other sciences) it was not only simple and rough, but also very poor in consonances. And from this we can comprehend the imperfection which was found in the ancient harmonies, and how poor the ancients were in consonances and
very much like to be, since they are more ignorant than he [is], abhorring, on the contrary, all those [things which are suitable for them], and afterwards [abhorring] all who are fit to do it with their virtuous means and customary examples. There is no other reason for that than ignorance. This [common fool] would unwillingly come to confess his ignorance every time he said that he needed to know about those [things].

Since these matters were known to the concords." Ibid., p. 62. "But if ancient music (as I have shown above) had in it such imperfection, it does not seem credible that the musicians could produce in human minds so many different effects as they tell in the histories, because one reads that sometimes they moved the mind to rage, other times they returned it from rage to meekness, now they induced it to tears, again to laughter or to similar passions. And it seems even less believable, because if music were reduced nowadays to that perfection, and one almost could not hope for better, one would not see that it made any of the above-mentioned effects."
Divine Plato, he commanded expressly in the *Laws*\(^{20}\) that "proschorda" should be sung, not "synphonon"; that is, in unison, not in harmony. He had first said

\[\text{Precept of Plato refuted by Zarlino in chapter 41 of the 2nd part of the *Institutioni*.}\] \(^{21}\)


\(^{21}\)Zarlino, *Institutioni*, p. 125. "There is no doubt that neither the di-tone, nor the semiditone, nor the two hexachords, and many other intervals which to us are now consonances were ever accepted by anyone of the ancients into the number of the consonances—as we can comprehend from their writings—nor did they even use them as consonances in the manner we use them, since they always had employed mainly the number of the Pythagorean strings, as one can understand from the strings which are located on many ancient instruments." Zarlino was fully aware of the great contrast between ancient music and that of his day, but recognized and approved the changes. He stated, moreover, with regard to tuning, that a skillful player would be led by his own sense of hearing to temper his instrument away from the old Pythagorean tuning, because he believed it impossible to observe the proportions of the ancient diatonic in actual practice. Galilei, faithful to Plato's original advocation of the ditoniaion, apparently felt duty-bound to point out Zarlino's heresy.
in the *Timaeus*\(^{22}\) that harmony, in addition to having conjunct movement and agreeing with the discourses of our minds, is useful to the man who employs his poetical genius with intelligence, and not for the sake of irrational pleasure, as now seems to be \[(\text{the case})\]. Thus, it is seen expressly that, up to the time of that Divine Philosopher, it was customary for some to sing and play in consonance, but they never uttered the same syllables of the very same word one after the other, nor did they spoil and break the order and the measure of verses as is customary today. Plutarch also lamented this same \[(\text{thing})\], and shortly before Gaffurio, Carlo Valgulio\(^{23}\) Plutarch laments the music of his times, and so does Carlo Valgulio.

\(^{22}\) Plato, *Timaeus*, translated by R. G. Bury (Cambridge, Massachusetts and London, 1952), p. 109. "And harmony, which has motions akin to the revolutions of the Soul within us, was given by the Muses to him who makes intelligent use of the Muses, not as an aid to irrational pleasure, but as an auxiliary to the inner revolution of the Soul."

\(^{23}\) Carlo Valgulio was the author of a Latin translation of Plutarch's treatise on music \[\text{Plutarch, Plutarchi Dialogum de musica ad Titum Pyrrhinum}\]
also lamented it, saying this. "Today, one sees flourishing certain adulterated songs which cause music to degenerate."

Since our practicing contemporaries were not content with the diversity of intervals which were contained by the fifteen pitches of the Greater [Perfect] Pythagorean System, they caused more to be heard, passing at will toward the low and toward the high registers, in addition to the quadrupla, the nineteenth, and twenty-second, and way on up to the antipodes. [This was] truly in opposition to every nature of affection, because as everyone can commonly feel who laments, one never departs from the high pitches, and, on the contrary, someone who is sad never departs from the low pitches, unless [it is] some easy distance. This distance, because it would

(Brescia, 1507) which he prefaced with a discourse on Plutarch's text. A copy of this treatise may be found in the British Museum. One of Vincenzo Galilei's manuscripts (Florence, B.N.C., Mss. Ant. a Galileo, Vol. VII) contains an Italian translation of both this discourse and Plutarch's De musica itself.
not be suitable nor fitting for such a purpose, never adds to the middle situation, only passes beyond it, as we feel happens with the compositions of our musicians. These [men], not only with the entire bulk of all their melodies mixed together, but very often with one part alone, either the soprano or the tenor, or some other part, indulge [in the practice of] leaping up high one time and another time down below, either indirectly or immediately, up to the distance of eleven and twelve strings or pitches. No one considers what Plato warns about it, and also, Aristotle.\textsuperscript{24} The latter says that whatever [type of] music does not serve the custom of the soul is truly to be

\textsuperscript{24} Aristotle, \textit{Politics} (1337b9-11), p. 1306. "Any occupation, art, or science, which makes the body or soul or mind of the freeman less fit for the practice or exercise of virtue, is vulgar." Ibid., p. 1311. Aristotle points out that music, in addition to common pleasure, should also have some influence over the character and the soul.
disdained. Among the noteworthy ancient musicians, seriousness was always highly reputed and curiosity was always greatly reviled. On the contrary, those of our times have, without any respect like the Epicureans, preferred novelty above everything else in order to delight the sense, arguing that the judgement of the ear is indeed related to the entire foundation of the art [of music]. If this were not so, there would be no dispute about voices and sounds. The same would happen everytime that the motion ceased—this brings us to the gist of the matter—but due to the differences in distance the intervals have among themselves, [this motion] is not discerned merely by virtue of the ears. The judgement of the [ears] in this affair is slow-witted (in order not to say deaf), but the laws and rules are composed

25 The Epicureans were followers of the philosopher Epicurus who taught a fondness for luxury and sensuous pleasure, especially that of eating and drinking.
in such a way that the sense obeys like a servant and the reason is guide and patron. What man possesses such a rational intellect and such perceptive hearing that he is able or knows how to extract a ninth or tenth part from the diapason? Who, on the contrary, can one time add to it three-fourths and another, a third? No one, as far as I know, can do this without the aid of the harmonic ruler. Thus, similarly, knowing the nature of the musical intervals is not pure ability of the sense. But why should I go gathering authority and examples, if this alone can suffice to persuade you who is more noble and who merits more praises, the practical or the speculative musician. In the labor of buildings when they are brought into being by artisans, and in the business of a city when it is subjugated by means of soldiers and by instruments of war, no one considers, nor ever mentions the work and service by which such undertakings have been
completed, but only the architect or the general of the armies. Now the same difference is found between the speculative musician and the practical singer, player, and contrapuntist. These practical men should obey the [speculative] musician like instruments which he rules and governs. Although the senses know black and white, and bitter and sweet, they are unable to discern that one thing is desirable and another is to be avoided.

The practicing instrumentalists of those times, therefore, began to form upon the instruments which I described to you above their rules and laws. The first of these was that it was not permitted, when sounding not more than two single notes at a time, to make two consonances of the type which today are called perfect, one after the other, in the same species and genus.

This was [done] only because [these consonances], between two strings only,
through the simplicity of their extreme sounds did not entirely delight the ear. The hearing, like all the other senses, derives its pleasure from the diversity of its proper objects. On the contrary, they allowed two and three imperfect consonances as less simple and more varied, not because of the difference of the major or minor tone which is found between them, as some dare to say, but on account of the variety of their extremes, which do not blend as well as the perfect consonances do in that instance. It is also quite evident that such a law of not making two or more perfect consonances one after the other with the conditions mentioned above, was instituted by these legislators only for a case where no more than two pitches were sounded at the same time, for when three, four, or more pitches were sounded together upon the artificial instruments, they permitted them, as they are still permitted today, without the ear being offended in any way. I know
very well that some pedants of our times—
I am not aware of a more honest name to
call them—dare to say to more simple per-
sons than themselves, who attend [their
every word] as miraculous, that the two
perfect consonances are avoided on the
keyboard instruments of which they make
profession with the [interchange] of the
fingers, and the sight but not the ear of
those who attentively observe them [is
deceived]. Notice, please, what unheard-
of foolishness it is to wish the sight to
be a competent judge of the different
qualities of sounds. This is the very
same thing as saying that the hearing has
a part in discerning the differences of
colors. I say therefore that the practi-
cal musicians who lived a little before
the time of our grandfathers had come to
consider, with regard to the method of
playing in consonance, that it was also
possible to compose and sing in this
manner, since the ancient, scholarly
method had been entirely lost many, many
years before through wars or through

The pedantry of
some modern key-
board players.

The method of
composing and
singing sev-
eral melodies
together was
derived from
the manner of
playing in
consonance.
other circumstances. We shall mention this [ancient method] a little further below, in addition to which we shall shed as much light as our feeble powers will allow beyond what we have already done. Our only purpose will be to incite great and powerful minds to devote labor to such a noble science and to see to restoring it to its original, happy state.

I do not maintain that this is impossible, since I know that it was not revealed by the stars to those who first invented it and brought it to the zenith of perfection, but that it was only acquired by the industrious labor and assiduous study of these men. I say that the ancient music was lost, together with all the fine arts and the sciences, of which so little knowledge remains that many believe its marvellous excellence to be a dream and a fable. After its loss they began to derive, from the stringed and wind instruments, as well as from the organ, which was in use in those times but somewhat different from ours, a rule
and a standard of composing and singing several melodies together, in the same way they had played them on [instruments]. They accepted as laws the same practices that the cithara players and organists had had in use, except, however, for that rule about not making two perfect consonances of the same species when four or more voices were sounding simultaneously. This, perhaps, was to make the matter more difficult or to demonstrate that they possessed a keener, more delicate sense of hearing than the others, or because they actually believed that the same conditions which regulate between two parts singing together also do so between four, six, or more parts. This manner of composing and singing, through the novelty which accompanied it, together with the ease and speed [with which one could] become a musician, pleased the general public, as most often is accustomed to happen, thanks to its imperfection and the little knowledge which it always possesses concerning the good and
the truth of things. This gave opportunity to the artisans to deal in fantasy and to introduce new practices in addition to the original ones. These last persons did not wish to follow in the footsteps of their forebears and were unwilling to approve their works entirely, in order that they might not almost seem to be confessing silently that they were inferior to these forebears in industry and ingenuity. They always pursued the goal of bringing music to the utter destruction in which it is found. Whereupon, they added to the precept of being lawful to make two

[succ]esive imperfect consonances, that these [imperfect consonances] must necessarily be of different species. In addition, when proceeding from imperfect to perfect consonance [the progression] should be the nearest [one], always meaning in compositions for two voices. Now you see how, little by little, lured by ambition, they proceeded without noticing it at all,
subordinating reason to sense, form to material, and truth to falsehood. Not content with this, those of our times have added to the method of proceeding from imperfect to perfect consonance, and from imperfect to imperfect, that one should have regard for and, at the same time, avoid the relations of the tritone and the semidiapente which could arise between one part and the other. They have therefore maintained that, when a third comes after a major sixth, it should be minor, whenever the parts have varied position by contrary motion, and that when the major third is followed by a sixth, it should always be minor, and vice versa. They claimed, in addition, that when four or more parts are singing together, the lowest part should never lack the third nor the fifth (or instead of the fifth, the sixth) or one of their replicates. There is no one who does not judge that these rules, because of the mere delight the ear takes in the harmonies by virtue
of their variety, are excellent and necessary, but they are pestilent for the expression of conceptions because they are not suited for anything else but to make the concord varied and full. This is not always suited—indeed it never is—to express any conception of the poet or the orator. I repeat, therefore, that if the aforementioned rules had been applied to their original purpose, those who have expended them in modern times would merit no less praise than the original makers [of these rules], but the entire error is that the object today is different, even in direct opposition to that of the first inventors of such music. The true purpose had already been ascertained. It was never the intention of those [inventors] for those rules to have to serve for the use of those harmonies, together with which one had to express the conceptions of the mind by means of the words and with that affection which was appropriate. [They were only to serve] the sound of the
artificial stringed and wind instruments, as one may gather from what we have said heretofore about their first authors. But the matter has always been understood oppositely by [their] successors, and this belief has become so entrenched that I consider it will be a very difficult task (if not an impossible one) to remove and evict it from the minds of men, particularly from the minds of those who are simple practitioners of this sort of counterpoint, and therefore reputed and valued by the vulgar and supported financially by different gentlemen, and who have, up to the present time, been informing others about matters pertaining to that practice which they term music. If someone desired to persuade such persons as these that they were ignorant of the true music, he would not need the rhetoric and eloquence of Cicero or Demosthenes, but the sword of the

27 Demosthenes was a Greek orator and statesman who lived from 385?-322 B.C.
paladin Roland or the authority of some magnificent prince [who was] a friend of the truth and who would be able, when he had abandoned this [vulgar music] to the vulgar, to persuade the nobles by his example to devote effort to that music, which is suitable to them, which is, as Aristotle says, honest music used with dignity. For in the well-ordered republic, as he says in the eighth book of his Politics, those forms of music which are, like the vulgar, corrupt and removed from the true form of music, are conceded to the vulgar, as these of today, which are so admired and valued by them, are conceded, since each man naturally seeks his like. Enough has

28 Roland was the legendary hero of the Chanson de Roland and other stories of the Charlemagne cycle, famous for his strength, courage, and chivalrous spirit. He was killed while fighting the Saracens at Roncevalles in 778 A.D. Galilei and his contemporaries knew of Roland's exploits best through Lodovico Ariosto's narrative poem, Orlando Furioso.

29 Galilei's reference to Aristotle's Republic should be to the Politics. See Aristotle, Politics (134b9-19), p. 1314.
been said [about this]. Consider each rule of the modern contrapuntists by itself, or, if you wish, all together. They are not geared to anything but the delight of the hearing, if one can actually call it delight. They do not even have one book among them for their use and convenience which speaks of a way to express the conceptions of the mind and impress them with the greatest possible effectiveness on the minds of the hearers, nor do they think now, nor have they ever thought of one since the invention of this [kind of music]. They have only thought how to disfigure it even more, if that is possible. It is true that the last thing in the world they think of today is to express the conceptions of the words with the affection which they require, except in that ridiculous manner which I will describe a little later. It is a clear indication that their rules and regulations involve nothing but a way of modulating among the musical intervals,
seeking to make the composition a battle of different harmonies, according to the precepts stated above [and] without any further consideration of the expression of the conception and sense of the words. If it were permitted me, I should like to show you, with several authoritative examples, that among the most famous contrapuntists of this century there are those who cannot even read, let alone understand. Their lack of consideration and ignorance is one of the most powerful reasons that the music of today does not produce in the listeners any of those virtuous and wonderful effects that ancient music caused.

Strozzi: Please refresh my memory [by telling me] part of those benefits

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30 See Alfred Einstein, *The Italian Madrigal*, 3 vols., translated by Alexander H. Krappe, Roger H. Sessions, and Oliver Strunk (Princeton, 1949), I, 241. Einstein feels that Galilei's invective was presumably directed against Luca Marenzio when he spoke of highly gifted, but uneducated, composers of madrigals. See also p. 873 below.
which ancient music brought to mortals, but with your usual brevity.

Bardi: Listen, please! From these you will know the perfection of ancient music and the imperfection of our own, although Zarlino, in the first and forty-ninth chapters of the second part of his Institutioni, says the opposite, that is, our own music is perfect and that of the ancients is imperfect.

[Ancient music] preserved modesty, made the ferocious meek, encouraged the faint-hearted, quieted the perturbed spirits, [and] sharpened the talents. [It] filled the soul with divine fervor, soothed disagreements born among the people, [and] instilled in men a habit

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31 See Zarlino, Institutioni, p. 58ff., 143, 144.

32 The ancient authors are full of accounts of the aesthetic and curative powers of music. Some of these stories were perpetuated through the writings of Boethius. See Strunk, Source Readings, pp. 82-85 (Boethius, I, 1). For a description by a sixteenth century Boethian, see Jacques Lefevre d'Etaples, Musica libris quatuor demonstrata (Paris, 1557), pp. 2-3.
of good customs. [It] restored hearing to the deaf, revived the bewildered spirits, drove away pestilence, [and] rendered oppressed minds glad and joyful. [It] made the luxurious modest, quieted malign spirits, cured the bites of serpents, mitigated the infuriated and drunkards, drove out the tedium produced by heavy cares and labors, and with the example of Arion we can say at last (omitting many other cases) that [ancient music] freed men from death. In addition, the authoritative books are full of its other admirable feats.

Strozzi: There are indeed many important [cases], even most wonderful ones, but, even so, that celebrated Arion of yours apparently did not have power with

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his music to placate those sailors, masters of the ship upon which he then was found. He had, through no fault of his own, been forced to hurl himself into the sea, aided afterwards more by chance than by counsel.

Bardi: On the contrary, Arion hurled himself into the sea to demonstrate even more the excellence of his great ability. Having calmed that sea from its original state of anger, he had simultaneously moved the dolphins to compassion for himself, who vied to carry him in turn upon their backs, bringing him safely over many miles [of ocean] to the Taenarus promontory of Laconia. So that you may know [the whole story], when Arion (after having been appraised that the sailors wished to kill him in order to remain heirs to the many [valuable] properties which he had on the ship) had dressed himself in royal garb, which was then permitted to musicians and poets.

Music frees Arion from death.

Dolphins naturally love music.

A description of the ancient apparel of noble musicians.
(only to nobles, however, for it was prohibited to base servants and mercenaries), he took his cithara in hand and began to play and sing, sitting upon the poop. He probably did not play things suited to please the sailors, but only to encourage himself (as he did), for example, Pythian songs, Orthian nomes, or similar compositions, in order, afterwards, to expose himself courageously—as you know—to the peril of the leap. He had first prepared his soul and made an invocation to the marine gods, who willingly considered his great virtue. Then he hurled himself, together with his cithara, down from the poop into the waves. You know very well the happy success of that heroic deed. Now consider which is the greater marvel, placating reasoning animals or beasts, or inanimate objects.

34Pythian songs were compositions in praise of the god Apollo who was himself known by the epithet of "Pythian". See Plutarch, Moralia, 15 vols. (Cambridge,
Strozzi: You are completely correct. I have learned what I did not know before from your having interrupted your discourse, and I would not have easily known it if you had not done that. Do not be displeased to return, however, when I interrupt, but proceed with the discussion which you have at hand, excusing my importunity.

Bardi: I now return to my first train of thought, once again saying this. If the goal of our practicing contemporaries is (as they say) to delight the sense of hearing with the diversity of the consonances, and if this property of tickling it—because it cannot be termed delight in any other sense—is contained in a simple piece of hollow wood, over which are stretched four, six, or more strings [made] from the intestines of some dumb animal, or of some other [material], disposed according to the nature of the harmonic numbers, or in a particular quantity of natural reeds or of artificial

Massachusetts and London, 1967), XIV, 337. Orthian "nomoi" were high in register and lofty in character. See Immanuel Bekker, Suidae Lexicon (Berlin, 1854), under the word "orthios".
ones made of wood, metal, or some other material, divided by proportioned and appropriate measures, within which a small quantity of air blows while they are touched or struck by the coarse, unskilled hand of some vile, idiotic man, then let this goal of delighting with the variety of their harmonies be abandoned to these instruments, for they are capable of no more, since they are devoid of sense, motion, intelligence, speech, discourse, and soul. But men who have been furnished by nature with all these wonderfully noble, excellent abilities seek by means of them not only to delight but, as imitators of the good ancients, to improve as well, for they have the ability to do this. To do otherwise would be contrary to Nature who is God's lady-in-waiting. Judicious and scholarly men do not find satisfaction, like the unskilled masses, in the simple pleasure which sight provides in regarding the various colors and the different forms.
of objects, but only in investigating afterwards what suitability and proportion those incidental characteristics have in common, and likewise their properties and nature. In the same manner, I say that it does not suffice to be delighted by various harmonies which one hears between the parts of a musical composition unless one also ascertains in what proportion the voices have been combined (in addition to other important, necessary considerations), in order not to be like the herbalist who, in his simplicity, knows nothing about his plants except their names. Like him are most of those who, according to the vulgar, bear the name of musicians. Among their impertinences and novelties is also included that of transposing songs which were originally composed by means of natural, singable, appropriate movements, up or down—skilled organists customarily do this to accommodate the choir, by a tone, a third, or another interval by means of accidental signs—to strange,
unsingable pitches which are completely out of the ordinary and full of artifice. They do this only in order to have a larger field in which to boast about themselves and their abilities to those who are more ignorant than they are, as if [their deeds] are miracles. In addition to this, there has been no lack, nor is there one now, among the most famous [musicians] of those who have first arranged the notes according to their whims and then have applied those words which pleased them, without caring at all that between the words and notes there is the very same, or even a greater disparity than that which was said to exist between the dithyramb and the Dorian mode. Even men of worth are surprised that most of the compositions of today sound better when well played than when well sung, failing to notice that the goal of these [compositions] is to be communicated to the listener by means of artificial, not natural instruments, since they are themselves artificial and not
at all natural. And to lessen their amazement even more and my labor in so often reciting the words of others, let them read in this regard, problem ten, book nineteen of Aristotle,\textsuperscript{35} which will take care of them. Beyond the beauty and grace of the consonances, there is nothing ingenious or exceptional in modern counterpoint but the use of dissonances, provided, however, that they are arranged with the necessary means, and resolved with discrimination. For the expression of conceptions in order to inculcate the affections of the listener, not only are both of these an impediment, but the worst of poisons. The reason is this: the continual delicacy of the variety of harmonies, mingled with

\textsuperscript{35}Aristotle, Problems, 2 vols., translated by W. S. Hett (Cambridge, Massachusetts and London, 1961), I, 385. "Why is it--granting that the human voice is a pleasanter sound than that of instruments--the voice of one who sings without words (as do those who hum) is not so pleasant as the sound of the flute or lute?"
that small [amount] of harshness and bitterness of the various dissonances—not to mention the thousand other insolent methods of artifice which the contrapuntists of our times have sought out so industriously to beguile our ears, which I do not enumerate in order to avoid being tedious—are, as I have said, the greatest obstacle to moving the mind to any affection. The mind, since it is occupied and almost bound, mainly with the snares of the pleasure so produced, is not granted time to understand, let alone consider, the badly uttered words. All this is totally different from what is necessary to affection from its nature, because [affection] and morality must be simple and natural, or at least appear so, and their only goal must be to arouse their counterparts in others.

Strozzi: From what you have said up to now, it seems that the music of today, among other important things, is
not of great value for expressing the conceptions of the mind by means of words, but it is only valuable for simple wind and stringed instruments, from which the hearing, it appears, desires nothing but to receive sweet nourishment from the variety of their harmonies, accompanied by the suitable and proportioned movements with which they are replete. These are manifested, then, to the ear by means of some practiced and expert player.

Bardi: What you say would always be true if the various harmonies of the artificial instruments were only suited to entertain and tickle the ears, as you say, and if the contrapuntists of our times were content to disfigure only that part of music which pertains to the expression of conceptions. They have not been satisfied with that, however, and have treated no better the portion which dealt merely with the harmonies of the artificial instruments and the
delight of the sense, without proceeding to that of the mind. They have also reduced this to such a condition that if it became just a little worse, it would require burial rather than needing to be cured.

Strozzi: Please tell me how [that could be].

Bardi: Have you not noticed the peculiar obstinacy of the parallel and contrary fugues which so frequently and insistently are used in that form of counterpoint, which is therefore called "ricercar", which represents a particular [branch] of music [designed] for artificial instruments. These "ricercari" are customarily composed for four voices [and] without any relation to the words. [This is done for] no other purpose except to have a broader field to please the ear even more with the various

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36 See Willi Apel, Harvard Dictionary of Music (Cambridge, Massachusetts, 1969), p. 731. The most important of this genre is the imitative type which is the instrumental equivalent of a vocal motet.
qualities of pitches, harmonies, and movements. These qualities are afterwards communicated to the ear by means of [those artificial instruments] and, as has been said, by a well-practiced player. The imitations of such fugues, through the extreme care used by the majority of composers, who are inspired by nothing else but ambition, many times cause the third to be missing in the low part when all four parts are sounding together. Another time, the fifth or the sixth may be missing, or one of the replicates, as has been said many times, not to mention the disproportionate movements and rhythms. One can reasonably compare these "ricercari", being thus composed, to that type of poetry which is known today as the sestina\(^3\) which, because of its

\(^{3}\)The poetic form, sestina, was popular in Renaissance Italy. It consists of six six-line stanzas and a three-line envoy (concluding stanza). The end words of the first stanza are repeated with progressively changed order in the other five stanzas and are included at the middle and at the
many restrictions, is less effusive than any other species of poetry. What will we say afterwards with regard to that other impertinence concerning the value of the notes from which they very often compose the above-mentioned fugues, for example, from semibreves with the dot and from breves, in order to omit in part those which are composed of notes of greater value? We will say only this. If in being played, particularly on the lute and on the harpsichord (both most noble instruments) they were not arranged with better judgement than the way in which they had been composed originally by their authors, they could not be heard in many places due to the thinness of the harmonies, if not with the least [amount of] pleasure. Since the discreet player avoids these inconveniences by plucking them more often, many others, on the contrary, remove them by avoiding them and "taceting" end of the envoy. Galilei's comparison of it with the ricercar almost certainly springs from the somewhat rigid character of the contrapuntal entrances in the musical form.
them when, however, it is convenient to move [such a note], often from one of the parts on the same pitch. All those who possess a good knowledge of those instruments can place their undoubting faith in this. The inconveniences which I am able to present, in addition to those recently mentioned, are infinite, should you wish to examine each of their operations more carefully. Showing their [own] error, however, to those who through bad advice have neither considered nor retracted it, is like planting seeds in the sand. It is better as a greater punishment to leave them in their blindness and direct our arguments elsewhere. Let us say only this as the climax of their confusion, that is, through the vain desire which they have of being reputed as intelligent men by those less knowledgable than themselves, they have attributed the signing of the diesis X on f fa ut or on g sol re ut to ignorance, however important the occasion [for it may be], when they ascend
from [f fa ut] to b fa, or from [g sol re ut] to c sol fa ut, saying firmly that it is not reasonable to proceed through dissonant intervals, meaning the semi-diatessaron. With all this, when such passages are sung or played in the style of cadences, and they are played and sung with the highest degree of excellence one could possibly desire, they would [still] scorn those [passages] because in reciting any of their compositions, when what has been said occurred there, they did not do it. They are actually most pleasant to hear in that particular manner, especially on the lute, which has, instead of semidiatessarons, major thirds, nor can the situation be any different, as I have proved to you above.

Strozzi: [It is] so much the better, then, that they possess so much discretion and judgement that they are ashamed to do what they are not ashamed to say.

Bardi: On the contrary. They are ashamed to say that which they are not
ashamed to do, because the true procedure in that kind of practice which they call music is the means of operating, either with natural voices or by means of artificial instruments, and not writing some character or other next to the notes. I had it in mind to lecture you concerning that other still more ambitious vanity, concerning which our practicing contemporaries make so much noise, to those, however, who are less knowledgable than themselves in music. For example, they write one or more parts of their compositions to be sung around the device, or coat of arms of the person to whom they wish to give [the piece], [or write them to be sung] from a mirror, or along the fingers of the hands. Sometimes, one of these parts will sing the beginning at the same time the other sings the end or the middle of the very same part. Other times, they will "tacet" the notes and sing the rests. Not content with this, others sometimes want them to be sung, without lines, on the words [themselves],
signifying the names of the notes with
the vowels, and their value with extravagant, bizarre Chaldean or Egyptian characters, or instead of the vowels and characters they paint beautiful flowers and diverse branches on cards, the singers of which represent to the sight of the listeners so many Aesculapians.\footnote{The Aesculapians were followers of the Greek god of medicine, Aesculapius, son of Apollo and the nymph Coronis. The term became a synonym for physicians. Galilei’s singers probably reminded him of a conference of medical practitioners solemnly poring over their charts.}

In addition to [these, there are] a thousand ridiculous vanities. All of these things, when used with the proper means at a suitable time and place would not be totally deplorable, but since they want to preach them out of season as extraordinary things, it is not reasonable to tolerate it. The true place and time for these conceptions of theirs would be, in my opinion, at the vigils of the carnival for fun and games, or indeed, after dining.
instead of the melon seeds which are customarily devoured at that time for diversion and in order to have less occasion to think and to feel the boredom of the heat. Such inventions are similar to those musical instruments which one perceives to be constructed by their manufacturers with the greatest of labor, diligence, and industry, but afterwards, even when played by a skillful, excellent hand, render rough sounds and unbecoming tones. The pleasure one derives from them is entirely one of sight although the desire of the manufacturers (even though the effect did not emerge according to their original intention) was mainly to satisfy the hearing. One could demonstrate, as I have said, a thousand other noteworthy inconveniences which we will reserve for another time. Finally, I come, as I promised, to deal with the most important and principal part of music, and this is the imitation of the conceptions which are derived from the words. Having
hastily disposed of this matter, I will proceed to lecture you about the rules of the ancient musicians. Our practicing contemporary contrapuntists say, or rather maintain as a certainty, that they have expressed the conceptions of the mind in a suitable manner and have imitated the words whenever, in setting to music a sonnet, a canzone, romanzo, madrigal, or

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39 See Zarlino, *Istitutioni*, p. 334. Zarlino describes the techniques involved in fitting the harmonies to the words. He states that it is not permissible to combine harmonies and words which do not agree with one another, for example, sad harmonies to happy words, nor to mix funereal texts with joyful harmonies. Harsh words should be fitted with equivalent harmonies, in an inoffensive manner, however. He recommends the use of sixths, sevenths, fourths, and seconds to achieve these rough effects. The use of accidentals, he says, creates a languid, sweet effect, while not using them produces a virile, sonorous one. Zarlino also advocates the use of fast tempi for light, gay words, and slow tempi for feeble, mournful ones. In addition, he advises that the words must always be accommodated to singable figures, avoiding any barbarisms, for instance singing a long word to too short a note, or the opposite. Finally, he admonishes composers to keep their eyes open, not closed, and to be sure to place rests with discrimination, reserving the long ones for places where the text has a period and using shorter ones where it has a comma.
another [poetic form] in which a line is found which says, for instance, "Bitter, savage heart and cruel will", which is the first [line] of one of the sonnets of Petrarch, they have caused many sevenths, fourths, seconds, and major sixths to be sung between the parts, thus producing a rough, harsh, disagreeable sound in the ears of the listeners. [Such a sound] is probably no different from that which the cithara of Orpheus gave in the hand of Neantius, son of Pittacus, the tyrant of Lesbos, an

40 This quotation from Petrarch occurs in his sonnet entitled "Hor che'l ciel e la terra e'l vento tace". Galilei may have been thinking of Gipriano Rore's setting of this text. See Einstein, The Italian Madrigal, I, 232. See also Zarlino, Istitutioni, p. 340, who refers to a setting of this same text by Adrian Willaert.

41 Pittacus, absolute ruler of Lesbos, reigned during the lifetime of the poetess Sappho (ca. 600 B.C.). He was noted not for tyranny but for wise, generous policies which rendered his domain a place of culture and prosperity.
island of Greece. On Lesbos flourished the greatest and most esteemed musicians in the world. We read that [that particular cithara] had been placed there in honor of their greatness after the death of the remarkable cithara player Pericleitus,42 the glorious victor in the Carneian festival of the Lacedaemonians. This Neantius, in practicing upon the said citharā, revealed through his ineptitude that the strings were partly of wolf-gut and partly of lamb-gut, either because of this defect or because of the sin he had committed in stealing the sacred cithara from the temple. He believed that in that [cithara] dwelled the magic power to play it well, just as the power was inherent in Bradamante's44

42 See Plutarch, On Music, p. 367, for an account of Pericleitus.

43 See Hieronymus Fracastoro, De sympathia et sympathia rerum (Lyons, 1554), p. 20. Fracastoro describes the impropriety of combining strings of wolf-gut and lamb-gut on the cithara.

44 Bradamante was a personage in Lodovico Ariosto's epic poem, Orlando Furioso.
golden lance to throw to the ground anyone whom it touched. [Neantius] received condign punishment for that [offense], being devoured by dogs. In this alone he emulated [Orpheus], the learned poet, wise priest, and singular musician, who was, as you know, killed by the Bacchantes. Another time they will say that they are imitating the words, when among the conceptions of these there are any which mean "to flee" or "to fly". They will utter these with the greatest speed and the least grace one could possibly imagine. With regard to words which mean "to vanish", "to faint", "to die", or actually "[to be] extinct", they have abruptly silenced the parts with such violence that, instead of producing those affections, they have moved the listeners [one time] to laughter and another time to disdain, thinking that

they were being ridiculed. Then, when they have declaimed "alone", "two", or "together", they have made one [part], two [parts] or all [the parts] together to sing with unparalleled gallantry.

Others, in the singing [of] this particular verse from one of the sestinas of Petrarch:46 "And with the lame ox he will be pursuing Laura", have uttered it to staggering, wavering, syncopated notes, as if they had the hiccups. And when the conceptions which they have had at their disposal (as sometimes occurs) make mention of the roll of the drum, or the sound of the trumpet or any other such instrument, they have attempted to represent its sound to the hearing with their music without caring at all that they were pronouncing these words in

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46 The "lame ox" quotation occurs in Petrarch's sestina, "La ver l'aurora (Ridon or per le piagge erbette e fiori)". See Einstein, I, 232, for a musical example from Rore's setting of this poem.
some unaccustomed manner. When they found words which denoted diversity of colors, such as "dark" or "light" hair and similar [sayings], they placed black or white notes beneath them, in order to express such a conception astutely and elegantly, subjugating the sense of hearing, in that case, to the accidents of form and color, which are the particular objects of the sight, and [subjugating it] to the touch in solid bodies.

There has been no lack of those who, being more corrupt still, have sought to depict with notes the words "azure" and "violet" according to the sound of the words, just as string-makers today

47 Lodovico Ariosto's ottava (Orlando Furioso, XXV, 68) which commences,

Non rumor di tamburi o suon di trombe
Furon principio all' amoroso assalto . . .

as set by Alexander Striggio (Second book of madrigals a 6, 1571), illustrates the trumpet and drum conception. See Einstein, I, 233, for an excerpt. See also Ibid., I, 233ff., for short illustrations of the conceptions of dark and light, up and down, and other extreme usages of eye-music.
color their gut strings. Another time, when a verse reads thus: "He descended into Hades into the lap of Pluto", they have, because of that, made one of the parts of the composition descend in such a way that the one singing it represents to the ear, in that instance, someone who wishes to frighten and terrify children, rather than someone who is singing sense. On the contrary, when [another verse] reads: "This man aspired to the stars", they have ascended to a height that no one screaming from excessive pain, internal or external, has ever attained. Under a word which sometimes occurs like "to weep", "to laugh", "to sing", "to shout", "to shriek", or else "false deceits", "harsh chains", "hard bonds", "rugged mountain", "unyielding rock", "cruel woman", or other similar things, not to mention their sighs, unusual forms, and others like them, they have declaimed them in order to enhance their impertinent, vain schemes in ways more ridiculous than those of some far-off barbarian. Unfortunate
men, they do not realize that if Isocrates, Corax, or another of the most celebrated orators had uttered even a single time two of those words in such a way, they would have moved all their listeners to laughter and scorn at the same time, and also would have been derided and despised by them as foolish, abject, worthless men. Yet, they wonder why the music of their times does not produce any of the notable effects which ancient music produced, when, on the contrary, since ancient music is so remote and dissimilar from modern music (even its opposite and mortal enemy, as has been said and proved, and will be proved even more) they would have more justification for their amazement if any such effects were produced, since there is no way [modern music] can even think [of] producing them, let alone doing it. Its sole aim, moreover, is nothing but the pleasure of
the ear, and that of ancient music is to produce in someone else the same affection one feels oneself. No one with any judgement understands how to express the conceptions of the mind by means of words in such a ridiculous manner as this, but in another manner which is far removed and very dissimilar.

Strozzi: Would you please tell me how.

Bardi: In the same manner that, among many others, those two famous orators, which I mentioned shortly before this, expressed them, and later, every notable ancient musician. And if they wish to understand the method of it, I will be glad to show where and from whom they can learn it without much labor and nuisance, but rather with the greatest pleasure. The way is this. When they go for their diversion to the tragedies and comedies presented by the mummers, let them for once forsake their immoderate laughter, and instead be kind

From whom our practicing contemporaries can learn the imitation of the words.
enough to observe the manner in which one quiet gentleman speaks to another, with regard to the highness or lowness of the voice, the volume of sound, the kinds of accents and gestures, and how the words are uttered with relation to fastness and slowness. Let them observe a little the difference which occurs among all those things when one of these gentlemen speaks with one of his servants, or one of these servants speaks with another servant. Let them consider the prince, when he has occasion to converse with one of his subjects and vassals or when he speaks with a petitioner who is presenting his petition. Let them observe how an infuriated or excited man speaks, and also the married woman, the young girl, and the mere child. Let them also observe how the clever strumpet speaks, how the lover speaks to his beloved while seeking to bend her to his will, how those who are mourning speak, also
those who cry out, how a timid man speaks, and, finally, how those speak who are rejoicing. From these diverse situations, provided they observe them attentively and examine them carefully, they can select the norm of what is suitable for the expression of any concept at all with which they may be required to deal. Every beast has the natural ability to communicate with its voice the pleasure and pain of its body and soul, at least to those of its own species, nor did nature give it a voice for any other reason. Among rational [animals] there are some so stupid that they believe themselves deprived of this [ability to communicate] since, thanks to their worthlessness, they do not know how to put it into practice. When the ancient musician sang any poem at all, he first examined carefully the [individual] qualities of the person speaking, his age, sex, with whom he was speaking, and what [effect] he was
seeking to produce by such a means. These conceptions, already dressed by the poet in chosen words suited to such a need, were then expressed by the musician in the mode, with the accents and gestures, [with] the quantity and quality of sound, and with the rhythms which were suitable for that action and the person involved. We read, therefore, about Timotheus (who, according to the opinion of Suidas was an aulete, not a cithara player), that when he incited

48 Timotheus of Miletus, a fourth century B.C. lyric poet, is frequently mentioned in ancient sources as a notorious innovator of Greek music. He was banished from Sparta for adding four strings to the cithara beyond the lawful number of seven, allegedly corrupting the youth of that city by using lascivious chromatic melodies instead of the approved diatonic ones (see p. 713 below). Following his involuntary exodus from Sparta, Timotheus supposedly went into the service of Alexander the Great. Suidas recounts the martial effect of his aulos playing upon Alexander [See Immanuel Bekker, Suidae Lexicon (Berlin, 1854), p. 1030]. Timotheus was satirized by the Greek dramatist Pherekrates (see Plutarch, On Music, p. 421), who introduced Music in the guise of a woman whose whole person had been brutally mauled. When asked how she had come to suffer such an outrage, she alluded to
Alexander the Great with the difficult mode of Minerva to combat with the opposing armies, not only were the aforesaid circumstances revealed in the words and in the conceptions of the whole song in conformity with his desire, but, in my opinion at least, his mien, the look upon his face, and each particular gesture and member must have indicated at that time that he was burning with desire to fight, overpower, and vanquish the enemy. Therefore, Alexander was forced to cry out for his arms and say that this should be the song of kings.

the various tortuous tunings foisted upon her by various composers, the worst of whom was Timotheus.

But Oh! my dear, Timotheus is murder, Mayhem and outrage!—And who is the man? —A redhead from Miletus, He's been worse Than all the other fellows put together; His notes crawl up and down the scale like ants, And when he finds me on a walk alone He tears and breaks me with his dozen strings.
Every time, therefore, provided the impediments have been removed, that the musician does not have the power to direct the minds of his listeners where they will receive benefit, his science and knowledge must be considered null and void, for music was instituted and numbered among the liberal arts for no other purpose.

Strozzi: Did the mere sound of an artificial instrument have the power to evoke any effect in the listener?

Bardi: Do not doubt it at all, although Zarlino\(^{49}\) is of the opposite opinion in chapter seven of the second part of his *Institutioni*, that the sound of an instrument made by art without the use of words had--according to what I pointed out to you above and as Aristotle says--the nature to imitate good character and to possess it itself, and very great power to produce in the minds of the listeners most of the affections which

\[^{49}\text{See Zarlino, *Istitutioni*, pp. 70-71.}\]
were pleasing to the skillful player. [In order to prove] that this is true, I now confirm it to you with the example of the aulete to whom Pythagoras said, "Change mode". When the player had changed it (according to what had been commanded) the original rhythm of the rapid dactyl became a slow spondee, and the mode abruptly changed from high to low. Thus, the angry youth of Taormina was placated, so that he did not burn the house of the harlot with whom he was greatly enraged. In addition, Sophocles in one of his tragedies was accustomed to call the aulos the tyrant of the soul, only because of the power

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50 For the story of the enraged youth, see Strunk, Source Readings, p. 82 (Boethius, I, 1).

which it had to pull them, almost violently, in any direction the skillful aulete pleased. Even further, some [authorities] claim that Alexander the Great was provoked to take up arms by mere sound of the aulos, although Plutarch\textsuperscript{52} believes that Antigeneidas, a most famous aulete, attended him with the song and probably not Timotheus, since he was a cithara player, as has been said and shown above. The forgotten opinion of those writers could be harmonized by saying that Alexander, having been desirous of glory, had been incited to combat on many occasions by various musicians of his times. I do not say on account of this that the cithara did not have the power to produce many other effects, but the aulos was more suitable to agitate minds and move them to fury. One also reads

\textsuperscript{52}\textit{See Plutarch, Moralia, 15 vols. (London and New York, 1936), IV, 431.}
according to Julius Pollux\(^5^3\) that Herodotus [sic.] the trumpeter, a contemporary of Euclid, greatly filled the soldiers with boldness by means of the sound of his trumpet. In addition, we prove this ourselves every day when we hear one instrument or another playing different melodies, in order to omit the drum [tamburo], the confused murmur of which one can insist is noisy with more reason than [calling it] sonorous and rational. To tell you even more about this matter, Aelian\(^5^4\) claims that the hermit crab is captivated by the sound of the photinx [flageolet]. This crustacean is such a great lover of that particular harmony that it comes clear out of the water up onto the shore in order to hear it and then becomes

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The hermit crab is captured with the sound of the photinx. Aelian in the History of the Animals, in chapters 31 [of the 6th book] and 44 of the 12th book.
someone's prey. The same [Aelian] also claims that stags are captivated by the sound of the aulos, in the same way as

At any rate they catch them by means of a flageolet [photinx] (this is the name of an instrument). Now the crabs have gone down into their hiding places, and the men begin to play. And at the sound, as though by a spell, the crabs are induced to quit their den, and then captivated with delight even emerge from the sea. But the flute-players withdraw backwards and the crabs follow and when on the dry land are caught." Ibid., III, 69. "In India if a full-grown elephant is captured he is hard to tame and his craving for freedom makes him thirst for blood, and if you make him fast with ropes his anger is inflamed all the more and he will not stand being a slave and a prisoner. But the Indians blandish him with food and try to mollify him with a variety of attractive baits, offering him what will fill his stomach and assuage his passion. Yet he is displeased with them and takes no notice of them. So what device do the Indians adopt to meet this? They introduce native music and charm the elephants with a musical instrument that is in common use; it is called "scindapsus". And the elephant lends an ear and is pacified; his rage is softened, and his passion is subdued and allayed, and little by little he begins to notice his food. Then he is freed from his bonds but remains captivated by the music, and eats his food with the eagerness of a man faring sumptuously; for in his love for the music he will no longer run away. But the mares of Libya . . . are equally captivated by the sound of the pipe. They become gentle and tame and cease to prance and be skittish, and follow the
we see all the time when birds are captured by means of the pan-pipes of the sly birdcatcher. He says, in addition, that the natives of India soothe the herdsman wherever the music leads them; and if he stands still, so do they. But if he plays his pipe with greater vigor, tears of pleasure stream from their eyes." Ibid., III, 73. "There is an Etruscan story current which says that the wild boars and the stags in that country are caught by using nets and hounds, as is the usual manner of hunting, but that music plays a part, and even the larger part, in the struggle. And how this happens, I will now relate. They set the nets and other hunting gear that ensnare the animals in a circle, and a man proficient on the pipes stands there and tries his utmost to play a rather soft tune, avoiding any shriller note, but playing the sweetest melodies possible. The quiet and the stillness easily carry the sound abroad; and the music streams up to the heights and into ravines and thickets—in a word into every lair and resting-place of these animals. Now at first when the sound penetrates to their ears it strikes them with terror and fills them with dread, and then an unalloyed and irresistible delight in the music takes hold of them, and they are so beguiled as to forget about their offspring and their homes. And yet wild beasts do not care to wander away from their native haunts. But little by little, these creatures in Etruria are attracted as though by some persuasive spell, and beneath the wizardry of the music, they come and fall into the snares, overpowered by the melody."
enraged spirits of elephants with song to the sound of the scindapsus and that the Libyans tranquillize ferocious, indomitable horses with the sound of the plagal aulos. This will suffice with regard to that [subject]. I do not want to fail to mention another sciolism of our practicing contemporary contrapuntists. When they put into music (as they say) any kind of rhymed verses, either free or connected, they are sung in such a way below their notes that they are not distinguishable from prose. By means of this [device] they become deprived of their natural ability and, consequently, they lose the power to produce in the hearer what they formerly produced, due to their particular natures when they were merely read or uttered, according to what was suitable to their qualities and those of the poem. And this is as much as it is necessary for me to tell you with regard to the rules and regulations of modern contrapuntists. When they have considered
this refinement rationally, in addition to [the fact that] I have shown a mind well disposed towards them, since I have sought with all my industry and knowledge to show them the truth, it can be an effective means of opening them a way to those more reserved, more profound speculations which can be more carefully considered in so noble a science by an intellect entirely capable of it, as I have said.
[CHAPTER V]

[A HISTORY OF MUSICAL INSTRUMENTS AND NOTATION]

[O] Returning, then, to lecture you concerning other matters which concur through knowledge of the rules of the ancient Greek musicians, one of these in particular which was extremely important was this. They were accustomed in their compositions to limit themselves to a great extent [to the area] around the mese of the mode they were singing, and thus they sought out as few notes as possible. These facts are gathered mainly from Aristotle\(^2\) in the *Problems* concerning harmony, and from Plutarch\(^3\) regarding Olympus\(^4\) and Terpander.\(^5\)

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\(^1\) Gioseffo Zarlino, *The Art of Counterpoint*, translated by Guy A. Marco and Claude V. Palisca (New Haven and London, 1968), p. 90. Zarlino maintains that the unison and octave must be avoided as much as possible in counterpoint, pointing out...
Strozzi: What was the origin of this?

Bardi: From knowing that the quantity of these pitches had hindered them from

that the duplication of sounds would be monotonous and displeasing to the ear.

2 Aristotle, Problems, 2 vols., translated by W. S. Hett (Cambridge, Massachusetts and London, 1961), I, 411. "Why is one string of the octave called 'mese' when there is no middle note to eight? Is it because in the old days the modes were on seven strings, and seven has a middle note? Again since of all the notes between the extremes the middle one alone is in a sense a starting-point (for in any arrangement of notes which incline to one or another of the extremes, one in the middle is a starting-point), mese will be in a middle position. But since the extremes of the scale are nete and hypate, and the remaining sounds lie between them, of which the so-called mese is alone the starting-point of the next tetrachord, it is right that it should be called mese. For, as we have seen, the middle alone is a starting-point."

3 Plutarch, On Music, translated by Benedict Einarson and Phillip H. DeLacy, Vol. XIV of Plutarch's Moralia, 15 vols. (Cambridge, Massachusetts and London, 1967), p. 389. Speaking of the ancients, Plutarch states, "It was not because they had never heard of the various modes that they employed only a few. No, it was not to ignorance that such restriction of range and confinement to a few notes was due, nor was it from ignorance that Olympus and Terpander and those who followed in the way these men had chosen eschewed multiplicity of notes and variety."
instilling in the listeners anything at all which had been proposed in the mind. One reads, moreover, as I have said, according to Plutarch, that Olympus and Terpander, both highly celebrated musicians, sought out not more than three or four strings or pitches in their songs. For the aforementioned reason, they should, in the same way, have been those pitches which were

4Isobel Henderson, "Ancient Greek Music" in Ancient and Oriental Music, Vol. I of New Oxford History of Music (London, 1957), p. 380. "The founder of auletic music was said to be Olympus, who was a myth, but was credited with real archaic compositions still known in the fourth century B.C."

5Ibid., p. 381. "Terpander—a shadowy figure assigned to variant seventh-century dates and suspiciously coupled with the mythical Olympus—was inflated into a Founder of kitharistic music, and was supposed to have increased the strings of the 'phorminx' from four to the symbolic number of seven, also imputed to Orpheus."

6Plutarch, op. cit., p. 389. "Witness the compositions of Olympus and Terpander and of all the composers who resemble them. These compositions, although confined to three notes and simple, are better than those that make use of variation and many notes."
nearest to the mese of the mode in which they were singing and playing, because the different powers of these modes mainly consisted, as has been shown, in the high register and in the low register. Plutarch gathers also from this that many other musicians, also noteworthy, sought out more pitches or strings in their songs than those which Olympus and Terpander had sought originally. Among them, mention is made of Philoxenus and Timotheus, who were, for that reason, esteemed as theatrical musicians, but they never added to the

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7 Philoxenus of Cythera (435-379 B.C.) was a dithyrambic poet who was famous, or perhaps infamous, for his musical innovations. Pseudo-Plutarch, whose dialogue on music is set in the third or fourth century B.C., states that Crexus, Philoxenus, and the composers of that time had a streak of coarseness in them and were fond of novelty, aiming at the manner which was called "popular" and "mercenary" in Plutarch's time. Thus, restriction to a few notes and simplicity and grandeur of music had come to be quite obsolete. See Plutarch, On Music, p. 381. Henderson ("Ancient Greek Music," p. 337) points out that the music of Philoxenus and Timotheus had died out by the later second century B.C.
excellence of Olympus and Terpander. The variety and quantity of the strings which they used in their songs was, however, perhaps no little hindrance to Philoxenus and Timotheus.

Strozzi: I do not know the source of excellence of that highly celebrated [man], Olympus, since he was a mere aulete.

Bardi: Olympus was not in credit during his times merely because of his singing and aulos playing, but because he was a most excellent musician and composer. This fact is clear from seeing that many hundreds of years later his compositions and airs remained highly esteemed, since they were most excellent in comparison with those of the others.

Strozzi: How did [the Greeks] know one mode from another, since the compositions of famous musicians did not seek

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8Gustave Reese, Music in the Middle Ages (New York, 1940), p. 13. Concerning the innovations of Timotheus, Reese mentions his composition titled The Persians. This is the only surviving fragment of the art of the nomos, which in Reese's opinion, "runs rather wild".
out, as you have said, more than three or four strings or pitches? These [pitches], in my estimation, came to be common to many modes.

Bardi: They knew it mainly because the system was more or less intense [i.e. stretched], and because each of the different species of the diapason, as has been said and demonstrated with an example, ascended and descended by different steps in each of the modes. [They also knew it] from the variety of characters which they had investigated and employed in this undertaking for no other purpose than to show openly the variety of modes. This matter is clearly seen in Boethius,⁹ because those which he uses for each of the three genera of

harmony belong to the Lydian mode. He promises in that place to show the others, but never does it according to what is seen in the rest of his work. It is easy for me to believe that [the work] may not be complete, since the end of it appears [to be] interrupted and imperfect. It is quite true that where he deals with tones (or modes) he makes mention of a few other characters which are indicative of many important things [which are] worthy of mature consideration. One can extract these in great numbers and in order from the writings of the Greek author Alypius, because all of them are seen clearly in a

also Friedrich Bellermann, Die Tonleitern und Musiknoten der Griechen (Berlin, 1847), for an exhaustive treatment of these symbols.

10 C. F. Abdy-Williams, The Story of Notation (London and New York, 1903), p. 222. Alypius was a sophist of the school of Alexandria who lived in the second century A.D. Nothing is known of his life, and the Introduction to Music has perished except the 11th of its seven parts, which gives the whole of the Greek notation, with a verbal description of each sign in order to avoid the mistakes of copyists. The manuscripts of this fragment are numerous, and are found in many of the ancient libraries of Europe.
book which he wrote mainly concerning the notes which the ancient Greek musicians used to write down the pitches in each mode (or tone) in any genera of their harmony. This book is found specifically in Rome in the Vatican library, from which I obtained a copy a few months ago with no little difficulty. One finds also in this book the different signs which the ancients used to denote the particular strings of an instrument in differentiation from those which signified the sound of the voice. Boethius\textsuperscript{11} also indicates this where he claims that the first of each string is that which denotes the [pitch of the] voice, and the second, that which signifies the string of the instrument. They had as many different kinds of these characters as there were differences among their tones (or modes),

\textsuperscript{11} Bower, Boethius, p. 222. "Thus the notes or signs given first and above in the arrangement will be those for music with words, whereas the second and lower notes are for instruments."
which in all reached the number of forty-eight, by means of descending (by conjunct movement) one time by tone and another by semitone. They had been formed from simple elements of the alphabet and from their parts, in imitation of which one sees the pitches of the Greater [Perfect] System notated in the Introduction of Guido,¹² [along] with those of the Romans.

Strozzi: Would it be possible to see an example?

Bardi: Not only [would it be] possible, but very easy. Take note, initially, of the characters of each of the eight modes according to Alypius in the order in which Boethius has described them. These [characters] denote any particular pitch of each of the eight systems, according to the [type of] diatonic distribution [known as] diatonic ditoniaion, where those [characters]

which signify the strings of their instruments have also been notated in differentiation from the others which denote the voice. One reads that the reason why one set of characters was different from the other, rather than the same, was in order not to confuse the melody of the sound with that of the voice. For when the very same words were sung by the voice (according to what some customarily do) as [were sung] in the other part [i.e. that of the sound], and when people were used to following one set of characters or the other above each syllable, according to what the composer had ordained, if the characters had been the same, confusion would have easily resulted. Above all, it would have resulted in those parts where sometimes one was silent and the other proceeded, or vice versa. Nevertheless, there are others of the opinion that the same ones would have been able comfortably to serve all without having caused any inconvenience. For greater
understanding and ease, I have decided for the sake of comparison to write the Latin characters according to the usage of the modern practice in the margin of this [example], and here they are [Table I.].
### TABLE I

**EXCERPTS FROM THE BOOKS OF ALYPIUS**

**Signs of the Hypodorian Mode**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Name</th>
<th>Symbol(s)</th>
<th>Voice</th>
<th>String</th>
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<tbody>
<tr>
<td>Aa</td>
<td>Netehyperbolaion</td>
<td>Gamma and nu</td>
<td></td>
<td>N</td>
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<tr>
<td>g</td>
<td>Paranetehyperbolaion</td>
<td>Eta and oblique reversed lambda</td>
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<td>Y</td>
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<tr>
<td>f</td>
<td>Tritehyperbolaion</td>
<td>Lambda and supine semi-delta</td>
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<td>V</td>
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<tr>
<td>e</td>
<td>Netediezeugmenon</td>
<td>Mu and elongated pi</td>
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<td>Z</td>
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<tr>
<td>d</td>
<td>Paranetediezeugmenon</td>
<td>Pi and reversed sigma</td>
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<td>Π</td>
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<tr>
<td>c</td>
<td>Tritediezeugmenon</td>
<td>Upsilon and reversed digamma</td>
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<td>h</td>
<td>Paramese</td>
<td>Phi and digamma</td>
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<td>Pi and reversed sigma</td>
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<td>c</td>
<td>Paranetesynemmenon</td>
<td>Tau and reversed digamma</td>
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<td>Symbol</td>
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<tr>
<td>( \psi )</td>
<td>Tritesynemmenon: Psi and supine half mu</td>
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<tr>
<td>( \omega )</td>
<td>Mese: Omega and half mu left</td>
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<tr>
<td>( \gamma )</td>
<td>Lichanosmeson: Reversed delta and oblique tau</td>
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<tr>
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<td>b</td>
<td>Tritesynemmenon</td>
<td>Beta and the acute accent</td>
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<td>a</td>
<td>Mese</td>
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<td>G</td>
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<td>D</td>
<td>Lichanoshypaton</td>
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<td>C</td>
<td>Parhypatehypaton</td>
<td>Psilon and reversed digamma</td>
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<td>h</td>
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<td>A</td>
<td>Proslambanomenos</td>
<td>Omega and half mu left</td>
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Next you will see a new description of the eight modes according to the opinion of Boethius, to the individual strings of which are applied those characters in the order which was described by Alypius. Concerning these systems, we will consider those things which are of greater importance. Initially, those characters which are on the same pitch, speaking of highness and lowness, although in different systems and denoted by different names, are, for all that, always the same, except, however, those which in descending change the size of their scale-steps. This happens as much to those which denote the voice as to the others which signify the string. This rule apparently suffers only in two situations. The first is between the paramese of the Hypolydian and the tritesynemmenon of the Dorian, and the second is between the tritesynemmenon of the Lydian and the paramese of the Dorian. This could easily have happened
from the corruption and antiquity of the text because no differentiation was made between small and large characters. It is also noteworthy that the pitches of the disjunct system [which are] different in name and location from those which are conjunct also have among them varied signs to distinguish one group from the other. In addition, those [men] before Guido d'Arezzo who signed the lowest pitch of the disjunct system (as Guido shows in his Introduction) with a Greek gamma did not do that to honor or remember the Greeks as inventors of music, but because this pitch came an octave [away] from the lichanos meson, which was signed by them with this character of the Latin alphabet, that is, "G", in addition to the fact that the same thing had been signed on the very same pitch by the Greeks.

\[13\] Galilei's reference to chapter three is erroneous. He undoubtedly means Zarlino II, 30. See Zarlino, Istitutioni harmoniche, pp. 103-105.
DEMONSTRATION OF THE EIGHT MODES, ACCORDING TO THE OPINION OF BOETHIUS, TO THE STRINGS OF WHICH ARE APPLIED THE CHARACTERS ACCORDING TO THE USAGE OF THE ANCIENT GREEKS.
This matter confirms, according to what I said above, that they derived the notes added to the Greater [Perfect] System from the instruments which were in use in those times, since the double gamma in that place denoted the string of the instrument, not the sound of the voice.

Strozzi: For this reason, was not the signing of the notes with the characters of the Latin alphabet an invention of Guido, as Zarlino\textsuperscript{14} says in chapter thirty of the second part of his Institutioni?

Bardi: Probably not, and [to prove] that this is true, here are two examples of plain song which I have right here in a book written some decades before he was born. These, I want to transcribe for you according to the practice of today for the purpose of better understanding [Example 12.].

\textsuperscript{14}See Zarlino, \textit{Istitutioni}, p. 103.
Sit nomen Domini benedic-tum in se-cula

Ad-iu-to-ri-um nos-trum in no-mi-ne Do-mi-ni

[Example 12--Sit Nomen Domini]
Returning now to the demonstration which Boethius made of modes, I say that we must not fail to consider that in the eight systems, not more than three pitches are found to be common to each one of them. These are the extreme high [pitch] of the lowest [system], the mese of the Dorian, and the extreme low pitch of the highest [system], while in those [systems] of Ptolemy, none of them [are common]. It is probably true that from the characters of Alypius shown above, Boethius was led to believe and say that the modes of the ancient musicians not only were eight [in number], but that each one of these proceeded in its particular system by the order of steps which has been demonstrated in his description, because in that of Ptolemy, it is not possible for us to adapt that which is satisfactory in itself. In addition, he concedes not more than seven modes, and by excluding the Hypermixolydian he tactfully implies that it was no longer in use, nor should
it be used. Nevertheless, the characters of the Hypermixolydian which are found through the testimony of Alypius demonstrate to us the contrary. It will, therefore, perhaps not be unsuitable at all to say, for that reason, that Ptolemy and Boethius related the matter of modes to us with regard to the quantity, according to what they believed or according to the way they [themselves] had ordered and disposed them, rather than according to the truth of the matter and to their use. If, however, it is believable that Alypius had actually compiled the characters with which the ancient Greeks notated the pitches of their modes, which probably should have been seen no less from Ptolemy than from Boethius, nevertheless one must consider that if the order of the species of diapason which has been related by Ptolemy is actually the one by which the ancient Greeks numbered them, then the modes would not, according to them, be more than seven [in number]. [This was]
because if they had approved the Hypermixolydian, or any other [mode] above the Mixolydian, they would have taken, consequently, for the first species of the diapason, since it was higher, that which had served [this diapason], which, according to the order of Ptolemy would have been between Aa la mi re and a la mi re, and not between h mi and h mi. Because of this and the other things said above, all the intelligent men of today concur with this property in the modes of the ancient Greeks as explained by Ptolemy and not by the others, since he spoke of them with a greater basis than any who have written before or after him. From the same characters and from playing it on an instrument, you can also comprehend why I said above in the case of that song which commences, "Clangat hodie vox nostra", that it was in the Mixolydian mode. Next, you will find (in order to demonstrate the effigy, the form, and the habit) four ancient
compositions composed in the Lydian mode by one of the ancient Greek musicians. They were discovered in Rome by one of our Florentine gentlemen\textsuperscript{15} in the library of Cardinal Saint Angelo in some letters which were in the back of a very old handwritten book of the music of Aristides Quintilianus\textsuperscript{16} and Bryennius.\textsuperscript{17} He extracted them most faithfully, and was kind enough to send them to me in this same copy which I now freely give you.

\textbf{Example 13.}

\textsuperscript{15}Galilei is referring to Girolamo Mei, a noted philologist with whom he engaged in a long correspondence on the subject of ancient Greek music. For the text of this correspondence and an account of the influence of Mei upon Galilei, Bardi, and the Florentine Camerata, see Claude V. Palisca, \textit{Girolamo Mei: Letters On Ancient And Modern Music To Vincenzo Galilei and Giovanni Bardi} (Rome, 1960).

\textsuperscript{16}Aristides Quintilianus, who was probably contemporary with Augustus (B.C. 63–A.D. 14) was the author of an important treatise on music. It is in three sections, the first of which contains several examples of Greek notation. There is a German translation by Rudolf Schäfke (Aristides Quintilianus \textit{von der Musik}, Berlin, 1937).
Example 13—Greek Hymns to the Muse, to the Sun, and to Nemesis.
Initially, I wish to warn you concerning these that if in translating them according to this modern practice, you find any fewer characters, or any which are different in mode, and any movements [which are] out of the ordinary or unusual, blame the times and the little diligence of those who have copied them many times. This [sort of] thing has occurred (for the same reasons) to a thousand other important works. You should also know that the hypate meson was notated by Alypius not only with a large and small sigma, but also with this character, namely, "c". The same occurs with the parhypate meson. You should likewise observe that every time a lone syllable of the verse is sung beneath different notes, in the same manner as that which also is customary today in ecclesiastical plain songs. You [98]

17 Manuel Bryennius was a fourteenth century Byzantine author on music. The Greek text with a Latin translation of his Harmonics may be found in John Wallis, Opera mathematica, III (Oxford, 1699).
may transcribe these [examples] someday, for your own amusement (according to the usage of the modern practice, as I have said) by means of the characters of Alypius.

Strozzi: This is indeed a thing which I view with greater pleasure than any other ancient one I could [ever] see of this kind. I have desired for many years to see even the smallest trace of it. Now, thanks to your courtesy, I [can] now enjoy some examples, which I wish, at the first opportunity, to transcribe and apply, as you have said, to the modern practice, for the purpose of better understanding. From here, one probably should derive some particular names [as the] epithets of instruments, for example, Dorian cithara, Phrygian aulos, and other similar [titles]. Or is it yet possible that this resulted from the number of the strings of the lyre or from the quantity of holes of the aulos? That failing, did the differences of their names consist otherwise?
Bardi: These, initially, could result from the inventor of a thing, from the country, and from the excellence of the tibia player, that is, aulete, which Vergil makes manifest, when he speaks of Orpheus going to Hades to recover his beautiful Euridice. [Orpheus], as you know, was a Thracian, and, according to the opinion of Pliny,\(^{18}\) he was the inventor of the lyre. In that same place of the poet [Vergil]\(^{19}\) one reads this: "Having confided in the Thracian cithara". After Orpheus has been admitted to the Elysian fields, Vergil adds:\(^{20}\)

The Thracian priest in long vestments plays the seven differences of the strings, plucking them one time with the fingers and another, with an ivory plectrum.

\(^{18}\)Plinius, The Natural History of Pliny, 6 vols., translated by John Bostock (London, 1855), II, 231. "Amphion, or, according to some accounts, Orpheus, and according to others, Linus, invented the lyre."

\(^{19}\)Publius Vergilius Maro, The Aeneid, translated by James H. Martinband (New York, 1964), p. 117. "If Orpheus was allowed to redeem the shade of his wife, trusting the harmonious strings of his Thracian lyre . . . ."
And Ovid, in the case of the same priest, says that he plucked the strings of the Thracian lyre. From the words of these two illustrious poets, one gathers a new argument, in addition to those which were mentioned above, to persuade us that the lyre and the ancient cithara were the same thing, not only according to the Greeks, but also the Romans, and also that the strings of this instrument were plucked and not cut [i.e. bowed] as up to the present day has been generally believed. We will avail ourselves of those authorities when they are needed. Those epithets of Dorian cithara and Phrygian aulos also could have derived


Nor does the Thracian bard, apparelled in long flowing garments, Fail to awake from his lyre the varying notes of the octave. Striking them now with his fingers, and now with the ivory plectrum.

from [the fact that] such instruments were used a great deal by the people of those nations, or else, because speaking of wind and stringed instruments, the strings of the Dorian lyre were strung, and the holes of the Dorian aulos were arranged in a different manner from those of their Phrygian counterparts with regard to highness and lowness and to the steps of the scale. For, as I said above, these [Phrygians] sang a tone higher than the [Dorians] and the Dorians proceeded by other steps in a different species of the diapason from the Phrygians [who in turn proceeded] in their [own] particular system and mode. Thus, likewise, in the instruments which were indigenous to one province and the other, there probably resulted the same variety and difference which we said had resulted in their singing, and the strings or holes of the particular instruments were differently tuned.
strung or arranged in the same manner or in the same order as you have seen the pitches disposed in the [Greater] Perfect System. It would be a great absurdity to believe and say that they sang in one manner and played in another different one, as some [men] of our times have believed and said to be happening today. This is false, as has been demonstrated above with effective reasons. From the variety of these situations it results that those who merely know how to play the lyre and the pipe according to the usage of the Dori ans do not know, for that reason, how to play their Phrygian and Lydian counterparts, unless they first have learned them separately. For that reason, in the demonstration of modes disposed and ordered according to the opinion of Ptolemy, the higher species of the diapason are seen with lower modes and the lower species with higher ones, because they first had been sung in these

Zarlino\textsuperscript{22} in chapter 45 of the 2nd part of the \textit{Istitutioni}.

\textsuperscript{22}See Zarlino, \textit{Istitutioni}, p. 135.
species by their predecessors. The temperaments of the instruments were actually different from one another, a fact one can gather, among other places, from that which Athenaeus says with regard to Pythagoras Zacynthus, who flourished during the same years or a little after Pythagoras of Samos. That Zacynthus discovered that very beautiful, artificial instrument called the tripod, in imitation of the Delphic tripod. The tripod of the said Pythagoras had three faces. On each one was strung a

Athenaeus in chapter 15 of the 14th book.

Pythagoras Zacynthus and his ability.

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23 See Athenaeus, The Deipnosophists, 7 vols., translated by Charles Burton Gulick (London and New York, 1928), VI, 439-441, for a fuller description of the tripod and its manner of performance. See also, Henderson, "Ancient Greek Music," p. 396. "A certain Pythagoras of Zacynthus is said to have invented a pyramid of three citharae, tuned to the Dorian, Phrygian, and Lydian harmoniae, on a revolving stool which he kicked round with his foot as he played—but, as the source [i.e. Artemon ap. Athenaeus 637e-f] confesses this contraption may be apochryphal."
determined number of strings. On the first of those [faces], they were disposed according to the Dorian mode; on the second, they were arranged like the Phrygian, and on the third, they were ordered according to the Lydian. Whoever had heard it without having seen it played would have guessed [that there were] three different citharas. The use of this soon was lost because of its difficulty of being laborious. One can also comprehend from what we have said what the difference actually was which was found between the cithara and the lyre. It was nothing else but the different tuning concerning the size and order of the intervals, and the highness and lowness of the strings. The cithara, therefore, was that which played the low harmonies like the Dorian, and the lyre, on the contrary, was that which played the high ones like the Lydian and the Phrygian. From their difference came the proverb which I told

The difference between the ancient lyre and cithara.
you above. The discordant lyre of Polyphemus\textsuperscript{24} in the hand of Eumelos the Aeolian\textsuperscript{25} was perhaps considered as a cithara, while the tuned cithara of Orpheus in the hand of Neantius\textsuperscript{26} was considered as a lyre. I will also readily believe that when Philoxenus changed the Dorian mode into the Phrygian, necessitated (as has been said) by the nature of the dithyramb, that he did not position the cithara

\textsuperscript{24}Polyphemus was the cyclops, or one-eyed giant, who captured Ulysses and his sailors in Homer's Odyssey only to be outwitted and blinded by his captives. His lyre, as described by Lucian, was made from the bare skull of a stag, the antlers of which represented the two side pieces. At the top he had inserted a bridge across which the strings were stretched without tuning pegs. See William Tooke, Lucian of Samosata, 2 vols. (London, 1820), I, 340.

\textsuperscript{25}Eumelos was a victorious citharoedist in the Pythian games, according to a story which Galilei attributes to Lucian. See p. 806 below.

\textsuperscript{26}Neantius, the son of Pittacus, tyrant of Lesbos, stole the cithara of Orpheus from the temple where it resided, only to be detected through his inept playing of that instrument.
for a low sound (given, however, that the sound of the chorus was accompanying it) and did not position the lyre for a high sound, but only changed the quality of the intervals of the strings. While he first plucked the low strings of the fourth species of the diapason slowly in the Dorian [mode], he plucked the high ones of the third species rapidly in the Phrygian. Thus, the same instrument in the hands of skilled musicians was both lyre and cithara, and they could do that easily by seeking only a few strings in their songs, although Philoxenus was numbered among those who sought out more of them than the others, perhaps because he had discovered the very lowest one, the Hypodorian, after all the other species of harmonies. But now I return, as always, to more sensible opinions.

Strozzi: I believe that they could be improved somewhat, but tell me another matter in the case of the characters of Alypius. Did the same [characters] which
denoted the highness and lowness of the sound also have the power to demonstrate the length and brevity of the time which each syllable ought to be held underneath its particular extension of the pitch? Or else, as Zarlino\textsuperscript{27} says in chapter eight of the fourth part of his \textit{Insti-
tutioni}, was there another kind which had such a power?

Bardi: The value of their notes and characters was manifested by nothing else but the diversity of long and short \textit{[poetic]} feet of the verse over which they were placed. Those who say otherwise, deceive themselves very greatly.

\textsuperscript{27}See Zarlino, \textit{Istitutioni}, p. 307. Zarlino refers to other characters found by John of Damascus which were fitted to Greek ecclesiastical melodies in such a way that they did not signify the individual notes like the Alypian characters, but demonstrated instead the intervals which had to be sung. Every singable interval therefore had its own character, so that as the tone differed from the semitone, or the minor third differed from the major third, and the same for the others which ascend, thus, when descending, the characters were different from the ascending ones. The durations were included in all, so that one could arrange every composition under those characters with greater speed than could be done with the notes used in Zarlino's own time.
Strozzi: Thus, the ancient musicians had no more than two kinds of notes and time, that is, long and short. But tell me this also. When they first began learning to sing, is it not still to be believed that they began to say the words of the composition all at once but [said] the notes in the manner which is customary today? Now in those early stages, how are we to believe, by way of example, that they managed to hold together a chorus of young boys who were learning to produce their voices as every day occurs in the schools of masters of this practice or when a single pupil sings with his master, both of whom are holding the notes the same [length of] time? Because they only had knowledge of the measure and quality of the verse of the poet, and since the notes sufficed them for the moment in those early stages should they not have renounced it and come to call them by
those names? I do not mean to call them by those names which their authors originally gave them, for if any of them have to be uttered under a note or syllable they are [something] beyond long modes.

Bardi: I firmly believe that if in learning to produce their voices, they proceeded to howl, in a manner of speaking, without expressing any particular, specific name, first because the ancient Greeks were not found to have described the notes with names other than those which you heard previously, most of which are very long, as you said, and, indeed, because one of those names of theirs had to be uttered under a simple extension of pitch, for example, proslambanomenos, tritediezeugmenon, or another similar to these, it seems to me ridiculous even to think of such a thing. But this is to advise you that they continually used to sing with an instrument and rarely, if ever, was an instrument heard without the
voice, or the voice without an instrument. I am not saying by this that it continually happened that the same one who sang also played the lyre of the cithara, because there were very few who knew how to do that well and such persons were highly reputed and valued. In order to honor them, they were called citharoedists in differentiation from those who simply played without singing, who were called citharists. Among the first ones who were able to do [both] was numbered Thamyris of Thrace.28

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28 Plutarch, On Music, p. 359. "Thamyris, a native of Thrace, sang with the most beautiful and melodious voice of all men of that time, so that (as the poets say) he engaged in a contest with the Muses, and it is recorded that he composed a War of the Titans with the Gods." See Plinius, The Natural History, II, 231. Plinius credits Thamyris with the invention of the Dorian mode. See also Curt Sachs, The Rise of Music in the Ancient World (New York, 1943), p. 271. Sachs tells us that the Thracian Thamyris invited the Muses to compete with him and was blinded for his insolence. Homer also mentions Thamyris (Iliad, ii, 594-600).
Strozzi: The citharoedist must have consumed a great deal of time in composing his songs and committing them to memory in order to recite them afterwards, in front of the prince or the senate, or wherever it was necessary, because, according to what I have understood and read, it was not always a madrigal, a song, or a brief neapolitana that the ancient musician recited when he sought, according to his ability, to produce some important effect in the listener, but most of the time an entire history or fable, or some heroic deed or the like, in which he quite often spent one or two hours of time.

Bardi: It is not believable, particularly according to what one can gather from the example of Philoxenus, that the ancient singer-musicians were accustomed continually to compose their songs first, and then memorize them for recitation, but only that they had memorized the poem. This poem, most of the time, if not always, was composed by the same persons, because How the ancients composed their pieces.
the musician then was not detached from poetry nor was the poet separated from music. It would indeed have been too great an obligation and loss of time had they composed the melody first and then memorized it together with the words, and also [memorized] on what strings they were to be played. Therefore, when they had first considered very well the poetry, history, or fable (or whatever it was) in that tone (or mode), whatever melody was more fitting, they then sang to the cithara (so to speak) as an improvisation and a fantasia. This, too, is the custom of learned, practical contrapuntists (according to the usage of today, however) who are also players on the lute and on keyboard instruments. They do that when they sing solos for their own amusement with the accompaniment of these [instruments] except the one they are playing. These effects would be the same as the ones the ancients produced every time they expressed the conception
of the words in the manner which was said to be fitting, and [everytime] they removed the above-mentioned impediments.

Strozzi: This is all very well, but those who sang to the aulos could not very well play and sing at the same time, if they did not already have a goat skin full of air which was released little by little into the aulos while they were singing, or some bellows arranged under the armpits, like the one I have already seen on a singer at the Neapolitan shore. During the time he conversed with the spectators, he played an accompaniment very gently on his pipe of many auloi, pumping the air into it with such dexterity that it was detected [only] with difficulty by the spectators. In that manner, this bagpipe was being blown simultaneously with the playing and the singing. [Thus, the ancient auletes] actually performed in the same way as the blind man of Furli does today. As you have been able to see, he has a boy who pumps the air into
one of his direct flutes, and while he is singing various airs, he opens and closes one group of holes or the other with his fingers, according to the requirements of the melody. This is exactly the contrary of that which you said earlier concerning Marsyas, who, with his breath and with the same fingers, played two pipes at the same time.

Bardi: The musical selections which occurred among those who merely played an instrument and those who only know how to sing, or else when they had practiced the songs in that particular way, were most often short, simple melodies, the greater part of which had been created for no other reason than to satisfy the vulgar. Over the sound of these melodies, the same [thing] was repeated to each of two, three, or four verses in the same manner as that which we hear everyday when a capitolo is sung with the lute. [We

29 A capitolo is one of the various subspecies of the frottola, consisting of a number of three-line stanzas (rhyme scheme aba bcb cdc) sung to the same music. Sometimes the final stanza consisted
hear it also] in both the songs and the
dances of the plebeians, the rustics,
and others like them. This manner of
playing and singing was frequently
employed, together with the dance, by
the chorus of satire, that of comedy,
and that of tragedy. This [chorus]
sang, either with the aulos or another
instrument, that air which was most
apt to express the conception which
was then at hand, in the same way as
was related earlier concerning the
dithyramb.

Strozzi: Who was the first to
employ the instrument or the voice in
this manner?

Bardi: The auletes and the
citharists were, most of the time, the
ones who composed the melodies, and the
chorus proceeded to support them. While
the priests of Egypt, according to what

of four lines, the last of which was
sung to a different melody, a sort of
coda. See Willi Apel, ed., Harvard
Dictionary of Music (Cambridge, Massa-
Demetrius of Phaleron\textsuperscript{30} tells us, used their seven vowels in praising the gods instead of the aulos and the cithara, singing them over and over in a fixed order with softness of voice.

Strozzi: I do not understand the manner in which the Egyptian priests praised the gods with their seven vowels and used them instead of the aulos and cithara.

Bardi: The text of Demetrius in that place is very obscure with regard to this affair. Nevertheless I interpret it thus. The priests, in pronouncing the vowels with their voices, for example, as one produces the notes today, the chorus sang the praises of the gods to the sound of these. Thus, the priests, by uttering them distinctly with an articulate, commensurable voice, came to serve as a guide for the chorus and to

\textsuperscript{30}Demetrius, \textit{On Style}, translated by W. Rhys Roberts (Cambridge, 1902), p. 105. "In Egypt the priests, when singing hymns in praise of the gods, employ the seven vowels, which they utter in due succession; and the sound of these letters is so euphonic that men listen to it in preference to \textit{[aulos]} and \textit{[cithara]}."
perform the function of the cithara
and the aulos which many other nations
used. I submit this opinion, as all
the others, always to someone who
understands it better than I.

Strozzi: I am very pleased with
your interpretation, and thus, simi-
larly, the opinion of those priests,
since they have banished the aulos
from the songs of the chorus. For it
seems an important thing to me, Signor
Giovanni, that the mere sound of these
auloi, according to what I have read
in some authors, since they were made
from no other material than the shin
bones of cranes, of eagles, and of
vultures, omitting for the moment
those which first were made of barley
and oat straws, delighted the ear by

31 See Zarlino, Istitutioni, pp. 62-
64, for a comprehensive discussion of
ancient music. Much of the material
therein is paraphrased by Galilei in the
ensuing section of the Dialogo, especially
with regard to early wind instruments and
their use in the Greek and Roman theaters.
means of their piercing [quality] and their very high noise.

Bardi: The auloi which were made from the materials you have described were not universally used, but only by some particular nations, because those [which were made] of the shin bones of eagles and vultures were used in Scythia by the Androphagi, by the Arimaspi, and by the Malachei, and those [made of] barley straw [were used by] Osiris [worshippers] among the Egyptians. It was made, afterwards, by other nations from various kinds of cane, of lotus, of wood, of horn, of bronze, of silver, from the shinbones of an ass, or of a stag, from laurel branch, from elder-tree, from crude leather, and from other [materials]. Thus, through the diversity of size and materials, some of these came to render a small, high sound and others (according to what was needed) a large, deep one.

That which Papinius Statius\(^{32}\) says, as

\(^{32}\)This quotation from the Roman poet Statius comes from his *Thebaid* vi. 120-121. See also Bower, *Boethius*, p. 42.
quoted by Boethius, constitutes an argument that these [auloi] were so constructed, not with regard to the material, which is a trite matter, but concerning the size. Statius says, "The aulos with the heavy, hooked horn puts forth a bellow." In addition, one reads according to Plutarch\(^3\) that the Spartans used them in their armies. When the battle had first been ordered, they moved their soldiers in the proper step to the sound of these auloi and inspired them with the Castorean nome to come to blows bravely against their enemies. The Swiss and the Germans, moreover, move their armies with transverse flutes or fifes, as they themselves call them. For that reason, they do not use them alone, but together with

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\(^3\)Plutarch, *On Music*, pp. 411-412. "In meeting [the perils of war] some employed auloi, like the Lacedaemonians among whom the so-called Air of Castor was played on the auloi whenever in well-ordered ranks they advanced to fight the enemy."
the drums, in the same manner that the
people of Ireland are accustomed [to
employ] the cornamusa, that is, bagpipe.

In addition, the ancient Greek and Roman
actors recited their comedies and trag-
edies to the sound of the aulos and
the cithara. As the occasion arose, they

Aristotle in
problem 49, con-
cerning the parts
of harmony, and
Terence in the
inscriptions of
his comedies.

34 See Aristotle, Problems, pp. 414-415.

35 Directions for the different types
of "tibiae" or "auloi" to be used in
Terence's comedies are given, along with
the cast of characters, at the beginning
of each play. See Edward St. John Parry,
ed., PublII Terentili comediae sex (London,
1857), pp. 4-6, and passim.

36 Zarlino, Istitutioni, p. 64. "The
Romans used several kinds of 'tibiae' in
their plays, which they called 'dextrae'
and 'sinistre' [right and left] from which
the spectators could comprehend what type
of play was supposed to be acted. For
when the play contained serious, heavy
material or subject matter, one heard the
low sound of the 'tibiae sinistre'. Con-
sequently, when the play was gay and
festive, the sound which originated from
the 'tibiae dextrae' was shrill. If the
subject matter was mixed, the musical
compositions were tempered with both types
of sound. And such compositions were not
composed by the poet who had written the
play, but by one skilled in the art of
music, as one can see in the preface of
each comedy of Terence. And they were
varied in mode, that is, 'tonos', and
they were performed before the play was
begun, in order that the material contained
in it (as I have said) could be known in
would employ high, low, or middle [auloi] in this situation, according to the character of the persons who took part in them. And in order to prove this fact to you more extensively, Lucian in his De saltatione, [refers] to a certain man who represented the enraged Ayace with only the movement of his body without speaking as well. This Ayace, as you know, went insane with the displeasure which seized him, when beneath the walls of Troy the Greek chieftains pronounced the sentence in favor of Ulysses in disputing which of them should have the arms of Achilles, who had been killed in advance by the spectators. Nonetheless, in our times, such types of 'tibiae' are still unknown, even though Servius, in the ninth book of Virgil's Aeneid, commenting upon that verse, 'O vere Phrygiae', shows that there were two kinds, one of which he names serrane 'tibiae' and the other Phrygian. The serranes were equal and so were called 'pares', because they were of identical size. The Phrygians were called by him 'impares', because they were unequal in size. Servius then brings forward the authority of Marcus Varro, wishing to state the meaning of 'tibiae dextrae' and 'tibiae sinistriæ', saying that the Phrygian 'tibiae' has only one hole, the 'tibiae sinistriæ' has two, from which one acquires its high sound and the other its low sound."

[Lucian] in his De saltatione concerning Ayace.
the assault of that [city]. The imitator of that situation (who was no less excellent a dancer that Telestes\textsuperscript{38} was in representing the Theban war) was so accomplished in this [skill] that he did not seem [to be] one who was imitating the case of the unhappy Ayace, but that he actually was [Ayace] at the height of his fury. Therefore, having forcefully taken an aulos, that is, pipe, from one of the auletes who was on the stage, he used it to strike the head of the man who was playing the part of Ulysses, who was seated among the other [characters], so that he fell at his feet as if he were dead. If his hair had not offered protection from the force of [the blow], it would have killed him. When the dancer had perceived this, having suddenly regained his senses, he became angry with

\textsuperscript{37}For the story of the dancer of Ayace and a description of the Greek dance, see Lucianus, "De saltatione", in Julius Sommerbrodt, ed., Lucianus, 5 vols. (Berlin, 1893), Ila, 127-184.

\textsuperscript{38}See Athenaeus, \textit{Deipnosophists}, I, 95.
himself, so that he never wanted to take part in such games again, despite his excellence in them, although he was begged and persuaded many times by close friends. Now consider this! If an instrument made from the shinbone of a crane, a vulture, or an eagle is apt to kill men by striking [them] and its sound [is fit] to move armies in time and in order, then how does that epithet concerning bellowing like bulls apply, unless the birds which we have just mentioned were larger in those times than the elephants of today. 39 I will not dispute at present, as I would be tempted to do by this fine opportunity, whether [or not] the "equal" and "unequal" auloi took their names from the difference which existed between them with regard to the size of their reeds, or from the number of holes, or even from the number of these instruments.

39 Zarlino takes exception to this passage of Galilei, quoting part of it verbatim and then providing a vitriolic commentary. See Gioseffo Zarlino, Supplimenti musicali (Venice, 1588), p. 14.
which were played at the same time. I will not even discuss whether the "right" and "left" acoly acquired such distinctive names because they were held while being played in the right or the left hand, or even because the auletes stood sometimes in the right wing of the stage and other times in the left, or, indeed, whether they acquired them because of the relationship these auletes had with the spectators, for what was left to the auletes was right to them. The same thing happens between two opposing combatants. I will also refrain from disputing about fingers, whether the high sound, which is rendered by those of the right hand, pertains to the Parthenians, and the low sound, which is rendered by those of the left, pertains to the Hyper- telians, or if, indeed, the contrary is

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40 The Greeks possessed several sizes and pitches of pipes. The "parthenioi" or "girls" pipes were the sopranos, the "paidikoi", or "boys" pipes were the altos, the "teleioi", or "perfect" pipes
true]. [I will not argue] whether the auloi were "pares" when both were on the right and "impares" when both were on the left. Similarly, I will not argue, concerning the significance of the gingrines and the serranes, if the serranes, which took their name from the noisy, shrill sound which the saw makes while sawing, were the same as the Phrygian [auloi], and the gingrines, which took their name from the hoarse squawking and squeaking of geese, which were called "gingre" by the Phoenicians who discovered them, agreed with the Lydian [auloi], or if, indeed, the opposite was true. I will also abstain [from disputing concerning] what sound, with regard to high and low,

were the tenors, and the "hyperteleioi", or "super-perfects" were the basses. See Curt Sachs, The History of Musical Instruments (New York, 1940), p. 139.

41 For a fuller explanation of the gingrine auloi, see Athenaeus, Deipnosophists, II, 293-294. These instruments apparently were nine inches long and emitted a high-pitched, plaintive sound.

42 The name serrane seemingly derived from the Latin word "serratus", meaning saw-toothed. See Parry, Terentii comediae pp. 4-6.
rendered the "incentives"\textsuperscript{43} and which sound rendered the "succentives", and if the concentus of the "equals" required synodio, and that of the "unequals" or dissimilars required nomodio, and also what relation there was between the holes and the size [of the tube]. I will also omit [any argument] concerning the identity and effect of the low plagals, the high hypophorbians which the Lydians discovered, the monopipes of the Egyptians, and threnodies of the Phrygians, the therians of the Thebans, the super-perfects which were sung by choruses accompanied by the cithara, the high, plaintive parastretes, the \textit{bombici} and, [finally], the gamelial symphony. I will also not dispute whether [or not] the "cat spine", which originated mainly in Sicily, actually had the power, in killing

\textsuperscript{43}Sachs, \textit{Musical Instruments}, p. 140. Sachs probes the mystery of the terms "incentiva" and "succentiva" used by the Roman writer Marcus Varro to distinguish different types of the tibia [aulos]. Sachs alludes to an antiphonal situation with the "incentiva" as leader and the "succentiva" as response, but his argument is inconclusive.

Synodio means accompanied and nomodio means as a solo.

Threnodies were dirges. The Parthenians and the Hyper-telians were super-perfects.

Gamelial means mutual.
stags, to operate so mysteriously that the auloi made from the shinbones of these stags were afterwards raucous in sound. This, however, is according to what Antigonus relates to us in his Marvels. The same thing happened, according to Pliny, to those auloi made of elder, if they had heard the song of the rooster, not to mention other considerations. For, indeed, after having wearied myself greatly in that regard and after having discussed it many times with extremely learned men, I have never learned from them, nor from the authors who deal with these things in various considerations, how to derive anything but confusion from it. Among others, Pollux, Varro, Pliny, Donatus, Servius, and Terence in the inscriptions of his comedies, have felt, as

\[\text{Antigonus} \text{ in the 8th chapter.}\]

\[\text{Pliny in the 16th book at chapter 71.}\]

\[\text{Antigonus of Carystus was a biographer and worker in bronze who died after 226 B.C.}\]

\[\text{See Plinius, Natural History, III, 411.}\]
I do, that this power is indeed what you have understood [it to be]. I have carefully observed in many bronze and marble antiques (not in order to scoff, however) where some auletes in bas-relief are seen playing two auloi at the same time. They have the high [aulos] on the right, and the low [one] on the left, if we assume that the short, slender one is the high [aulos], which it probably is, and that the long one, which is larger than the other, is the low [aulos]. But enough has been said. I promise to speak at greater length another time about many things, with greater convenience. For example, I shall speak about all the wind instruments and also cover most of those materials which at present I am, in a

46 See p. 619, n. 43.
47 See p. 908 below.
48 Donatus was a Latin grammarian whose Ars minor was the leading text in his field for centuries.
49 Servius, as reported by Zarlino (Istitutioni, p. 64) provides information with regard to the Roman "tibiae". See p. 614 above.
manner of speaking, only pointing out to you. Now, returning to our principal intention, I say that the one who said the following did not, perhaps, deviate greatly from the truth. When the ancients learned, in the beginning, to produce their voices, they applied the sounds of [the voice] to the words of the verse by plucking at the same time that string of the instrument which was in unison with the voice, the string serving as a guide for the voice, and this opinion could also be supported by many other places in the [works of] serious writers, including what Boethius says in chapter twenty of the first [book] of his [De] musica, where he clearly manifests the diligence which the ancient musicians placed on the artificial instruments, from which, apparently, they learned to sing. Because

50 Much of the material concerning the addition of strings to the lyre by various historical or mythical figures, found later in this chapter, is also derived from Boethius I, 20. See Bower, Boethius, p. 72-83.
of this, they were rebuked many times for negligence by men of judgement. Speaking of remaining together with regard to the length and brevity of the time in holding their notes, when, in the beginning, they learned to sing, one could respond that they sang continually close to the words, as also is customary today. From these they could very easily comprehend the brevity and length of [the notes], for [the words] were something they most easily understood, since they were composed in their native language, and also because they were not ignorant of such a thing, for they attended to that art in which they were employed in a way other than the one which is customary today. They had, moreover, removed from the method of singing many difficulties and imperfections which are in use at present.

51 See Aristotle, Problems, p. 411, with regard to the question of staying together while singing.
for example, the variety of singable figures, the quantity of strings, the disproportionate mixture of modes which are sung all together at the same time, [and] the diverse mixture of genera, in addition to the other vanities mentioned above, which had been introduced against every propriety. It is unbelievable that it was necessary for the choir master of those times to beat time in the manner which is customary today, in order to hold the singers together. First of all, there is no authoritative record of it, as far as I know, nor do I see why they would need to beat time, since they did not sing more than one melody at a time and [since] there were those who sang as much as they wished, as we experience from the choir in church, especially the [one composed of] friars and monks [who sing] the antiphons, the responsories, the introits, the psalms, and, in summation, the whole of plainsong, there

The beat was not used by the ancient musicians.
was no need for so much diligence in maintaining all the voices in the same extension, united together under the very same rhythm. It seems to some, that one could derive a slight inkling or a shadow from the words which Plutarch uses in the end of the life of Demetrius with regard to Xenophantus the aulete, and the rowing of sailors, but since we consider this a frivolous matter, and one of no value in this affair, we will not mention it further.

Strozzi: Was every mode suitable to express any affection?

Bardi: One can argue from the example of Philoxenus that every mode was not suitable to express any conception

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52 Plutarch, Lives, 11 vols., translated by Bernadotte Perrin (Cambridge, Massachusetts and London, 1950), IX, 133-134. "Moreover, the most celebrated flute-player then living, Xenophantus, sat near, and with the most solemn melody upon his flute accompanied the rowers; to this melody the oars kept perfect time, and their splashing, like funereal beatings of the breast, answered to the cadences of the flute-tones."

53 See p. 556 above.
and to introduce in a person any affection, because the middle [modes], which are between the low [modes] and the high [modes], were suitable to introduce into the minds of the listeners a quiet, moderate disposition of affection, and in those subjects which were similar to them by nature or by chance, [these affections] were increased even more. The high modes were suitable for moving and uplifting [the minds of the listeners] and the low ones for inducing in them abject, weak, sad thoughts, in the same way that the number midway between fast and slow demonstrates a composed, quiet, dispassionate mind. The fast [number] shows an agitated, doleful mind, and the slow [number] shows a lazy, slow, fearful mind. All this variety results mainly from the different quality of the location, the sound, the quantity of it, and from the diversity of the rhythm with regard to the value of the time. For example, in the first case, one of these bore a low sound to the ear, and another, Number is the movement of the body when dancing.
a high one; in the second, the former brought a large, plentiful quantity, and the latter, a small, sparse one; the third [one of them] had rapid, short movements and numbers, and others had slow, long ones, in addition to those which then had each of these cases in between or nearer to one than the other. They operated these various properties either closer to or farther away from the middle or to one of the extremes, according to how great or how many they were and according to [the way] they found the subject disposed. For, like the painter, no matter how excellent he was, it would be impossible [for him] to represent to the sight a delicate face over a plank, canvas, or wall which was harsh, rough, and rugged to the touch with gross, hastily ground colors. In the same way, the musician was not sufficient, for all his great knowledge, to produce any important affection in a person, if he first had not removed the impediments.
and disposed [this person] to receive that from which he sought to introduce into him. All that happened through a defect in the subject, not one of art.

Strozzi: Did the Dorian mode have the same effect when it was sung in the diatonic genus as it did in the chromatic and in the enharmonic, or was it different? In which of the genera of harmony did this [Dorian mode] produce its effects more vigorously than that other mode?

Bardi: When the same [Dorian mode] was sung and played in the diatonic [genera], those effects which were virile and energetic were produced with greater efficiency than they were in the chromatic genera, and [they were produced with] less [effect] in the enharmonic. On the contrary, in the chromatic the soft and effeminate effects were more efficient than in any other [genera]. Since the lyric poet Timotheus had used the chromatic genera a great deal among the Spartans, this was the reason that they, as

Whether [or not] the Dorian mode sung in the diatonic genera had the very same power as [it had] in the chromatic and in the enharmonic.
lovers of serious music, drove him out of their territories. One should not be at all surprised that Timotheus [used the chromatic, for] it happens that his native land was an island of Greece called Miletus, the inhabitants of which were (according to what the histories say) lascivious, effeminate men, and (as I understand it) they still are today.

Strozzi: Was this Timotheus not the author of the said chromatic genera?

Bardi: No, Signor, not if you mean that Timotheus who lived at the time of Alexander the Great.

Strozzi: How can that be? It happens that regarding him in particular, Aristotle says these exact words.

If there had not been a Timotheus, we would not have so many kinds of melodies.

54 See Aristotle, Metaphysics (993b. 15-17), Richard McKeon, ed., The Basic Works of Aristotle (New York, 1941), p. 712. "It is true that if there had been no Timotheus we should have been without much of our lyric poetry; but if there had been no Phrynis, there would have been no Timotheus."
Suidas,\textsuperscript{55} secondarily, says this:

Timotheus, son of Tersander, changed the ancient music into a softer and more delicate form.

This is the proper nature of the chromatic compared to the ancient diatonic. It is quite true that he was attributed with blame by men of judgement, as one sees well according to the testimony of Boethius who seems to wish to infer the same thing when he says that Timotheus changed the ancient, serious music into the chromatic genera, which is softer. And finally, Zarlino,\textsuperscript{56} as you know, makes quite a long discourse about him in chapter thirty-two of the second part of his \textit{Institutioni}, in which he says clearly that not only did Timotheus discover the chromatic genera, but he [also] tells in what manner he was able to find it.

Bardi: Slow down, if you please!

In the first place, the words of the


\textsuperscript{56}See Zarlino, \textit{Istitutioni}, p. 108.
ancient writers to which you alluded did not conclude otherwise that Timotheus was the author of the chromatic, as it seems to you, but only, as Boethius clearly states, that since he was in Sparta, he turned the heavy, serious music, which he had received from the Spartans, into the chromatic, which is soft and effeminate. The use of this [mode] greatly blighted the early years of the boys, making them become thus, [that is, soft and effeminate]. For this, [Timotheus] was ordered by the Spartans into exile, as has been said, and so this particular Timotheus could not, under any condition, be the one who discovered the chromatic genera, as Zarlino says. There is clear indication that Olympus the Phrygian, pupil of Marsyas, lived before the Trojan war. To Olympus, as you will learn, is attributed the invention of the enharmonic, which, however, was after the use of the chromatic. Now you see how it can be that Timotheus, who lived so many
decades after Olympus, had first discovered the chromatic genera. In addition, in the decree which the Spartans made against Timotheus one reads, in the language in which it was written, these words:

Timotheus abandoned the enharmonic, reverting to the chromatic as softer and easier.57

Since I wish, therefore, that the account turns out according to your calculation, it is necessary to find a new Olympus or a new Timotheus to whom are attributed the inventions of the chromatic and enharmonic genera of harmony, and not melody, as Aristotle says. The word [melody] signifies a thing which is contrary to your feeling.

Strozzi: It is necessary that the fact remains as you say. Since this is not understood by modern musicians in this

57 For the full text of the decree against Timotheus, see Oliver Strunk, Source Readings in Music History (New York, 1950), pp. 81-82.
true form, it has caused them to say a thousand foolish things about it.

Bardi: So much for them! [Now], let us attend to the matter which we have undertaken, and say that the enharmonic according to Aristoxenus and Plutarch, was discovered, together with the nome called "curule", by the above-named Olympus, who also transmitted the method of singing in consonance with the aulos from Thrace to Greece, although Plutarch, in telling how Olympus found it, names only three pitches of the tetrachord,

The enharmonic was discovered by Olympus but in many times.

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58 Plutarch, On Music, p. 375-377. "Olympus, as Aristoxenus says, is supposed, by the musical experts, to have been the inventor of the enharmonic genus, all music before him having been diatonic or chromatic." They suspect that the discovery took place as follows. "Olympus was moving about in the diatonic genus, frequently making the melody pass to the diatonic parhypate, sometimes from the paramese and sometimes from the mese; and when he skipped the diatonic lichanos he saw the beauty of the resulting character, and hence, conceiving an admiration for the set of intervals, constructed on the analogy of this omission, adopted it, composing in this set of intervals in the Dorian mode, for it had no connection with the distinctive features of the diatonic or of the chromatic genus, or indeed of those of the enharmonic. Such were his first enharmonic compositions."
that is, the mese, the parhypate, and the hypate, omitting the lichanos. This situation makes me doubt that the two dieses called enharmonics were present to complete the number of the four strings of the tetrachord. These were constructed by someone else, or perhaps by the same one a number of years later. If the case were otherwise, it would seem to me an important thing, since it was an extremely powerful cause of changing the use of the diatonic and chromatic genera into the enharmonic, that Plutarch did not mention it in this regard. He only mentioned the elegance of the ditone in the compound mixture which one finds between the mese and the parhypate. This genera of harmony was mainly used by this Olympus in the Dorian mode, the melodies of which, according to the opinion of Aristotle, had the power to fill souls with divine fervor; this Olympus, moreover, was the first who played on the wind instruments in the manner which has been said. Archilocus, similarly, was the one who, before
everyone else, played on the stringed instruments. The enharmonic genera was used by the Greeks, mainly because of its majesty, in sacred temples to celebrate the praises and the honors of the gods. It is said to have been suitably accommodated to the voice, but for all this, it was always less virile and less natural than the chromatic, and more artificial than any other. Tones, necessarily have the very same force and effect in each of the genera, in proportion, however, to what the nature of each one will allow. The diatonic, then, which by nature is more common, and therefore natural, produced its effects, reasonably, more according to the natural

59 The Phrygian mode, not the Dorian, was the one which filled the soul with divine fervor. See McKeon, Aristotle, p. 1311. Speaking of music, Aristotle said that it must have influence over the soul if characters are affected by it. He also points out that the songs of Olympus exercise this power, for undoubtedly they inspire enthusiasm, and enthusiasm is an emotion of the ethical part of the soul.
instinct than the other two, of which the chromatic produces its effects more vigorously than the enharmonic, since it more closely approaches the diatonic than the enharmonic. The enharmonic is what was understood by Greek music. Because it was more regulated than the other two which were first, and had need of greater diligence in order to express well its affections, it was, for this reason, the last to come into use and the first to go astray (in order not to say, be lost) and the distribution which Aristoxenus made of it so many years after its origin was thus reputed to such an extent that the singer-musicians who came a number of centuries later, thinking that too much intricacy was being admitted into practice, said as an excuse for their ineptitude that that particular genera of harmony was a discovery of learned men, but it actually had never been put into practice, not noticing that in that instance

The enharmonic is what is understood by Greek music.

The enharmonic of Aristoxenus was greatly esteemed.

Ignorance of some ancient practical musicians.
they were coming to confess their ignorance. It did not seem possible to them to produce the voice so distinctly as they sought out its smallest intervals. What greater authority do they wish for this fact than that which Plutarch says, being a man of the truth and so recognized? He not only affirms that it was in use among the practical musicians, but that this alone was greatly reputed and practiced by the Greeks. These are the very words which he uses.

Why did the ancients not pay attention to the diatonic nor the chromatic, but only applied their mind and all their studies toward the enharmonic?

Besides, what vanity it would have been if Aristoxenus, [who was] such a friend of the senses, and others after him,

60 Plutarch, On Music, p. 435. "Of the three genera into which musical movement is divided, all of them equal in range and in the value of their notes, as well as of their tetrachords, the ancients studied only one, the enharmonic, our predecessors never considering either the chromatic or the diatonic, and again in this they considered only the one range, that of the so-called octave."
had made, so many years after its origin, so many new distributions if none had been put into practice! I have said that the modes necessarily have the very same power in all the genera, because they proceeded in each one, according to the nature of their system, either from low to high or from high to low. Since this alteration was a sign of intrinsic movement, it necessarily carried with it at all times the affection whence it originated, which others represented, as has been said, by this means.

Strozzi: Where is it that Clement of Alexandria following the opinion of Aristoxenus says (according to what I have read in some books) that the diatonic genus is sharper than the chromatic and the enharmonic?

61 The Stromata of Clement of Alexandria is printed in Jacques Migne, Patrologiae cursus completus (Paris, 1844-55).

Bardi: I do not know that one reads in Clement of Alexandria or in Aristoxenus an opinion so far from the truth. Those from whom you learned such a things must not have had any knowledge of the genera of harmony in order to say a naive thing like that. In addition, it is an impertinence to want to contradict with one authority or another the things which the senses can easily ascertain. Therefore, as a man, I intend to speak of natural, ordinary things and not of supernatural and divine [concerns]. It is quite true that the Alexandrian says that the enharmonic genera particularly agrees with the Dorian harmony, and the diatonic with the Phrygian, because it is indeed sharp, as Aristoxenus affirms. Perhaps these particular [men] could have wished to infer that the Phrygian mode, sung in the diatonic genera, is sharper than the Dorian sung in the chromatic and in the enharmonic, or else

63 See Zarlinin, Istitutioni, p. 302.
that the movable pitches of a tetrachord, and not of the whole system (as these \[104\] seem to understand) are more intense than those of the enharmonic and the chromatic in the same mode. But why such a vanity? Let me explain myself better. It seems impossible to those \[men\] that the Phrygian mode sung in the diatonic genera is sharper than the Dorian mode sung in the chromatic and enharmonic genera, only because they want to apply the manner of singing \[used\] by the ancients (which they do not understand) to the singing of today. But what person is so stupid that, although he understands how the modes of the ancient musicians were sung, and in what manner the strings are distributed in the three famous, old species of harmony, he \[still\] wonders about that?

Strozzi: I have understood everything very well, but tell me another thing. Would it be possible today in our mode of composing and singing to use each simple genera which made a good effect?
Bardi: [It would] from the diatonic on, but I do not believe that [it would] with each one of the nine species of this [diatonic].

Strozzi: For what reason?

Bardi: Mainly because of the harmonies which our practicing contemporary contrapuntists use between the different parts of their compositions. These harmonies are their basic principle and are not found so frequently between the pitches of the other two genera as in the diatonic, particularly in the synthetic species of Aristoxenus, and in that of Dydimus.

Strozzi: May it not displease you to reveal to me some of the difficulties which are opposed to the two other genera when one wishes to use them simply according to this new practice.

Bardi: The chromatic and the ancient enharmonic, among the many species that are found in each genera (omitting on the one hand the distributions which Aristoxenus made), are suited to give less
imperfection (according to this mode of composing today and singing in consonance, as has been said) than any of the others. Nevertheless, the diapente is not found in the first species of the diapason more than once, and this is between the hypate meson and the paramese. In the Greater Perfect System, it does occur more than three times in all, in addition to having its thirds and sixths dissonant, the majors as well as the minors. It is quite true that in the diatonic diatoniaion, one finds the fifth in each pentachord, excepting, however, that which is contained by the hypate hypaton and the parhypate meson. This thing happens in every other species of every genera. Besides, the ditone is not found in the chromatic between three pitches, nor is the semiditone found thus in the enharmonic. On the contrary, [they are also not found] in two places beyond that, since instead of them, there are major and minor seconds, which remain
dissonant just as their original ditones and semiditones were. For if the latter two were consonances, the former would be consonances also, as one can see and hear in one or the other diatonic syntones [which are both] encompassed by the chromatic and enharmonic pitches. The very same [thing] occurs in every other interval except the diapason, which is called, for that reason, queen of the consonances.

Strozzi: The same, according to what I have read and learned, ought to have happened [to] the ancients, and it must be that they also did not use them pure, but proceeded to mix one genera with the other as is customary today, and for the very same reason.

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64 Galilei's reference should be to Istitutioni, III, 77, instead of II, 77. See Zarlino, The Art of Counterpoint, p. 277-280. Zarlino maintained that the chromatic and enharmonic genera could not be used simply without being mixed with the diatonic, stating that no Greek or Latin author had ever mentioned their being employed separately.
Bardi: On the contrary, the ancients used in the purest and simplest [state] not only each of the three genera, but any of their individual species, which were numerous, because the excellence, not the imperfection of harmony and melody, actually consists of such simplicity as that, and those of today who believe, or have believed or written otherwise have greatly deceived themselves. [In order that you may see] that that is true, observe this! Originally none of the simple genera or species brought them the impediment of harmonies between the parts as [it did] to the moderns, because each of their songs, whether it was sung as a solo or by many, was a cantus firmus from which issued a single melody, no different from what we hear in church when psalms are sung during Mass, especially when the solemn [rite] is celebrated. This results from knowing very well, as has been said, that a low sound

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65See Zarlino, Istitutioni, pp. 105-107. See also Ibid., pp. 118-120.
has one effect, a high sound has another, and a middle sound has another. They know, in addition, that the contrary qualities which result from being mixed and mingled together weaken and in a certain way nullify each other's power, so that not only do they sing together the very same words and the same melody at the same time and with the same sound, in relation to highness and lowness, but in the same amount of time and with the very same quality of number and rhythm. This is because the supplicant pleads his case at a different rate of speed and utters his words with a different level of volume and voice than someone who possesses an untroubled mind, and the agitated man utters [his words] in a completely different way from both of these persons. [All of this] I have already told you on another occasion.

Strozzi: Did the ancient musicians, therefore, not sing in consonance?
Bardi: I am not certain [exactly] what I said to you recently [in this regard].

Strozzi: Did you not say a little while ago that Olympus brought [this practice] from Thrace into Greece?

Bardi: Yes, the mode of singing in consonance with the aulos.

Strozzi: Is this not the same thing?

Bardi: No, Signor.

Strozzi: What difference is there between them?

Bardi: Singing in consonance with the aulos in those times could not be other than [a situation in which] the aulete was playing one of his melodies and someone else sang the same melody while uttering the words at the same time, but with a different sound with regard to high and low, for example, at the octave or perhaps the fifth. Or else, it could be a case in which an aulete was playing a tenor in the low [range] while another [aulete] played
a part in diminution in the high range, in the same way the tiny aulos of the bagpipe does today over the bagpipe's drone. For the ancients used to say very often to sing by playing and to play by singing, and accepted equally the strings for their sounds, the aulos for its holes, and vice versa, but no one who has a good knowledge of music believes that two or more singers sang different melodies in consonance and at the same time in the manner which is customary today. In some choruses, however, the participants were youths, old men, ladies, young boys, and others, who because of the difference in their age, sex, and constitution, were not able to sing in unison when they all sang together. It is not because of this that they did not attempt, by nature and by art, with all their ability and knowledge to approach it more closely than they [actually] were able. It is probable and reasonable
that between their voices continually sounded octaves and fifteenths, but that happened through the natural indisposition of subjects and not from a rule, which in this situation had more regard for the possible than for that which was suitable and finest. One can comprehend this today from the choruses in the chapels of our churches where such a mixture of men occurs who have the very same objective in view, mainly, a cantus firmus. It is true that at present they are more corrupt than what is suitable, invited, perhaps, by polyphonic compositions; this did not happen in the former case for the alleged reasons.

Strozzi: If the singing was done by many people, all of whom simultaneously sang a simple song, then was it necessary, through books, to make such a commotion about their consonances?

Bardi: My answer to you is this. The sciences have a different procedure
and a different goal in operating which the arts do not have. The sciences are seeking the truth of situations and complete correctness of their subject, together with their causes, having as their goal the truth of knowledge and nothing more. The arts have as an operational purpose something different from understanding. The arithmetician seeks the correctness and the ramifications of numbers, for example, if they are equal, if they are unequal, if they are likewise equal, if they are squared, if they are cubes or perfects, what proportion they have with each other, how such results are obtained, and a thousand other things pertaining to them. One who calculates with an abacus, then, does not use any of these things, but only attends to multiplying, dividing, subtracting, and adding numbers and the parts which are derived from them, considering them in measures, or in values of some
subject and material. Do not be surprised, however, if the ancient musicians, even though the consonances were not related to their singing, considered their nature and effect. Although Aristotle deserv-edly demands only the perfect diapason, they do not perfect nor imperfect (so to state) any of these consonances in their singing as those who sang a slow melody did (as has been said) although it is certain that they did sing together. They had no need of this procedure, because the effect of their music consisted primarily in the fact that the melody of the song was composed by a good master, constructed with suitable materials, and performed by skilled persons whose voices were provided with natural, dependable equipment, since this master wished, according to the intention of his conception, to express [Aristotle], book 19, problem 35.

66 See Aristotle, Problems, p. 399.
that affection which he wanted to signify with the words. It was not found [to have] concords, fugues, diminutions, and various other unsatisfactory devices. In order to prove that this is true, it is incontrovertible evidence that one does not find any names which correspond to those which are used today to distinguish the parts, like bass, tenor, contralto, cantus, soprano, or others. One does not find that they even possessed the use of imperfect consonances, which, as you know, are important to the method of singing in consonance. In addition to the fact that Plutarch said to us a little earlier that Olympus and Terpander did not employ more than three or four pitches in their songs, and since we also saw the false comparisons of the two last genera which they had used so frequently, from this situation we can clearly comprehend how much those have


Reasons of the author for contending that the ancients did not sing in consonance.
deceived themselves who have simply understood by the word "harmony" the musical consonance of many voices, not unison, since the ancient Greeks called their airs and songs by this name. What these were has already been demonstrated. The ancient Greeks, therefore, understood harmony to be the beautiful, graceful progression of the melody of the composition. The words of this composition were understood entirely, and thus, the verse of the poet, and consequently their conceptions, without being interrupted accidentally by any which would sway the mind from their effect. This is the opposite exactly of what happens to the music and singing of today, because, in a certain way, it bears with it at the same time into the mind of the listener diverse, contrary notes of affection, while it mixes indistinctly together completely dissimilar melodies and modes of contrary nature, in addition to the difference of the words, the time, and the rhythm. Although each of these things
naturally had in itself the proper quality and force necessary to arouse and move the appropriate affections by means of its resemblance, nevertheless, it is not ordinarily able by itself to move any. On the contrary, it can manifestly appear (as has been said) to one who considers it rationally, that it does not have by nature a [single] way (let alone another) of being able even to consider it, because it is necessary that the force and effect of the melody, of high modes, and of rapid movement weaken and dull the vigor and power of low, slow ones. On the contrary, the qualities of the low, slow ones are mutually weakened and broken down by the opposite nature of the high, rapid ones. Because of this, the mind of the one who hears, having been distracted at the very same time (almost instantly) into opposite quarters by the mixture of the different notes which together resemble harmony consisted of the beautiful movement of the composition and the mode in the high and low parts of it.
proportionally diverse and contrary affections, is no longer able to be impelled by the force of any of these more to one affection than to the other, for if one violently pulls it in a certain way to one [side], the other pulls him back with equal forces. This is not unlike that which Colonna said, that is:

But here is a warning that none of those played nor sang in consonance who, by means of their singing and playing wished to produce any of those virtuous, marvellous effects mentioned above, and similar effects.

The Lacedaemonians devoted labor mainly to that simplicity of music, and persevered in it more than any of the others who worked on it including most of the nobles in the whole [country] of Greece. This good usage, by means of lascivious and delightful pursuits, was abandoned in progress of time and was lost altogether. Later, the false music,

68 See Fabio Colonna, La sambuca lincea (Naples, 1618).
rather than the true, was transmitted to
the Romans. I now return to the mixture
of genera and species of the ancient musi-
cians and say that no reference to this
is found before Ptolemy, who, compared to
these ancients, is modern in a certain way.
Let me add to this that before Ptolemy
such a mixture of various genera and
species was never actually in use nor
under any consideration. And that is
gathered from that which he himself says.
Moreover, Ptolemy explains that in his
time it was customary to mix together
some of the species of the diatonic and
chromatic genera. In this manner of
mixtures, which were four in number
as you will learn, he caused one of his
distributions to participate in each one,
in addition to similar mixtures of dif-
ferent species which he teaches, al-
though they had been used at his time or
before. Although they do not have a
thing in the world to do with our mode,
nevertheless it suits the comparison to
say that the ancients used them for the convenience of the concords between the parts.

Strozzi: May it not tax you to describe these mixtures to me, I pray you.

Bardi: There were, according to Ptolemy, four manners of mixtures, because, in his opinion, either the chromatic syntonon was mixed with the diatonic toniaion, or the soft, delicate diatonic was mixed with the diatonic toniaion, or else, the diatonic toniaion was mixed with the diatonic ditoniaion or the diatonic toniaion was mixed with the diatonic syntonon. Now consider that apart from the third manner of mixture where the ditoniaion partially participates, all the other species are creations of Ptolemy, being the same as the ancient diatonic. He attributed himself with the toniaion, [claiming it] as his own, although it originally

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In chapter 14 of the 2nd book.

Ptolemy claimed the toniaion as his own.

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69 See Ingemar Düring, Ptolemaios und Porphyrios über die Musik (Göteborg, 1934), pp. 89-98, for the mixtures of modes.
belonged to Archytas,70 not otherwise than what he did with the syntomon of Dydimus.71 Whoever believed as he did, that he himself was the author of these mixtures probably believed a thing which was far from the truth. Then he persuaded the craftsmen of his time to put this novelty into practice. In this usage there flourished neither that quantity nor that caliber of illustrious musicians which formerly had flourished. Concerning the practice as well, from that time on it pertained to the theater, and labor was devoted to little else. These things gave Ptolemy

70 Archytas, a Pythagorean philosopher of the fourth century B.C. from Tarentum, is mentioned in numerous ancient sources. See Athenaeus, Deipnosophists, II, 315, for mention of his aulos playing and his treatise on the aulos. For fragments of Archytas' writings, see H. Diels, Die Fragmente der Vorsokratiker, 3 vols. (Berlin, 1912), I, 334.

71 Dydimus (ca. 63 B.C.-A.D. 10) was an eminent musician of Alexandria. He is reported to have been the first to introduce the minor tone (10:9) and the major third (5:4) into the scale. See Charles Burney, A General History of Music from the earliest ages to the present period, 2 vols. (New York, 1935), I, 354.
even more occasion to rob some, rather the greatest part of his predecessors, who were worthy of the highest praise, already having (without respect and contrary to every propriety) blatantly insulted the distributions of Aristoxenus, in addition to those of Dydimus, of Archytas, and of Eratosthenes. This distribution was perhaps the most esteemed of all the others including the ancient diatonic and the two in the other genera which sprang from it. He also began to reprove and depurate this [distribution], saying that from the consonant intervals and the tone on, the others were not in superparticular proportion like those in the intense syntonic of Dydimus, which he had unjustly appropriated as his own. His only reason was that he reordered it in some manner. This [distribution], for all that, did not have that effect which he desired, because, as I have said, no reference was found concerning Many ancient musicians who were worthy of praise were reproved [by Ptolemy].
such a mixture of species nor any other mixture according to any writer except the same Ptolemy. Perhaps this had not even been put into practical use during his time nor after. Given that this is so, it must have failed to satisfy, which is an adequate reason that no reference to it was found. Now the method of the mixtures was as follows: in the [Greater] Perfect System, the first and highest tetrachord of the two high ones was the chromatic synttonon, and the second [tetrachord], less high, was the diatonic toniaion, and similarly, the first and highest of the two lower ones was the chromatic synttonon, and the second and the lower was the diatonic toniaion. The tone of the disjunction stood fast. The same [procedure] occurred in the other species.

Strozzi: From what you have made me look (in a manner of speaking) in the face, I perceive that I was in extremely great error to believe that the ancients

His mixtures did not have a thing in the world to do with the usage of today.
did not use the species of their genera unless they were mixed, because from your discourse I have understood the opposite, that they did not use them unless each one of them was in simple, pure form. In addition, if one wished to apply this mixture to our mode of composing, greater difficulty would be brought with regard to the false relationships of dissonant fourths and fifths, and not facility, as I believed. Even more difficulty would occur, since it was devoid of imperfect consonances. If I could have a particular example of each of the distributions made up to our time, it would be more than agreeable to me, on account of the knowledge which I could indeed derive from them. I would also be glad to know how many there were, by whom were they made, and how they were distributed.

Bardi: I have gathered all of them from one book or another with the greatest possible care and I have placed them in
the order which the variety of times in which they had been distributed and arranged by their authors permitted. The first of these to be made, omitting the oldest diatonic, chromatic, and enharmonic, were those of Archytas, almost concurrent with Timotheus. Aristoxenus lived soon afterward. Following these was Eratosthenes, and a long time afterwards, Dydimus. Not long after these came Ptolemy and then Boethius, whose distributions I presented to you as a gift. Without the knowledge and practice of these distributions, their mixture could not be understood well. Therefore, I now warn you that they were divided differently by their authors on account of their diverse designs and goals and not because they were all actually approved and accepted

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72 Eratosthenes, the noted Greek mathematician and astronomer of the third century B.C., is remembered musically for three string distributions, one in each genus of harmony, which were preserved in the works of Ptolemy.
into practice nor because some took precedence over others. For the great speculators judged according to their opinions of [the subject] and the general public then followed them to the extent that [such opinions] proved more convenient to them, with no other regard for their speculations or judgments. Boethius especially can testify to this, according to whom you see recited only the most common ones, including all the arguments about them which have been broached by Ptolemy and the others, who have [in turn] followed only the ones which were most used. And this usage has always remained steadfast, for, after all, men have wanted to use their singing voices despite all the opposition given them by those great intellects who have been named above, who wanted mainly to follow the reason of numbers. These were the Pythagoreans, who were therefore called harmonists.

Others who opposed the sense of hearing to the reason of these numbers were called canoners and canonists. They were the Aristoxenians. Some, then, wanted by a particular method to unite the Aristoxenians and the Pythagoreans together in such a way that among them there were no discrepancies in anything. They were the Ptolemaics, because they said that the judgement became refined and corrected when it seemed that sense and reason concurred in the very same opinion. Since their arguments were stated with the principles proposed, thus, one sect appeared different from the other.
[TABLE II]

DESCRIPTION OF THE HYPATON TETRACHORD,\textsuperscript{74} of any of the distributions made by the ancient musicians in each genera of harmony, with the names of their authors, concerning those which mutually agreed and concerning their differences. These, in all, make the number of twenty five, among which there are nine diatonics, nine chromatics and seven enharmonics.

The oldest diatonic diatoniaion tetrachord, the author of which was nature. \([\text{It was}]\) later followed by Pythagoras, by Plato, by Eratosthenes, and by Ptolemy who calls it ditoniaion. It was afterwards accepted by Boethius, by Guido d'Arezzo, by Franchino [Gaffurio], by Glarean, by LeFèvre, and by others.

\begin{align*}
\text{E} & \quad 6144 \quad \underline{\text{Sesquioctave}} \quad 768 \quad \text{Difference} \\
\text{D} & \quad 6912 \quad \underline{\text{Sesquioctave}} \quad 864 \quad \text{Difference} \\
\text{C} & \quad 7776 \quad \underline{\text{Super 13 partiente 243}} \quad 416 \quad \text{Difference} \\
\h & \quad 8192 \\
\end{align*}

\textsuperscript{74}The string distributions listed here are extracted from the Harmonics of Ptolemy. Compare J. Murray Barbour, Tuning and Temperament (East Lansing, 1953), pp. 16-21, where the string lengths are recalculated and the intervals are figured in ratios, parts (for Aristoxenus' distributions), and cents. See also Düring, Ptolemaios, pp. 89-99.
The diatonic tetrachord of Archytas which has its lowest interval in common with that of its chromatic and enharmonic; it is the same as the tonikon of Ptolemy, except the numbers, which are triple to it [in size].

<table>
<thead>
<tr>
<th>Note</th>
<th>Value</th>
<th>Interval</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>1512</td>
<td>Sesquioctave</td>
<td>189 Difference</td>
</tr>
<tr>
<td>D</td>
<td>1701</td>
<td>Sesquiseptima</td>
<td>293 Difference</td>
</tr>
<tr>
<td>C</td>
<td>1944</td>
<td>Sesquivicesimus septima</td>
<td>72 Difference</td>
</tr>
<tr>
<td>h</td>
<td>2016</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The diatonic tetrachord of Aristoxenus called intense, syntonic, content, and agitated, from which Aristoxenus was accustomed in his distributions to extract the portions of the size of the intervals, not from one string with the other. [This tetrachord] is, in effect, the same as the oldest [diatonic].

<table>
<thead>
<tr>
<th>Note</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>90</td>
<td>24 Sixty tiny parts of the entire fourth. Enharmonic diesis.</td>
</tr>
<tr>
<td>G</td>
<td>102</td>
<td>24 Sixty tiny parts of the entire fourth. Enharmonic diesis.</td>
</tr>
<tr>
<td>F</td>
<td>114</td>
<td>12 Sixty tiny parts of the entire fourth. Enharmonic diesis.</td>
</tr>
<tr>
<td>E</td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>
The soft, delicate diatonic tetrachord of Aristoxenus, divided in the same manner, but by other intervals.

<table>
<thead>
<tr>
<th></th>
<th>60</th>
<th>Sixty tiny parts of the entire fifth. Enharmonic diesis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>90</td>
<td>G</td>
</tr>
<tr>
<td>G</td>
<td>105</td>
<td>18 Sixty tiny parts of the entire fifth. Enharmonic diesis.</td>
</tr>
<tr>
<td>F</td>
<td>114</td>
<td>12 Sixty tiny parts of the entire fifth. Enharmonic diesis.</td>
</tr>
<tr>
<td>E</td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>

The diatonic tetrachord of Dydimus, divided into the same intervals as the syntomon of Ptolemy, but disposed in another order.

<table>
<thead>
<tr>
<th></th>
<th>96</th>
<th>Sesquioctave 9 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>72</td>
<td>Sesquinona 9 Difference</td>
</tr>
<tr>
<td>D</td>
<td>81</td>
<td>Sesquinoctavem 9 Difference</td>
</tr>
<tr>
<td>C</td>
<td>90</td>
<td>Sesquiquindecima 6 Difference</td>
</tr>
<tr>
<td>h</td>
<td>96</td>
<td></td>
</tr>
</tbody>
</table>

The diatonic tetrachord of Ptolemy, called equal and regulated.

<table>
<thead>
<tr>
<th></th>
<th>12</th>
<th>Sesquioctave 1 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>9</td>
<td>Sesquinona 1 Difference</td>
</tr>
<tr>
<td>D</td>
<td>10</td>
<td>Sesquioctavem 1 Difference</td>
</tr>
<tr>
<td>C</td>
<td>11</td>
<td>Sesquiquindecima 1 Difference</td>
</tr>
<tr>
<td>h</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>
The diatonic syntonic tetrachord of Ptolemy; which, according to the opinion of Zarlino, is that which is sung today; this opinion is refuted by the author.

<table>
<thead>
<tr>
<th>E</th>
<th>36</th>
<th>Sesquinona</th>
<th>4 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>40</td>
<td>Sesquioctave</td>
<td>5 Difference</td>
</tr>
<tr>
<td>C</td>
<td>45</td>
<td>Sesquiquindecima</td>
<td>3 Difference</td>
</tr>
<tr>
<td>h</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The soft and delicate tetrachord of Ptolemy.

<table>
<thead>
<tr>
<th>E</th>
<th>63</th>
<th>Sesquiseptima</th>
<th>9 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>72</td>
<td>Sesquinona</td>
<td>8 Difference</td>
</tr>
<tr>
<td>C</td>
<td>80</td>
<td>Sesquivesimus</td>
<td>4 Difference</td>
</tr>
<tr>
<td>h</td>
<td>84</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The tetrachord of Ptolemy, called toniaion and tonikon; it is the same as that of Archytas.

<table>
<thead>
<tr>
<th>E</th>
<th>504</th>
<th>Sesquioctave</th>
<th>63 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>567</td>
<td>Sesquiseptima</td>
<td>81 Difference</td>
</tr>
<tr>
<td>C</td>
<td>648</td>
<td>Sesquivesimus septima</td>
<td>24 Difference</td>
</tr>
<tr>
<td>h</td>
<td>672</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The hypaton tetrachord of the ancient chromatic, whose intervals that are common with the diatonic are from the ditoniaion; it is the same species as that which is marked in the hyperbolaion tetrachord, the inventor of which is unknown to the author.

<table>
<thead>
<tr>
<th>E</th>
<th>6144</th>
<th>Trihemitone</th>
<th>Super tripartiente 16</th>
<th>1512 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>7296</td>
<td></td>
<td>Super quintaspartiente 76</td>
<td>480 Difference</td>
</tr>
<tr>
<td>C</td>
<td>7776</td>
<td>Limma h</td>
<td>Super 13 partiente 243</td>
<td>416 Difference</td>
</tr>
</tbody>
</table>

The chromatic tetrachord of Archytas, whose lowest interval is common with its diatonic and enharmonic.

<table>
<thead>
<tr>
<th>E</th>
<th>1512</th>
<th></th>
<th>280 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>1792</td>
<td></td>
<td>152 Difference</td>
</tr>
<tr>
<td>C</td>
<td>1944</td>
<td></td>
<td>72 Difference</td>
</tr>
<tr>
<td>h</td>
<td>2016</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The chromatic tetrachord of Aristoxenus, called soft and delicate, in its first species.

<table>
<thead>
<tr>
<th>a</th>
<th>90</th>
<th>Mese</th>
<th>Super 13 partiente 45</th>
<th>22 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>112</td>
<td>44</td>
<td>Index (Lichanos)</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>116</td>
<td>8</td>
<td>Sesquivicesimus octogesimas</td>
<td>4 Difference</td>
</tr>
<tr>
<td>E</td>
<td>120</td>
<td>8</td>
<td>Next to the highest mese, trite</td>
<td>4 Difference</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sesquivicesimus nonogesima</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Highest trite</td>
<td></td>
</tr>
</tbody>
</table>
The chromatic tetrachord of Aristoxenus called toniaion and tonikon; it is the same as that of Eratosthenes.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>108</td>
<td>36 Sesquiquinta 18 Difference</td>
</tr>
<tr>
<td>F</td>
<td>114</td>
<td>12 Sesquiduodevicesimus 6 Difference</td>
</tr>
<tr>
<td>E</td>
<td>120</td>
<td>12 Sesquiundevicesimus 6 Difference</td>
</tr>
</tbody>
</table>

The chromatic tetrachord of Aristoxenus called hemiola and sesquialtera, perhaps because its two lowest intervals are in sesquialtera [proportion] to those of its enharmonic.

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<tbody>
<tr>
<td>a</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>111</td>
<td>42 Super 7 partiente 30 21 Difference</td>
</tr>
<tr>
<td>F</td>
<td>115</td>
<td>9 Supertripartiente 115 4 Difference</td>
</tr>
<tr>
<td>E</td>
<td>120</td>
<td>9 Sesquiventitresima 5 Difference</td>
</tr>
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</table>

The chromatic tetrachord of Eratosthenes. It is the same as the toniaion of Aristoxenus, except in the consideration mentioned above, concerning the size of numbers of the pitches.

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<tr>
<td>E</td>
<td>180</td>
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<tr>
<td>D</td>
<td>2160</td>
<td>Sesquiquinta 360 Difference</td>
</tr>
<tr>
<td>C</td>
<td>2250</td>
<td>Sesquiduodevicesimus 190 Difference</td>
</tr>
<tr>
<td>h</td>
<td>2400</td>
<td>Sesquiundevicesimus 150 Difference</td>
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</tbody>
</table>
The chromatic tetrachord of Dydimus, some of whose intervals are common with his diatonic, is considered by Zarlino \(^7\) in chapter forty-six of the second part of his *Institutioni* as the one which is used today, and which, in addition to first having refuted both it and its author Ptolemy, he has badly distributed, since he claimed in that place, as in other places, that the sesquioctave was capable of no more than the major and minor semitones of the synttonon.

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<tr>
<td>E</td>
<td>120</td>
<td>Sesquiquinta</td>
</tr>
<tr>
<td>D</td>
<td>144</td>
<td>Sesquivesimusquartas</td>
</tr>
<tr>
<td>C</td>
<td>150</td>
<td>Sesquiquindecima</td>
</tr>
<tr>
<td>h</td>
<td>160</td>
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</table>

24 Difference

6 Difference

10 Difference

The syntonic and intense chromatic tetrachord of Ptolemy in its first species.

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<tbody>
<tr>
<td>E</td>
<td>4158</td>
<td>Sesquisexta</td>
</tr>
<tr>
<td>D</td>
<td>4851</td>
<td>Sesquiquindecima</td>
</tr>
<tr>
<td>C</td>
<td>5292</td>
<td>Sesquivivesimus</td>
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<tr>
<td>h</td>
<td>5544</td>
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</table>

693 Difference

441 Difference

252 Difference

The soft and delicate chromatic tetrachord of Ptolemy, whose intervals common with the diatonic are from the second species of his toniaion.

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<tbody>
<tr>
<td>E</td>
<td>505</td>
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<tr>
<td>D</td>
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<td>C</td>
<td>135</td>
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<tr>
<td>h</td>
<td>140</td>
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The hypaton tetrachord of the ancient enharmonic, discovered by Olympus, and used by Boethius in the hyperbolaion tetrachord as the ancient chromatic.

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<tbody>
<tr>
<td>E</td>
<td>6144</td>
<td>Super 17 partiente 64</td>
</tr>
<tr>
<td>D</td>
<td>7776</td>
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<tr>
<td>h</td>
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The enharmonic tetrachord of Archytas, the lowest interval of which is common with its chromatic and enharmonic.

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<td>h</td>
<td>2016</td>
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The enharmonic tetrachord of Aristoxenus which, in effect, is the same as that of Eratosthenes and corresponds with the chromatic tonikon.

<table>
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<th>Frequency</th>
<th>Difference</th>
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<tbody>
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<td>a</td>
<td>90</td>
<td>48</td>
</tr>
<tr>
<td>G</td>
<td>114</td>
<td>6</td>
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<td>6</td>
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<tr>
<td>E</td>
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The enharmonic tetrachord of Eratosthenes. It is the same as that of Aristoxenus and agrees with the chromatic tetrachord of the same Eratosthenes.

<table>
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<th>Note</th>
<th>Frequency</th>
<th>Difference</th>
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<tr>
<td>C</td>
<td>156</td>
<td>4</td>
</tr>
<tr>
<td>h</td>
<td>160</td>
<td>0</td>
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</table>

The enharmonic tetrachord of Dydimus. This agrees in its two lowest intervals with his chromatic tetrachord.

<table>
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<th>Note</th>
<th>Frequency</th>
<th>Difference</th>
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<tbody>
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<tr>
<td>D</td>
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<td>5</td>
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<tr>
<td>C</td>
<td>155</td>
<td>5</td>
</tr>
<tr>
<td>h</td>
<td>160</td>
<td>0</td>
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</table>
### Enharmonic tetrachord of Ptolemy.

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<tr>
<td><strong>E</strong></td>
<td>276</td>
<td><strong>Super 23 partiente 92</strong></td>
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<td>69 Difference</td>
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<tr>
<td><strong>D</strong></td>
<td>345</td>
<td><strong>Sesquivicesimus tertias</strong></td>
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<td>15 Difference</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>360</td>
<td><strong>Sesquiquadragesimus quintus</strong></td>
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<td>8 Difference</td>
</tr>
<tr>
<td><strong>h</strong></td>
<td>368</td>
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The enharmonic tetrachord of an anonymous person.

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</tr>
<tr>
<td><strong>E</strong></td>
<td>4620</td>
<td><strong>Sesquiquarta</strong></td>
<td></td>
<td>1155 Difference</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>5775</td>
<td><strong>Sesquivicesimus unus</strong></td>
<td></td>
<td>275 Difference</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>6050</td>
<td><strong>Sesquiquinquagesimus quintus</strong></td>
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<td>110 Difference</td>
</tr>
<tr>
<td><strong>h</strong></td>
<td>6160</td>
<td></td>
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Strozzi: I thank you very much for the favor and for the courtesy you have shown me by giving me such a fine collection of each of the distributions which have been created up to today, and which you have arranged with so much care and discrimination. Before we depart, however, from the matters pertaining to these, tell me if it was possible to make from the other [distributions] which were different from these, any other effects, and if it is probable that, before the last two genera were found, the composers proceeded in their diatonic compositions by ditones and semiditones.

Bardi: With regard to making new distributions which made good effects which were different from those of the ancients, I do not believe that they could be made more proportionately than those you have seen, unless we did not wish to use the high intervals of tetrachords in the places of the low intervals and the low intervals in the places of the high ones, but I

Whether [or not] it is possible to make new distributions.
doubt, when the system of the Dorian mode, for example, commenced in some way with the tritone, that it would produce any other effect different from its original nature, let alone, a good one.

Strozzi: For what reason do we believe that the ancients arranged the tetrachords in one manner more than another?

Bardi: I said to you in the beginning that when the ancient speculative musicians found the proportion of the minor semitone, that is, limma, they extracted two tones from the diatessaron, and what remained they called minor semitone. Now because in extracting the sesquioctave from the sesquitertia, it is more likely and reasonable for one to take it from the high part than from the low. On the contrary, in augmenting it, one adds to the high part and not to the low, because of seeing that in diminishing it, it becomes taut. For the same reason, therefore, the tetrachords in

If in diminishing or augmenting the interval, one diminishes or augments in the high part or in the low part.

[112]
diatessarons were constituted of two tones in the high part, and not in the low. One could also seek, given this opportunity, [to learn] why the most famous and the oldest constitution, which is that of the Dorian mode, commences on A re and ends on Aa la mi re, rather than on two other pitches. In response to this I say, briefly, that it resulted more by chance than by design, as you will see clearly as our discussion progresses. With regard, then, to whether they proceeded by ditone and semiditone in their diatonic compositions, there is no doubt [that they did]. And [this happened] not only before, but also after the two last genera were discovered and in use. To prove that this is true, there is the example of the ancient compositions, which provides incontrovertible proof. The singable intervals which were never used in the diatonic genera were not more than three in number. Before these came under consideration by men, they could not in any way be put into

Why the system of the Dorian mode commences with A re. Whether [or not] proceeding by ditone and semiditone was permitted in the diatonic genera.

Which intervals were not used in the diatonic.
practice, and afterwards, they were unsuitable since it was a reasonable thing that they remained individual and specific to the genera from which they derived origin, if for no reason, in order to distinguish these intervals from the others. Two of them were peculiar to the chromatic genera, and the other [was] enharmonic. The interval which was properly enharmonic was the diesis, called also by the Greeks tetartemoria,\textsuperscript{75} which is the smallest singable interval. Aristotle\textsuperscript{76}

\begin{quotation}
William Harris Stahl, Martianus Capella and the Seven Liberal Arts (New York and London, 1971), pp. 206-207. "Among quarter tones there are three sizes: the first, a smaller one, is called 'tetartemoria' by reason of the fact that it measured a 'fourth part' of a whole tone; it is also known as the 'enharmonic interval' because it is a basic step in constructing the enharmonic genus of musical movement; the second, a larger interval, is called 'tritemoria', consisting of a 'third part' of a tone, it is known as the 'chromatic interval' because it is the basis of the chromatic genus; the third size consists of a quarter part of a tone and a half part of a quarter tone, and is called the 'hemiola' of the enharmonic division."

See McKeon, Aristotle, pp. 836-837.
\end{quotation}
believes that it is common measure with every consonant interval of his times (called perfect consonances today), just as unity is common measure with any number. By this diesis, he undoubtedly means that of the enharmonic of his pupil Aristoxenus, since the semitone is composed of two of these [dieses] and the tone is composed of four. This is not true of any other diesis. But if it is true that in that place the philosopher [Aristotle] understands by diesis that interval which we have mentioned, it will not only be common measure with any perfect consonance, but with imperfect ones [as well], and also [with] dissonances of the diatonic syntonon, the chromatic toniaion, and the enharmonic of the very same Aristoxenus. This matter will greatly verify and amplify that which Aristotle understands in that situation. While he does not mention consonances otherwise, nor perfect or imperfect dissonances (as some
of the modern translators would have it) one can gather that from the very words of the text, and they are as follows:

In astrology, however, this one is principle and rule, for they suppose the movement of the sky to be equal and very rapid, according to what the others believe. In music, it is the diesis, because it is the smallest thing, and elemental to the voice.

And this particular diesis is, according to what we have said, the smallest singable element, the comma (omitting the schisma from consideration) is likewise the smallest sensible one. I repeat that the particular, specific chromatic intervals were the trihemitone and the semitone, which is called major by many. I did not mean by this the apotome, for I would be in error, but what is in each case its second interval, the tone, and the enharmonic diesis. In addition, I doubt greatly (although this is contrary to the common opinion) that it was lawful in any genera of harmony to proceed in its system through the tone of the disjunction, since it is common to every

77See Zarlino, Istitutioni, p. 142.
species of every genera, and not subjected, along with the very lowest tone [proslambanomenos], to alterations, as all the others are which are not contained by stable pitches of tetrachords. This opinion is repugnant to that which Zarlino 78 says in chapter seventy-five of the third part of his Institutioni, for he claims that the major tone is peculiar to the diatonic, which, according to what I have shown, is not precisely true. If the diatonic which he believes is sung today indeed had its own, specific tone, that tone would then more likely be minor than major, but this does not happen in any way. I do not want to omit another matter which I recall, because those who reputed it true and of some importance are aware of the good standing of its author. The fact is that even if the diatonic which is sung today were truly that which Zarlino contends it is, he still


79 See Zarlino, Istitutioni, p. 142.
should not render thanks as if he had discovered it. It happens that that particular opinion (even though it has not been approved, due to its impertinence) was carefully written by Lodovico Fogliano\textsuperscript{80} sixty or seventy years ago in the second section of this \textit{Musica theorica}. There is no other difference between them than in the quantity and proportion of semitones, in which case both of them are equal.

\begin{quote}
\textsuperscript{80}See Lodovico Fogliano, \textit{Musica theorica} (Venice, 1529), Sectio II, fol. Xlv. Fogliano disparages the limitation of consonances to the octave, fifth, and fourth by the Pythagoreans, saying: "Although this standpoint is based upon the highest authority, it nevertheless seems false since it contradicts the sense of hearing. No one can deny that many other consonances can be found in addition to the previously mentioned [three]. For does one not find within the diapason, besides these, the semiditone, the ditone, the minor hexachord, and the major hexachord? Similarly does one not find above the diapason the diapason plus semi-diatessaron--these were established by Ptolemy-- not to mention the diapason with a major hexachord? In addition, these consonances which we are adding are the ones called by practitioners minor third, major third, minor sixth, major sixth, minor tenth, major tenth, eleventh, minor thirteenth, and major thirteenth? No one can deny that all these are genuine, most pleasing consonances."
\end{quote}
mistaken, as everyone can clearly see who has full account of this matter. The fact that the two above-mentioned intervals ultimately were sung in each genera of harmony is manifested decisively in their string distributions, among which they are found, as everyone knows who possesses any knowledge of the situation. I do not even know what reason there was to prohibit the proceeding by ditone and semiditone in the diatonic ditoniaion before the two last genera of harmony came into use, nor do I know any reason for prohibiting it afterwards.

Strozzi: It seems thus to me also, but as I see it, the apotome was never put into use by the ancient practical musicians.

Bardi: I am not certain, because it is, as I told you, an interval which is considered only as a relation in comparing the tritesynemmenon of the conjunct system with the paramese of the disjunct. I want to make an end of this case by warning you
that simply calling the interval which is in the middle of each of the tetrachords of the ancient chromatic by the name of major semitone, without adding what genera it is, could add a certain amount of difficulty and confusion, since this is not something which, having been added to the minor [semitone], completes the tone as the apotome and the limma do. It would not be unsuitable, however, after extracting [it] from that [tone], to call it a major chromatic semitone, and not (for the reasons mentioned) merely major semitone, although they did not ever want to say that this is the major semitone which is found in use in the chromatic, and the apotome that which is in effect as a relation in comparing (as has been said) the tritesynemmenon with the paramese.

Strozzi: This has been a valuable admonition, and since you now have removed every difficulty concerning modes, species, and genera of the distributions,
I would be pleased if you were willing to tell me minutely the way the situation developed with regard to the augmentation of the strings of the lyre and cithara of the ancient musicians to so great a quantity, since they had no more than three or four in the beginning, for I hope with your aid to clarify many things which cause me to doubt greatly.

Bardi: All this affair has been expounded by Boethius\(^8\) in the most excellent order and clarity, so that you will obtain any clarification you may desire from his words. There is no other difference between him and the ancient Greek musicians

8\) See Bower, Boethius, p. 72-83. The following discussion concerning the addition of strings to the Greek lyre is largely a paraphrase of Boethius I, 20. Boethius, in turn, bases his discussion on Nicomachus (Jamus, Scriptores, pp. 244-245; p. 256; pp. 266, 268; p. 274). For contrasting opinions with regard to the tuning of these strings see Sachs, The History of Musical Instruments (New York, 1940), pp. 131-135; Otto Gombosi, Die Tonarten und Stimmungen der Antiken Musik (Copenhagen, 1939), pp. 33-77; and R. F. Winnington-Ingram, "The Pentatonic Tuning of the Greek Lyre: A Theory Examined," Classical Quarterly, VI (1956), 169-186.
This instrument, according to the opinion of most of the ancient writers, was ordered by this [Mercury] with four strings and no more, in imitation of worldly and elemental music, which had been strung there, according to the opinion of this Boethius, in the disposition which you will learn. From the first (beginning with the low [part] according to this learned writer, as has been said) to the second string was a diatessaron. From [the second] to the third was a sesquioctava (or tone). And from the third to the fourth and last was another diatessaron, so that the first with the third and the second with the fourth sounded as a diapente, and the outer strings as a diapason.84 This opinion, according to the view of some judicious and learned men, which I would like for us to accept also departs greatly from the manner of singing of those early times and, consequently, from the truth.

84 See Bower, pp. 72-73.
This is not at all reasonable, the cause of which we will show with authority at the proper place. Therefore, it is necessary to say that Mercury also wanted, according to the opinion of others, that the lowest string, being first on the lyre and more worthy than the others, be known as hypate \[\text{highest}\], since Jove, his father, had been called by that name and since that title had also been given to the consul. This string was also attributed to Saturn, since his laziness greatly agree with its low \[\text{quality}\]. He named the second parhypate which means after or next to the hypate. He named the third lichanos, because the Greeks referred by this name to that finger of the hand which is after the thumb, and it is that which was then called index by the Romans because it demonstrated nothing else but the fact that this string was the first which was touched and plucked by that finger in being played. This thing is seen to be in use
also today by players of certain instruments whose strings are touched and plucked by the fingers. We will add to that consideration this one, according to the opinion of Aristoxenus,\textsuperscript{85} which is that it was so called because the intervals of the tetrachord in the middle of which it was located demonstrated whether the distribution was diatonic, chromatic, or enharmonic. This property was not constituted with reason in the meson tetrachord, since it was the first known, the most famous, and that in which, before all the others, had been distributed the strings of the two last genera of harmony. On the contrary, these genera had been discovered in [that very tetrachord]. One can also argue from what has been said that the strings of the lyre were first plucked with the fingers rather than the plectrum. It also came about that the fourth and last string was given the name of mese,

\textsuperscript{85}See Macran, \textit{Aristoxenus}, pp. 202-204.
the meaning of which is nothing but "middle". As the immortal god had foreseen, that particular string was ordained to hold the middle place in the Greater Perfect System. Nothing was ever added to this cithara, nor was the tuning of any one of its strings changed up to the time of Orpheus, but these strings were maintained between the proportions which we have described, and which are seen here, notated in the example [Diagram XII.]. The strings in this demonstration have been distributed according to different opinions, but what is most probable and reasonable will be mentioned at the proper place, as has been said.
[DIAGRAM XII]

THE LYRE OF MERCURY, TEMPERED ACCORDING TO DIFFERENT OPINIONS

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<td>C</td>
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<td>e 6144</td>
<td>E 6144</td>
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Fourth of Boethius Zarlino Plutarch Bryennius
Then came Corebos, \(^{86}\) son of king Atys of Lydia, by whom the fifth string was added to the above-mentioned cithara. He called it paramese and trite from the location; paramese, because it was beside the mese, and trite, because it came third in the synemmenon tetrachord in which, as you will learn, its position was established. Therefore, he began to enumerate the strings of the high part of the tetrachord as the ancient Greeks were accustomed to do, and not according to Boethius. It seems that the liberties [taken by] this great prince emboldened Hyagnis the Phrygian\(^{87}\) (original author of playing on the aulos and father of the audacious Marsyas\(^{88}\)) to add the sixth string to

\(^{86}\)See Bower, p. 74. Corebos, also known as Toroebus, Torebos or Torrhbebos, was also alleged by some ancient authors to have invented in Lydian mode (Plutarch, *On Music*, p. 385). See also Gombosi, *Antiken Musik*, p. 42.

\(^{87}\)Bower, p. 74. Athenaeus, *Deipnosophists*, VI, 365, attributes the invention of the Lydian mode to Hyagnis. For further discussion see Gombosi, p. 42.

the cithara, which he called paranete. Afterwards, Terpander of Lesbos [was likewise emboldened] to add the seventh string. By doing this, he precipitated the loss of the cithara, because the ephors, who were very strict Laconians, took it from him and suspended it on top of a very high column, at the foot of which was read the reason for that action. Terpander called the string he had added to the cithara the nete, which signified in that language what in ours means "inferior" and "below".

If, however, Hyagnis the Phrygian was the first, as they say, to play the aulos, one could argue from that that the cithara had been in use before him, Apollo, lost his skin, while King Midas, who had acted as the umpire, was given ass's ears."

89 See Plutarch, Moralia, 15 vols. (London and New York), III, 427. "If anyone presumed to transgress in any way the rules of the good old music, they would not permit this, but even Terpander, one of the oldest and the best harp-players of his time as well as a devoted admirer of the deeds of heroes, the Ephors none the less fined, and carried away his instrument and nailed it to a wall because he put in just one extra string for the sake of the variety in the notes; for they approved only the simpler melodies.
although there seems that [this hypothesis] has in itself some difficulty with respect to the artifice of the cithara and the simplicity of the aulos. But this single consideration in that regard is sufficient for now. When the lyre had been arranged with the number and limit of the said seven strings, it was then strung in the manner which is seen described in the example [Diagram XIII.]. These [strings] were divided into two conjunct tetrachords, giving the name of meson to the low one and to the high, the names of synemmenon and synaphe, which mean nothing else but "conjunct". It is probable (in my opinion) that these three strings were added to the said lyre and cithara in the briefest space of time, one after the other, since no mention is found between this [lyre] of seven strings and that of four strings that the Greeks had another instrument with the name of lyre, except the quadrichord of Mercury and the heptachord of Terpander, as you have learned. It is
[DIAGRAM XIII]

HEPTACHORD SYNNEMMENON OF TERPANDER

<table>
<thead>
<tr>
<th>Tetrachord Synemmenon</th>
<th>Tetrachord of Mercury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 d 3456</td>
<td>7 E 6144</td>
</tr>
<tr>
<td>2 c 3888</td>
<td>6 F 5832</td>
</tr>
<tr>
<td>3 b 4374</td>
<td>5 G 5184</td>
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<tr>
<td>4 a 4608</td>
<td>4</td>
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<td>5 G 5184</td>
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<td>1</td>
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<table>
<thead>
<tr>
<th>6 of Terpander</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 of Terpander</td>
</tr>
<tr>
<td>6 of Hyagnis</td>
</tr>
<tr>
<td>5 of Corebos</td>
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<tr>
<td>4</td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

Nete
Paranete
Paramese and
Tritesynemmenon
Mese
Lichanos
Parhypate
Hypate
quite true that we know from the testimony of Julius Pollux\(^{90}\) that the Arabs discovered one which was different from that, the trichordon\(^{91}\) which was then called pandura by the Assyrians, and that the Scythians, before any others, used the pentachord. In this regard, however, Boethius speaks particularly about the lyre of the ancient Greeks although he changes their order of naming the strings, as I have said. Furthermore, I maintain that all three strings were added to the cithara on the same day, and this is the reason which impels me to believe this. The son of the Lydian king could not logically have named the string which he had added to the cithara "paramese" or "trite" when no others had been mentioned afterwards, because trite, \([\text{in that case}]\) not only purported to signify the third of something, but also (as you will learn)


\(^{91}\)See Sachs, *Musical Instruments*, p. 137, with regard to the trichordon or pandura.
the third of those which did not exist.
In addition, that name of paranete, which
Hyagnis the Phrygian gave to his string
means "after the nete", and as yet there
was no nete. Nete, then, is that which
has been said above, so that whoever be-
lieves (resting on the significance of
the words, which is as much information
as one can derive from Boethius concern-
ing this fact) that such an undertaking
was planned by these authors in contem-
plation of some great prince, does not
perhaps believe something unreasonable,
unless we wish to add that, until they
reached the number of seven [these
strings] did not have (which seems closer
to truth) any proper names. In fact, it
is quite true, according to the testimony
Plutarch\textsuperscript{92} gives, saying this: "Terpander
gave the citharistic laws proper names and
also the strings". In this situation the
admonition seems to be that Plutarch called

\textsuperscript{92}See Plutarch, \textit{On Music}, pp. 359-371,
with regard to the origin of the instru-
mental laws [nomes]. Galilei's discussion
of these nomes is based principally on Plu-
tarch's testimony.
them citharistic laws, not citharoedic, because of the difference which was mentioned above between one and the other.

Strozzi: For what reason were they called laws?

Bardi: They were so called as if they had been prescribed by law, since it was not permitted to change in any way the adjustments of the strings and pitches in which they had been disposed and arranged by this Terpander. Their names and parts were these, that is, beginning, principal, change, after the change, umbilicus, seal, and epilogue.

In imitation of these, Clonas,\(^93\) an extraordinary aulete, first gave the laws to the aulos, the names of which (according to the same Plutarch) are apothetos, elegoi, comarchios, schoinion, Cepion, dio, and trimeles, or, to put these also in our own language in order to know them better, we will say that apothetos means the same thing as "secret". Elegoi,

which is derived from elegy, means the same as "mourning" and "crying". Comarchios means the "leader" of the village or of the banquet. Schoinion signifies the same thing as "measuring [device]". Cepion is a proper name and means, in this instance, the very same as Terpandrian and Hieracian among the laws of citharists. Dio means "two" and trimele means "three songs" or "canzonas", or else it seems to signify to us with the number of three, [the combination of] singing, playing and dancing, which they frequently used all at once. In order to state it better, it was that nome of Sakadas the Argive which I mentioned earlier called tripartile. For a more complete understanding of these laws, you should know that not only did the ancient musicians have particular, specific [laws] for the wind instruments and stringed instruments, but they had them for anything else which was related to both sorts of instruments. Each one
of these took its name either from rhythms, as the Orthian and the trochaic, or from modes, or else customs, as the high pitched \( \text{oxys} \) and the tetraoidios [four-songed]. Others took their names from their inventors and from peoples, as the Aeolian and the Boeotian, that is, the Terpandrian and the Hieracian just now mentioned. In another instance they took their names from the material with which they dealt, such as the Pythian battle and the curule. This will suffice for now with regard to the laws of musical instruments. You ought to know also that the citharistic laws were composed by the same Terpander in verses and published. This singular citharoedist played on stringed instruments with more marvellous an artistry than any other [performer], and he also added new modes to his verses and to those of Homer by way of particular rules. In summation, these were the first men to give laws to stringed instruments and wind instruments.
Lasus\textsuperscript{94} was the one who, before anyone else, discovered the warlike dithyramb, and the one who wrote (in the time of Darius, king of Persia) many volumes pertaining to the art of music. I must not fail to tell you another consideration about the matter of increasing the strings of the lyre. It may well be that the lyre of Mercury, with only four strings, was employed by men in that simplicity up to the time of Corebos. Having practiced on it and found it very lacking in strings (which was the truth regarding the expression of conceptions), he added one in that place which was not only in conformity with the natural mode of singing which was used in the province in which he was born and which he ruled, but [in that place] where it was necessary, and this was the high part, as you will learn

\textsuperscript{94}\textit{See Bekker, Suidae Lexicon, p. 649, with regard to Lasus of Hermione, whom Suidas established as a contemporary of the Persian King Darius who lived 521-485 B.C.}.
at the proper place. The sixth [string], as has been said, was added afterwards to the same part by Hyagnis the Phrygian, and thus the strings were maintained without an individual, specific name until Terpander came. Since the men of those times probably had distinguished them, during those years, with the names of first, second, and third, like the Spaniards do today with those of the lute, this Terpander, being the knowing man that he was, having added the seventh [string], gave suitable names and laws to each one of them. What has been said is also probable with regard to the consideration which Aristoxenus makes about the name of the string "lichanos", for if when it acquired this name, no other species of harmony except the diatonic was in use, then the power which Aristoxenus had attributed to it would be totally vain and useless, which is unthinkable. The length of time which passed, then, concerning this affair was the result of my desire to advise
you about it, knowing what knowledge can be derived there. However, I have not found a [single] definite thing which is worthy of remembering, only the greatest confusion. Consequently, I judge that it is much better to adhere in such matters to that which the writers tell us, without looking any further. These [writers] have at times made incidental mention of one musician or another in describing his life or in recounting a deed of some prince in whose employ they were, as has happened also to many of the ancient poets. From the first example of the cithara with four strings, in the third of which (in the opinion of Plutarch, however) is found that which was then called paramese, being accepted thus today, and from the example with seven strings in the fifth of which is located that which they then called tritesynemmenon, one can derive the knowledge of which of the two was first in use, the h mi or the b fa, speaking now as a pure practical musician. Those who Which string was first in use, the h mi or the b fa.
do not proceed to investigate more carefully this case which has so often been disputed haphazardly in our times, will give a verdict in favor of those who maintain that the h mi was in use before the b fa. Nevertheless, the opposite will be gathered from what I am to tell you a little later. The lyre, therefore, was confined to such a limit when Orpheus came and customarily played it both with his fingers and with the plectrum, as Vergil advised us above. The musicians of those times applied each of these [strings] to one of the errant stars [planets]. There were, however, some philosophers of the opinion that the sound of the low strings corresponds to the largest planets, because of the slow motion which these [strings] have compared to their slowness and size; and the [sound of] the high [strings] through their

delicacy and speed of movement, owing to the intensity of the bodies from which it proceeds, [corresponds] with the lowest [planets], since these also have these qualities. Others, on the contrary, believed that the low strings corresponded with the lowest spheres and the highest [strings] with the loftiest [planets]. The Ptolemaics were in accord with these [second authorities], and so was Cicero, when he considered the [heavens], whereas the Pythagoreans, considering the motion of the planets and the capacity of their sky, were in agreement with those [first authorities]. According to these diverse opinions, one sees quite often in stringed instruments that when they are being held in the arms [of their players] the bass and tenor strings are sometimes reversed.

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96 Düring, Ptolemaios, p. 136.

with the alto and soprano strings, in order to apply their various schemes to a modern instrument, and another time they are reversed in the opposite way. Since, however, the cithara of those times (in a manner of speaking) did not have body, or to say it better, depth, and since, as on the harp, one could play as much on one string as on the other, this variety of position did not cause them the difficulty which it would bring today to players of the lute and the viol if practiced in only one way. Then Lycaon of Samos\textsuperscript{98} came and added the eighth string to the cithara, although Pliny\textsuperscript{99} attributed this invention to Simonides, which he placed between the paranete, and the paramese which was also called trite,

\begin{flushright}
Lycaon of Samos added the eighth string to the lyre. This [deed] is attributed by Pliny to Simonides. Lycaon applied the string which he added to the heaven of the fixed stars.
\end{flushright}

\textsuperscript{98}Bower, Boethius, p. 75. Bower asserts that Lycaon may have been Lycon of Tarentum to whom a Pythagorean work is attributed; see Diels, Die Fragmente der Vorsokratiker, ed. Kranz (9th edition; Berlin, 1960), I, 57, pp. 445-446.

\textsuperscript{99}Plinius, Natural History, II, 231.
and also because it was third from the nete (when one begins to count from the extreme high part and moves toward the low according to their method, as I have said) they gave it the name of trite, which, for the above-mentioned reason was quite suitable. He attempted to apply this string to the heaven of the fixed stars. The resultant instrument they then called the octochordon of Lycaon of Samos in differentiation from the heptachord of Terpander the Lesbian with regard to the number of strings.

These strings were then disposed on this instrument in two disjunct tetrachords; because of this disjunction it was fitting that the high tetrachord gave up the name of synemmenon and took in its place [the names] of diezeugmenon and diezeuxis, which meant "separated". The eight strings of the said instrument therefore corresponded with the proportions which are represented by the numbers of the below-placed example [Diagram XIV.], and the cithara was in The meaning of diezeuxis and diezeugmenon.
[DIAGRAM XIV]
OCTOCHORD DIEZEUGMENON OF LYCAON

<table>
<thead>
<tr>
<th>Tetrachord Diezeugmenon of Mercury</th>
<th>Tetrachord Meson</th>
<th>Tone of the Disjunction</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
</tr>
<tr>
<td>1 e 3072</td>
<td>7 d 3456</td>
<td>6 of Hyagnis</td>
</tr>
<tr>
<td>2 d 3456</td>
<td>8 of Lycaon</td>
<td></td>
</tr>
<tr>
<td>3 c 3888</td>
<td>5 of Corebos</td>
<td></td>
</tr>
<tr>
<td>4 b 4096</td>
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<tr>
<td>5 a 4608</td>
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<tr>
<td>6 G 5184</td>
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<td></td>
<td></td>
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<tr>
<td>8 E 6144</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nete
Paranete
Trite
Paramese
Mese
Lichanos
Parhypate
Hypate
this form in the time of Aristoxenus, as he himself testified. In this diagram, one must consider that when Lycaon placed the string which he had added, between the paramese and the paranete, it came to occupy the position of that of Hyagnis the Phrygian which was (calling it according to this new practice) C sol fa ut, and to sharpen it so much that it became d la sol re. The very same [thing] happened to that of the law-giver Terpander, because, since it was d la sol re on the heptachord, it became e la mi on the octochord, which was called thereafter the Dorian nete of Terpander, and thus it was maintained in the Greater Perfect System. Then, when that string which Corebos of Lydia had added was sharpened by an apotome, while on the heptachord it was b fa, on the octochord it became h mi, so that with regard to the order, the eighth [string] came to the place of the sixth, the sixth to the place of the seventh, and the seventh to the place of the eighth. It is probable (due to the

Considerations of the author.

Dorian nete of Terpander.
novelty of the distribution) that it was held for a short period of time at that number of strings. Next, came Prophastus Periotes,¹⁰⁰ or, perhaps, Perinto, and there added the ninth [string], although, according to Pliny,¹⁰¹ this was the invention of Timotheus the Milesian. Pliny, in so doing, was probably influenced by what you told me above about this Timotheus according to the opinion of the philosopher [Aristotle].¹⁰² He [Prophastus] placed this string in the low part, beneath the hypate, with regard to sound, but above concerning the location, and he named it parhypate from its position. From this fact, one can argue that when the lyre is held by the arm in being played, the lowest strings face upward (like those of the lute) and not the contrary. The strings of that instrument

¹⁰⁰ The name Prophastus appears in Boethius as Prophrastus (see Bower, p. 77) and in Nicomachus as Theophrastus (see Janus, pl 274).
¹⁰¹ Plinius, II, 231.
¹⁰² McKeon, Aristotle, p. 712.
were afterwards compared with the chorus of the nine muses and they called it enneachord. Prophastus placed the string which he had added to the lyre in the low part for no other reason than in order to have (as one sees in the below-placed example [Diagram XV.], the mese in the middle of [these other strings].

The enneachord was compared with the chorus of muses.
Shortly thereafter, Estiacos of Colophon came and added, still in the low part of the cithara, the tenth string. After that, the lyric poet Timotheus added to that place the eleventh string, although Suidas gives the honor of both to the same Timotheus, and others claim that he added from the seventh up to the eleventh strings, perhaps on account of the above-mentioned authority of Aristotle, or, indeed, because of that decree which the Spartans once made against Timotheus, shortly before which (according to what Plutarch tells us) one of their ephors had publicly cut off those strings, which had been added to the cithara, upon the stage of the theater. Since, however, he did not correct himself, but shortly afterwards made a larger number of holes

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103 The name Estiacos appears as Histiaeus in Boethius (see Bower, pl 78) and also in Nicomachus (see Janus, p. 274).

104 Plutarch, Moralia, III, 238. "Moreover, when Timotheus was competing at the Carneian Festival, one of the Ephors took a knife, and asked him on what side he should cut off the superfluous strings beyond the usual seven."
in the aulos, or persuaded the auletes of his times to do that (if, however, he was the same Timotheus, as most of those who have written of this affair claim) and since he had rendered the music more delicate and more varied than it was when he first received it, they banished him at last [from their borders] as a destroyer of the ancient, serious music. Afterwards, he entered the service of Alexander of Macedon. From this it manifestly appears (contrary to the opinion of some) that one punishment was given to Timotheus when he added one or more strings to the cithara, and another when (as those say) he invented the chromatic genera. One can also comprehend from this that the writers have made mention indistinctly of Timotheus the citharoedist and Timotheus the aulete, as I indicated to you a little earlier.

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105 See Zarlino, Istitutioni, p. 108, for a description of Timotheus' innovations, trial, and banishment.
Strozzi: May it not burden you to remind me of the contents of that decree, I pray you.

Bardi: The summary of the decree, according to the way Boethius recites it (although in the language in which it was made, it sounds otherwise, as has been said) was as follows: Since the Spartans were angry with Timotheus the Milesian because, by rendering music more varied, he harmed the minds of young boys and prevented them from [attaining] the modesty of virtue, and because he turned the simple harmony he had received into the chromatic genera which is more delicate (as you just now said speaking of [Timotheus]), his exile gave the Lacedaemonians occasion to summon at great expense Thaletas Gortyn of Crete, author of paeans, in order to teach their young boys the discipline of heavy, serious music. Through his efforts, the same Lacedaemonians were, in addition, freed from the

Decree\textsuperscript{106} of the Lacedaemonians against Timotheus.

\textsuperscript{106}For the text of the decree against Timotheus, see Bower, pp. 36-38.
plague, and thus, likewise, the Argives. It was customary for the ancients to punish severely transgressors of the laws and, on the contrary, to reward greatly good men and lovers of these [laws], and this custom endured for a long time, particularly among the Greeks. From the acquisition of the two strings, moreover, which were mentioned above, the musicians of those times created a new tetrachord on the cithara in the low part, which they called hypaton from the name of the strings which composed it. I admonish you, however, that they named the hyperhypate of the enneachord lichanos hypaton in the endecachord, and joined it with the parhypate by thrusting it toward the high part by a tone. They left to the fourth string, which was then called pene suprema, the same name which it had at first, but accompanied by this word, meson, in the same way as

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107 During, pp. 66-68.
108 Macran, p. 198-208.
all the others in its tetrachord. The fifth [string] they called parhypate; the sixth [they called] lichanos, its original name; the seventh, mese; the eighth, paramese; the ninth, trite; the tenth, paranete; and the eleventh and last [they called] nete. They ordered and disposed this number of strings in their endecachord into two conjunct tetrachords in the low part and one [which was] separated from [the lower two] in the high part. In the opinion of Ptolemy, this constitution of strings occupied the space of a [perfect system], since in those times (says he) only the three modes were in use, that is, Dorian, Phrygian, and Lydian. These were always more famous and esteemed than the others. After complete knowledge of the fifteen strings was gained, or, to say it better, after they had been generally accepted by everyone, being divided and arranged in four tetrachords, they
afterwards called this constitution the
greater perfect disjunct system. They
named that [distribution] with eleven
strings (to distinguish it from the one
with fifteen) the lesser imperfect sys-
tem, lesser with regard to the number
of modes and of consonances, since it
lacked the diapason plus diapente, the
disdiapason, and the three species of
the octave which later served as plagal
modes. All this manifestly appears in
the following example [Diagram XVI.].
Calling the low tetrachord hypaton
(from the added strings which composed
it) and the middle [tetrachord] meson,
they named the high tetrachord diezeug-
menon (since it was separated from the
two lower ones by the space of a tone)
from the effect [of being detached]. I
cannot possibly imagine, however, in
this instance, how Ptolemy\textsuperscript{109} could
say that the cithara of eleven strings
could be required [to be] the perfect

\textsuperscript{109} Düring, p. 68-72.

\[118\]
[DIAGRAM XVI]
ENDECACHORD OF TIMOTHEUS THE MILESIAN

Diezeugmenon Tetrachord

1 c 3072 7 of Terpander
2 d 3456 6 of Hyagnis
3 c 3888 8 of Lycaon
4 h 4096 5 of Corebos

Tone of the Disjunction
5 a 4608 4

Meson Tetrachord of Mercury

6 G 5184 3
7 F 5832 2
8 E 6144 1

Hypaton Tetrachord

9 D 6912 9 of Prophastus
10 C 7776 10 of Estiacos
11 h 8192 11 of Timotheus

Netediezeugmenon
Paranetediezeugmenon
Tritediezeugmenon
Paramese
Mese
Lichanosmeson
Parhypatemeson
Hypatemeson
Lichanoshypaton
Parhypatehypaton
Hypatehypaton
system, which we have stated according to his opinion. It happens that Philoxenus was the one who invented the Hyperdorian harmony (as has been proved) which was the last to be discovered, and it was before the cithara had this number of strings, as one can comprehend from what we have said above. I believe that this constitution is the one which Boethius designated between the proslambanomenos and the nete synemmenon.

Strozzi: Another doubt occurs to me in this case, and it is this. If Epigon discovered the epigoneion, an instrument of forty strings, and he lived, as you have said, in the time of Socrates, master of Plato, how marvellous or novel [in comparison with this] will be that [benefit] which Timotheus brought us when he added a string in the low part to the decachord of Estiacos of Colophon!

Bardi: Initially, you should know that in the times of Epigon, as in others, [Boethius] in the 14th chapter of the 4th book.

Doubt.

Resolution of this [doubt].

there were many sects\textsuperscript{111} of musicians among which is numbered that of Damon. According to the testimony which Plato makes concerning him, he was master in music to Pericles and [lived] in the same times as Socrates. In those days the sect of Eratocles also flourished and also that of Agenore. These [sects] had different opinions about the practice of music. [The followers of Agenore] believed that one played and sang in consonance. [The Eratocleans], on the contrary, prohibited it as a pernicious thing. Others claimed that one played but did not sing [in consonance]. The record, moreover, which the writers retained of the work of Timotheus resulted from the novelty which he brought into the place where he was then found, which was among Lacedaemonians of extreme severity, the mortal enemies of any alteration of the statutes already approved in

\textsuperscript{111}The various sects of Greek musicians are discussed by Aristoxenus in the first book of his Harmonics. See Macran, pp. 166-169.
the republic by the senate. Although the sect of Epigon had first (in a manner of speaking) infected many parts of Greece, such novelty was brought to the Lacedaemonians by Timotheus, because of which they charged against him all you have learned. If the number of strings of the instrument of Epigon and, likewise, the distance which Aristoxenus said existed between the Hypertelian and the Parthenian auloi of his times, so that there was an interval greater than the terdiapason from the extreme low pitch of the Hypertelian auloi to the extreme high pitch of the Parthenians, would not seem to be effective arguments to persuade you that one played in consonance, at least this truth will convince you. [I refer to] that which Socrates and Plato advised and commanded (mainly to nobles) in the Laws, that is, "one

112Macran, p. 179.
should play and sing proschorda and not symphony". This precept would have been vainly advised and commanded if no one had played and sung in consonance in that century. I believe, with what I have said, that I have not only dispelled your doubt, but also the opposition ultimately made to Ptolemy.

Strozzi: You have spoken very well. Continue, however, and tell what is needed to understand the addition of the other strings to the cithara.

Bardi: Since the eleven strings which have been shown, had been reduced, either by the musicians named or by others, to the number of ten by taking away the netesynemmenon and putting in place of the paramese, which was later called pene media by the Romans, the tritesynemmenon, when the said string had been removed from the cithara, they arranged others. "So, to attain this object, both the lyre-master and his pupil must use the notes of the lyre, because of the distinction of its strings, assigning to the notes of the song notes in tune [unison] with them."
the ten which remained into three conjunct tetrachords, leaving to the two lower ones the same names which they had in the endecachord. Since the high tetrachord became conjunct with the next to lowest, they named it synemenon, as [it] already [was called] in the heptachord of Terpander. These then were disposed in the manner in which they are seen notated in the example below [Diagram XVII.]. Some claimed that Timotheus was the author of that deed, arguing that the difference which exists between the diezeugmenon tetrachord and the synemenon gave them occasion to investigate the chromatic genera, [and] believing (besides having proved that Timotheus probably was not the inventor of this) that the distance which is found between the tritesynemenon and the paramese is the same as that which in

\[119\]

\[^{114}\text{Zarlino, Istitutioni, p. 108.}\]
DECACHORD

<table>
<thead>
<tr>
<th>Synemmenon Tetrachord</th>
<th>1 d 3456</th>
<th>6 of Terpander</th>
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<tbody>
<tr>
<td></td>
<td>2 c 3888</td>
<td>8 of Hyagnis</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>4 a 4608</td>
<td>4</td>
</tr>
<tr>
<td>Meson Tetrachord of Mercury</td>
<td>5 G 5184</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>6 F 5832</td>
<td>2</td>
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<tr>
<td></td>
<td>7 E 6144</td>
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<tr>
<td>Hypaton Tetrachord</td>
<td>8 D 6912</td>
<td>9 of Prophastus</td>
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<td></td>
<td>9 C 7776</td>
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</tr>
<tr>
<td></td>
<td>10 b 8192</td>
<td>11 of Timotheus</td>
</tr>
</tbody>
</table>

Netesynemmenon
Paranetesynemmenon
Tritesynemmenon
Mesesynemmenon
Lichanosmeson
Parhypatemeson
Hypatemeson
Lichanoshypaton
Parhypatehypaton
Hypatehypaton
the ancient chromatic is found in the middle interval of each one of its tetrachords, which is not exactly true. This other consideration in the demonstration of the decachord should not be omitted. When the mese had joined the high tetrachord to that of the middle, they had been accompanied with its name, that is, mesesynemmenon. Since the musicians of those times were not completely content with any of the demonstrated distributions and quantities of strings, they resolved to add to the eleven shown above an entire tetrachord in the high part, which took (mainly from the location and from the strings which composed it) the name of hyperbolaion, which means "exceeding". No record of its author is found in the text of Boethius nor anywhere else, as far as I know. Thus they obtained from the number of fourteen strings four tetrachords, two of which were added in the low part, and two others in the
high \[\text{part}\]. The tone of the disjunction (so-called because of its meaning) was interposed between the two high tetrachords and the two low ones according to what one sees described here \[\text{Diagram XVIII.}\].
[DIAGRAM XVIII]

DECATESCARACHORD OF AN UNKNOWN AUTHOR

Hypaton Tetrachord

Meson Tetrachord of Mercury

Diezeugmenon Tetrachord

Hyperbolaion Tetrachord

<p>| | | | | |</p>
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<td>f 2916</td>
<td>12</td>
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<tr>
<td>4</td>
<td>e 3072</td>
<td>7 of Terpander</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>d 3456</td>
<td>6 of Hyagnis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>c 3888</td>
<td>8 of Lycaon</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>b 4096</td>
<td>5 of Corebos</td>
<td></td>
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<td></td>
<td>Tone of the Disjunction</td>
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<tr>
<td>8</td>
<td>a 4608</td>
<td>4</td>
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<tr>
<td>9</td>
<td>G 5184</td>
<td>3</td>
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<tr>
<td>10</td>
<td>F 5832</td>
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<tr>
<td>11</td>
<td>E 6144</td>
<td>1</td>
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<td></td>
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<tr>
<td>12</td>
<td>D 6912</td>
<td>9 of Prophastus</td>
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<td></td>
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<tr>
<td>13</td>
<td>C 7776</td>
<td>10 of Estiacos</td>
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<td></td>
</tr>
<tr>
<td>14</td>
<td>b 8192</td>
<td>11 of Timotheus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Netehyperbolaion
Paranetehyperbolaion
Tritehyperbolaion
Netediezeugmenon
Paranetediezeugmenon
Tritediezeugmenon
Paramese
Mese
Lichanosmeson
Parhypatemeson
Hypatemeson
Lichanoshypaton
Parhypatehypaton
Hypatehypaton
When they at last had considered that in this particular distribution of strings the mese did not come in the middle of these [tetrachords] as its name implied, and that out of five intervals which they had accepted as consonances, the bisdiapason was lacking, they once more resolved to add one string in the low part, which came beneath the hypate hypaton by a tone. They called it proslambanomenos, and others [called it] prosmelodos, the meaning of which was explained earlier. Its author has not come to my attention, or if he has I have forgotten. With the acquisition of this [string] in the said position, the mese came into its rightful, desirable place. In addition, the extremes of the fifteen strings corresponded to each other by a disdiapason, as one clearly sees in the example [Diagram XIX.].
[Diagram XIX]

Greater Perfect System, Disjunct

<table>
<thead>
<tr>
<th>Tetrachord Hypaton</th>
<th>Tetrachord Meson</th>
<th>Tetrachord Diezeugmenon of Mercury</th>
<th>Tetrachord Hyperbolaion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Aa 2304</td>
<td>2 g 2592</td>
<td>5 d 3456</td>
<td>12 D 6912</td>
</tr>
<tr>
<td>3 f 2916</td>
<td>4 c 3072</td>
<td>6 c 3888</td>
<td>13 C 7776</td>
</tr>
<tr>
<td>14</td>
<td>13</td>
<td>7 b 4096</td>
<td>14 b 8192</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 a 4608</td>
<td>15 A 9216</td>
</tr>
</tbody>
</table>

Netehyperbolaion
Paranetehyperbolaion
Tritehyperbolaion
Netediezeugmenon
Paranetediezeugmenon
Tritediezeugmenon
Paramese
Mese
Lichanosmeson
Parhypatemeson
Hypatemeson
Lichanoshypaton
Parhypatehypaton
Hypatehypaton
Proslambanomenos
Afterwards, when this quantity of strings had been distributed thus, they called it the greater perfect system, disjunct, in which the strings are strung according to the Dorian mode in the diatonic genera, and in the ancient species called diatonic ditoniaion. When they had attained that number of strings and had arranged them on this cithara according to the manner and disposition shown by the numbers, their intellects were contented and appeased, knowing very well that the human voice could not ascend any higher or descend any lower without great inconvenience to the singer and the least satisfaction to the hearers, in addition to other causes which are engendered by that. This, likewise, was the reason that Pythagoras of Samos commanded not to pass beyond the quadrupla, and not because he ever believed or said that the intervals greater than bisdiapason were dissonances, as some moderns have
written. The ancient musicians, then, for many additional centuries did not mind proceeding or passing into the low part or into the high part through each individual, specific system of any of their tones (or modes). The cithara was ultimately arranged with the number of strings, which they then employed in each species and genera of harmony by merely shrinking them and by enlarging those intervals and keys which sought the quality and nature of the [mode] in order to express it (aided by other circumstances) with the greatest affection that anyone could possibly imagine. With these [procedures], the skillful musician will always attain the desired result. In order to be able to play in different modes (or tones) conveniently, according to their highness and lowness, they have for this purpose wind and stringed instruments of different sizes with their holes variously

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distributed or their strings adapted to this. Concerning the diversity of these distributions, I wish, for greater clarity, to present to you the example of each, one after the other [Diagram XX.], so that you may also be able to comprehend minutely what the difference is which is found between them, with regard to the highness and lowness of the strings.
<table>
<thead>
<tr>
<th></th>
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<th>Aa2304</th>
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<tr>
<td>e 3072 Terpander</td>
<td>e 3072 Terpander</td>
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<td>d 3456 Hyagnis</td>
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</tr>
<tr>
<td>c 3888 Lycaon</td>
<td>c 3888 Lycaon</td>
<td></td>
</tr>
<tr>
<td>h 4096 Corebos</td>
<td>h 4096 Corebos</td>
<td></td>
</tr>
<tr>
<td>Tone of the Disjunction</td>
<td>Tone of the Disjunction</td>
<td></td>
</tr>
<tr>
<td>a 4608</td>
<td>a 4608</td>
<td></td>
</tr>
<tr>
<td>G 5184</td>
<td>G 5184</td>
<td></td>
</tr>
<tr>
<td>F 5832</td>
<td>F 5832</td>
<td></td>
</tr>
<tr>
<td>E 6144</td>
<td>E 6144</td>
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</tr>
<tr>
<td>D 6912 Prophastus</td>
<td>D 6912 Prophastus</td>
<td></td>
</tr>
<tr>
<td>C 7776 Estiacos</td>
<td>C 7776 Estiacos</td>
<td></td>
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<tr>
<td>8192 Timotheus</td>
<td>8192 Timotheus</td>
<td></td>
</tr>
<tr>
<td>g 2592</td>
<td>g 2592</td>
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<tr>
<td>f 2916</td>
<td>f 2916</td>
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<td>e 3072 Terpander</td>
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<tr>
<td>h 4096 Corebos</td>
<td>h 4096 Corebos</td>
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<td>G 5184</td>
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<td>F 5832</td>
<td>F 5832</td>
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<td>E 6144</td>
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<tr>
<td>D 6912 Prophastus</td>
<td>D 6912 Prophastus</td>
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<tr>
<td>C 7776 Estiacos</td>
<td>C 7776 Estiacos</td>
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<td>8192 Timotheus</td>
<td>8192 Timotheus</td>
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<td>A9216</td>
<td>A9216</td>
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</tr>
</tbody>
</table>

733
Strozzi: I have understood everything very well. Since, however, I have heard you many times before naming the greater perfect system with the word "disjunct" added, I am convinced that there also must be the greater perfect system, conjunct, for comparison.

Bardi: Do not doubt it at all, and if you wish an example of this also, here it is!
# DIAGRAM XXI
GREATER PERFECT SYSTEM, CONJUNCT

<table>
<thead>
<tr>
<th>Tetrachord Diezeugmenon</th>
<th>1 Aa 2304</th>
<th>Netehyperbolaion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 g 2592</td>
<td>Paranetehyperbolaion</td>
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<tr>
<td></td>
<td>3 f 2916</td>
<td>Tritehyperbolaion</td>
</tr>
<tr>
<td></td>
<td>4 e 3072</td>
<td>Netediezeugmenon</td>
</tr>
<tr>
<td></td>
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<td>Netesynemmenon</td>
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<tr>
<td></td>
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<td>Tone of the Disjunction</td>
</tr>
<tr>
<td></td>
<td>6 c 3888</td>
<td>Paranetesynemmenon</td>
</tr>
<tr>
<td></td>
<td>7 b 4374</td>
<td>Tritesynemmenon</td>
</tr>
<tr>
<td></td>
<td>8 a 4608</td>
<td>Mese</td>
</tr>
<tr>
<td>Tetrachord Synemmenon</td>
<td>9 G 5184</td>
<td>Lichanosmeson</td>
</tr>
<tr>
<td></td>
<td>10 F 5832</td>
<td>Parhypatemeson</td>
</tr>
<tr>
<td></td>
<td>11 E 6144</td>
<td>Hypatemeson</td>
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<tr>
<td></td>
<td></td>
<td>Lichanoshypaton</td>
</tr>
<tr>
<td></td>
<td>12 D 6912</td>
<td>Parhypatchyphon</td>
</tr>
<tr>
<td>Tetrachord Meson</td>
<td>13 C 7776</td>
<td>Hypatehypaton</td>
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<tr>
<td></td>
<td></td>
<td>Proslambananomenos</td>
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<tr>
<td></td>
<td>14 H 8192</td>
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<td></td>
<td>15 A 9216</td>
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</table>
Having considered this, you will find that it is the same as the decachord, except for the fact that the proslambanomenos and the hyperbolaion tetrachord have been added, being separated from the synemmenon by a tone which is called in that place [the tone] of the disjunction.

Strozzi: Now I understand clearly the difference which is found between the disjunct and conjunct systems, being nothing else but that which by our practicing contemporaries is called through \( h \) durum or through \( b \) molle.

Bardi: That is it exactly, and in order that you may know even more, [I will tell you that] Ptolemy\(^{116}\) proceeded carefully to investigate [this situation]. [He found], since the three lowest tetrachords in the disjunct greater perfect system which existed before the conjunct [system] had been joined together, that the three higher tetrachords

\(^{116}\)Düring, p. 68-72.
could [also] be joined together conveniently, and he proved by demonstration that this was true. If this topic is gratifying for you to understand, I will proceed to explain with great facility.

Strozzi: This will be unusually gratifying to me, as well as anything else pertaining to the knowledge of the art of music.

Bardi: Ptolemy also says in order to prove that in the disjunct greater perfect system the three low tetrachords can be joined together as well as the three high ones, in this manner:

The fifteen strings of the said system are contained between B, extreme string of the low part, and A, extreme string of the high part. Moving away from this A and coming toward the part opposite, two tetrachords are joined to this which are marked AC and AD. Beneath these immediately follows the tone of the disjunction at DE. Two other tetrachords are then joined to the E (still following that direction), and they are EF and FG. In this demonstration two tetrachords will be joined together in the high part and two in the low,
but one pair is separated from
the other by the tone of the
disjunction at ED. When this
disjunction is transposed into
the high part or into the low
part by a diatessaron, there
will be in the opposite part
three tetrachords which are
joined together one after the
other. [To verify] that this
is true, I leave the tetra-
chord AC separated by the tone
of the disjunction in CD. From
this D, I cause three tetra-
chords joined together to pro-
ceed into the low part (these
are DE, EF, and FG) using,
however, the string tritesynem-
menon instead of the paramese.

Now Ptolemy, likewise, says this in
order to be able to join together three
[tetrachords] in the low part in another
manner:

Let the two conjunct tetrachords
be taken from the low part of
the ordinary greater perfect
system, disjunct, which are AC
and CD, and let the sixth string
(commencing to count from the
low part) be raised up so that
it comes to sound as a perfect
diatessaron, and not as a 'hard'
fourth or tritone, as we should
call it, with the paramese at
letter D. Then let the third
[tetrachord] be joined in the
low part at DE, following the
two high tetrachords of the dis-
junct system, which are AC and
CD. After these let the tone
of the disjunction proceed toward that immediate part into EF. Under this, let another tetrachord follow, which is marked with the usual letters FG.

Thus there are three conjunct tetrachords in the high, as there were in the manner which is seen clearly in the nearby demonstration arranged in [terms of] our own practice [Diagram XXII.].
[DIAGRAM XXII]
[THE CONJUNCTION OF TETRACHORDS, ACCORDING TO PTOLEMY]

Demonstration of the conjunction of tetrachords according to Ptolemy in chapter 6 of the 2nd [book] applied to modern practice.
Strozzi: Among the many important things which I have learned in this particular demonstration there are these. I always see that the Greater Perfect System, whether conjunct or disjunct, contained not more than fifteen strings arranged in four tetrachords plus two tones. Previously together with others, I believed that the strings of different sound numbered at least sixteen, and those different in name numbered eighteen, [being] divided into five tetrachords. I even pointed out that this was so in the mixture of the species and genera which the same Ptolemy taught, where this [fact] is clearer. I know besides that if the string [called] tritesynememonon of the disjunct system were found in modern compositions it probably would not be diatonic, nor pure chromatic, nor accidental as some say. The

There are not more than 15 strings and 4 tetrachords in the Greater Perfect System.


Zarlino in the same place.

same thing would happen if the paramese were found in those compositions which might be composed through the conjunct [system]. Thus, there would be only a third mixed thing, or one can say with more correctness that in that case the composition would pass from the conjunct system into the disjunct system or vice versa. If, however, the string of F fa ut were altered, I do not know even now how the situation would result.

Bardi: If, in the beginning of a son, a character were placed on F fa ut which denoted in what place this string should be sharpened, so that it would continually sound (as has been said) a perfect fourth with h mi, and if no other string were altered in it but that one, I would say that such a composition was plainly diatonic.

Ptolemy proceeded ingeniously and subtly to examine this situation with his usual diligence, together with many other things. In that instance, he explained
where it could have originated that the system with three conjunct tetrachords in the low part, commonly called "through b molle" by contemporary practical musicians, had been considered for some time by the ancient musicians as the perfect system. For that reason it was necessary to show what purpose it served. And because it manifestly appeared that one could doubt from this situation that it brought with it alteration and mutation, mainly of four ways of being considered in harmony, namely, either through the nature of their genera, as [in changing] from enharmonic into chromatic, and the nature of their species, as [in changing] from diatonic synteron into delicate diatonic; or else through change of mode, as from Dorian into Phrygian; or through changing, according to the custom, from quiet into languid, or from languid into slow and somewhat splendid, or otherwise; or through changing only with regard to the order
and almost the air of the system and constitution of strings, having left that [consideration] of custom to one side perhaps because it was a thing that was openly seen [to be] completely removed from this [situation] which he had in hand. [Ptolemy] showed that it was not mutation of mode, because the entire system did not move any higher or lower. Similarly, it was not mutation of genera, because in the tetrachords the distribution of the strings was not altered at all, since their stable and their movable strings all maintained the very same intervals. Instead, mutation was [inherent] in a certain way the song mounted up and ascended, because only with this was the order of the tetrachords changed. These generally were accustomed to being placed together in such a way that from four, the number they were in the perfect system, two of them

\[118^{118}\text{Zarlino, Istitutioni, pp. 317-318.}\]
were conjunct with only one common string in the high part and two [common strings] in the low part, while the two lower tetrachords became disjunct from the two upper tetrachords by the separation of a sesquioctave interval, otherwise called tone, as has been demonstrated. Therefore when three had been joined together, after the two had been positioned, the form of the system was changed at that place where the tone of the disjunction was ordinarily located, which is, as you know, between the mese and the paramese. For, since it was the usual thing to ascend from the string a la mi re to the following note with one interval of a sesquioctave, in that case, a much smaller one ascended, which was [located] (according to what that particular distribution permitted, either diatonic, chromatic, or enharmonic) in the lowest interval of the tetrachord, which in the diatonic was a minor semitone. It also descended so that, in descending and in
ascending in that place of the system, the size of echelon was almost changed. This shrinking or lowering of the [said interval], having been used in a mode and meter which were proportionate and suitable to the song, emerged with this graceful, convenient mutation. Used too frequently, however, or at an inappropriate time and place, it was both useless and very harmful. Now this same alteration could be done for the same reason in the Greater [Perfect] System, where there were four tetrachords, by joining together the three highest [tetrachords] in the same fashion as the three lower ones. This was because nothing prevented the convenient and undisturbed transposition of any one of the distributions of genera or (concerning the highness and lowness of the entire system) the interval of the disjunction beneath the three higher tetrachords, that [prevented all this] above the three lower
ones, for the identical reason and cause serves one alteration as much as the other. Since the interval of the disjunction is not pertinent to the distribution of the strings of the tetrachord, being instead common to all the perfect systems, whatever genera or species they may be and only being [common] to tetrachords as a sesquitercia between them (since it does not matter if these are lifted from their ordinary place) it [the interval of the disjunction] performs its function as much in separating the three lower tetrachords from the highest one of all as [it did] in dividing the three higher ones from the fourth one which is the lowest of all. For only when it is placed in the middle and common between two high tetrachords and two low ones do all seven species of the diapason appear in the system, which they cannot do when they are placed elsewhere.
Nevertheless, no impediment to moving it from that particular place presented itself because of this to the ancients, because having (according to Ptolemy, as has been said) neither use nor knowledge of more than three modes, the Dorian, Phrygian, and Lydian, they did not desire other forms. In that case, the usual disjunction is transposed, and having ascended, therefore is joined together in front of its ordinary place toward the high group. When the highest of the two lower tetrachords is joined together with the lower of the two higher ones, the result is three conjunct tetrachords in the low part. When the lower of the two higher [tetrachords] joined together, having been separated from its group, is transferred to two lower ones it becomes the highest of all three. After the usual disjunction when the lower of two high [tetrachords] joined together is joined with the higher of two low ones toward
the low group, three tetrachords become newly joined together in the high part, of which the one transposed becomes the lowest of all three. These two distributions and positions of tetrachords are necessarily accomplished in this way. This is what Ptolemy wished to prove demonstratively in the manner which has been said and shown.

Strozzi: This has been a fine, useful consideration, truly worthy of Ptolemy, but next relieve me of another difficulty. Since joining the three high tetrachords is the same as joining the three low ones, why did they join the lows more than the highs? Why, also, did those famous writers, who presented the Greater Perfect System in their distributions as an example, propose the disjunct in preference to the conjunct? And why did they not sign in this a string in the low part which sounded as an octave with the tritesynemmenon, plotting it in place of the hypate hypaton? Finally, why did they always
order their conjunct and disjunct distributions in any genera and of harmony by tetrachords, and never by pentachords, or hexachords, or other intervals?

Bardi: Each one of the three first difficulties proposed to me are removed with what I just now told you concerning the opinion of Ptolemy, that is, the ancients provided that in their Greater Perfect System each one of the seven species of the diapason were found in order. The reason, then, why the strings of this system were ordered by tetrachords rather than by other intervals are these. They were not induced to do that, in my opinion, for any other reason than the fact that the first and smallest of their consonances, which is the diatessaron, is found in sesquiquarter proportion between four and three. With the larger of these numbers, they came to denote the quantity of the strings in all different genera,
and with the smaller they came to indicate the number of the spaces. I am not aware that this occurs in another interval. Or else, they did this in memory of the number of strings on the lyre of Mercury, which were distributed in such an order, in addition to the fact that this particular number of strings is capable of modulation into any mode, as one can comprehend from the example of Olympus and that of Terpander. And it seems that those who said that these strings were so ordered because the tetrachord had, without a greater number, power to reveal the genera of this particular distribution of strings did not offer much relief. It happens that this [tetrachord] was constituted by Mercury when the cithara and lyre did not have (as you will soon learn) more than four strings. This was before the chromatic genera and the enharmonic
genera were in use. There are other opinions on this subject recited by Gaffurio in chapter thirteen of the first treatise of his Theorica, which have been honored by some moderns, and thus, similarly, on that subject concerning the order which Guido d'Arezzo maintained in distributing the twenty-two strings in his Introduction into six hexachords, together with many other things of great importance. But enough has been said!

Strozzi: These two reasons of yours are very novel and ingenious, and since they have reminded me on the strings of the lyre, they have aroused in my mind another difficulty, and not a small one.

Bardi: Tell me what it is.

119 Franchino Gaffurio, Theorica musice (Milan, 1492).
120 Zarlino, Istitutioni, pp. 97-99; pp. 103-105.
Strozzi: You have demonstrated to me with [an] infinite [number of] reasons, examples, and authority, that the ancient cithara and lyre had been brought to the number of fifteen strings. As a result, I see that Vergil and Ovid, in addition to other writers, do not mention but seven [strings] when speaking not only of Orpheus, but of Apollo, Linus, Amphion, and others. [These instruments] (because of being lower, as one also sees in our [times]) probably should have a greater number of strings rather than a smaller [number]. Why is this?

Bardi: For different reasons. First, because at the time or Orpheus, the number of fifteen strings had not been attained on the lyre, but only that of seven, as I told you above according to the opinion of Boethius. These were divided into two conjunct tetrachords, according to what you have seen, so that the extremes came to sound as a minor heptachord, the same sound which is
made by the extreme high tone of the Mixolydian mode with the extreme low tone of the Hypodorian. This, then, is the manner in which the seven strings of the lyre of Orpheus were disposed. Some claim that it was given him by Mercury, and others [attest] that he himself was its discoverer. In addition, [this lyre] had later been brought to the number of fifteen strings, and anyone who believes that the famous citharists and citharoedists, in what they ordinarily played and sang, did not have this quantity of strings strung [on their instruments] perhaps believes something which is not far from the truth. One can comprehend this from the example of the ephor, when in public he cut off the two [strings] added by Timotheus, and also because [these ancient musicians] employed [only a] few [strings] in their songs, as has been said. Having used more
than seven, or up to eight for the perfection of the extremes, would have been a vanity. Let me also tell you this. Among the Assyrians, as among the Lacedaemonians, there was a specific law that any citharoedist or citharist must not dare to use more than seven strings. Aristotle also concurred with this opinion, adding that the poet would not consider it a vice if anyone, in merely making mention of the lyre (or cithara) had described it exactly like it was in its simple antiquity in the hands of those famous citharoedists, although those of whom he spoke had employed it with a greater number. Even though it had been received by Mercury with four strings and no more, it had not, therefore, been held in such esteem as it was after attaining the number of seven. The author of this, as you have learned, was the great law-giver...
Terpander of Lesbos, in whose honor the writers have so often mentioned that particular number of strings and of reeds, that is, auloi, and Orpheus himself played the cithara with such a quantity of strings.

Strozzi: Since you have declared to me with such fine order and with so many important admonitions how the matter of adding strings to the lyre progressed, may it not be a burden to you to tell me by whom and in what manner was this lyre discovered, because the history of its origin has been told differently by the writers.

Bardi: The matter of invention is understood, as you know, in several ways. First, they say that someone is the inventor of a thing when it was not in use before he discovered it, for example, the inventor of the sundial. According to Vitruvius,\textsuperscript{121} the author of this was

Beroso, the Chaldean, and according to others, Anaximander. Another is said to be the inventor when he places under consideration and into use a thing which [already] exists, not having been known before by anyone. What is derived from it then is useful and convenient, as from worms which make the silk, the cochineal from which crimson is made which itself is a species of worms brought to us recently from the Indies, or, let us say, the use of purple, the inventor of which was Hercules by means of one of his dogs. The invention of a thing is also attributed to the one who greatly betters it, as we should say about Giotto\textsuperscript{122} in painting. Now, I conceded that there were not only others who painted, but perhaps [there were others] before him and at the same time. Because, however, [painting] was converted by him into a state of greater perfection, he has been accorded the

\footnote{\textsuperscript{122}See p. 875 below.}
honor of this invention, that is, among early modern painters. Sometimes the invention of a thing is also attributed to the one that in putting it into practice exceeds all the others of his times and the ones who have been before him in the memories of the men of that century, for instance, to Orpheus in playing the lyre. Finally, the invention of a thing is attributed to the one that teaches it, demonstrates it, or describes it with greater order, distinction, and facility than the others, as Aristotle does in the matters of philosophy. Having considered these cases in the different manners which have been mentioned many times brings no little difficulty to those that seek to know the certainty of some invention and particularly concerning who first found the lyre and in what manner, not only because of the antiquity, but with regard to the varied opinions which exist among those who have treated
and written of it. The greater part of these are poets and have said many things about it as fables, and, according to various subjects which they had in hand, they took the opportunity to write in their proposals that which proved to them more convenient. Homer, the very ancient, famous poet—Hyginus also spoke of this—whose opinions we will first recount, told about its origin in this way.

Mercury, son of Jove and one of the twelve daughters of Atlantis called Maia, was born in Mount Cilenio in Arcady. When during his tender youth he was out walking, on the third day after his birth, to an area outside the house, he encountered a tortoise which was eating grass (although Lucian claims that it was dead). Having seen it and considered it very carefully because of its novelty, he thought it suitable to enhance the scheme which its form brought into his mind. Having picked [this tortoise] up, and

[123]Compare Andrew Lang, The Homeric Hymns (New York, 1899), pp. 134–137. The "Hymn to Mercury" is thought to be in the style and manner of Homer, but not actually written by him. According to Greek tradition it cannot be earlier than the fortieth Olympiad. [Ibid.], p. 35.

[Lucian] in the Dialogue of Vulcan and Apollo.
returning home, talking to himself all the while, he addressed the tortoise in this manner: "I do not want you to go wandering alone through the woods anymore eating grass, but when I become king I want you to stay at the royal palace, around the sumptuous banquet tables loaded with precious viands, full of guests brimful of merriment, and particularly at the time of new marriages." Having carried it home, first he killed it with a knife, and afterwards carefully emptied each hollow particle of its shell of the hide, meat, nerves, bone, and intestines.

The manner which he then used to adapt the strings over it is told by the same Homer with these few words.

He measured and fitted, dividing reeds of calamus and transfixing them through the back into the hide of the tortoise. He stretched cowhide around, through his cleverness. He placed the elbows there,

124 There is an account of Mercury's invention of the lyre in H. I. Rose, ed., Hygini fabulæ (Leyden, 1933).

125 Howard Williams, Lucian's Dialogues (London, 1907), p. 16. Apollo, speaking to Hephaestus [Vulcan] says: "Somewhere or other he found a dead tortoise, and from it formed a musical instrument: for, having fitted in the horns (or side-pieces) and joined them by a bar, he next fixed pegs, and inserted a bridge beneath them; and after stretching seven strings upon it, he set about playing a very pretty and harmonious tune."
and accommodated the yoke to both of them. Then he strung seven consonant strings of sheep-gut over it. After he had built it, while he was carrying the attractive plaything, he explored it part by part with the plectrum, and what solemnly and the god sang sweetly, suddenly striving.

These words are very obscure and have need of mature consideration in order to be understood well.

Strozzi: May it not be a burden to you to tell me your feelings about it.

Bardi: I do not know how I am to satisfy so suddenly and unexpectedly.

Nevertheless, I will say, in order to comply with you, all that which I recall as briefly as I can. Therefore, [I repeat what] the poet said.

He measured and fitted, dividing reeds of calamus and transfixing them through the back into the hide of the tortoise.

He might have said, "having first arranged seven reeds of calamus equally

126 Note that Mercury is credited with placing seven, not four strings on the lyre. Lucian, Ibid., concurs with the seven strings.
divided", but here I must first warn you that calamus to the Greeks is a particular species of reed which is very soft, straight, and durable. All its nodes are quite distant from one another, and it is ordinarily employed by them for writing, for it has particular ability to mark their characters excellently. The buds of this [calamus] are almost half an arm in circumference. They are soft, smooth, and equal. Saying in such a way "reeds of calamus" is, by way of example, like saying in our language, "he took wood from the cypress tree", or let us also say that [calamus] reeds are most different from marsh reeds. In this way, every calamus is a reed, but, on the contrary, not every reed is a calamus. Therefore, he fitted the seven reeds of calamus, having first arranged them in equal lengths, through the back (that is, through the length) into the hide of the
tortoise. By [the word] back, one may understand the part underneath and above its skin, or rather (since this was not there at the time) where it formerly was, or else through that which he had adapted around it. Regarding this subject he added, saying this, that is, "he stretched cowhide around." [This] says that he stretched cowhide around, that is, around the calamus [reeds] or, rather, around the circumference of the tortoise through whose hide these calamus reeds passed, in order that the spirit of the air from the plucked strings which caused the sound, did not escape so easily from those parts which protruded from the shell a proportionate, convenient length suited to its need.

"Through his cleverness" means the very same as if he said, "how shrewd and astute he was!" "He placed the elbows"—he called the elbows those parts of the calamus reeds which extended outside,
above, below, and beyond the extreme parts of the shell, for the wise god had already envisioned in his idea the aid and convenience which could be derived from these—"and accommodated the yoke to both of them."

He calls yokes (in my opinion) the bridges which coupled the strings and held them suspended from the breast-bone of the tortoise. This is no different from what is seen today on the modern lute, because plucked with the plectrum or with the fingers, they sent out the sound not in a raucous and confused manner, but sonorous and distinct. "He fitted these yokes to both the elbows."

That is, he put the yokes over the elbows and not over the bone of the animal, perhaps in order to have more room over which to stretch as he made the strings. He added to this, "and seven consonant strings of sheep-gut."

Some claim that Mercury stretched over...
the lyre seven strings in honor of the Pleiades, daughters of his grandfather, among whom was numbered Maia, his mother. They say also that the above-mentioned Mount Cillenio, after the lyre had been discovered by Mercury, was called Chelydorta from chelys, which means, as you know, the same as lyre. The lyre of Amphion has also been described with seven strings by Lambino¹²⁷ in his commentary upon the Ars poetica of Horace. In memory of these seven doors were made to the ancient city of Thebes. Homer added, "consonant strings", that is, sonorous, because not all (in the disposition in which they had been arranged by Mercury) harmonized with one another. He also said, "of more than one sheep", not "of one sheep", although the latter was probably more suitable, since a greater quantity than was necessary for this

¹²⁷Galilei is referring to Dionysius Lambinus (1520 or 21-1572). A copy of his commentary on Horace may be found in the British Museum.
instrument (due to its very small size) was derived from the intestines of only one sheep—in order to denote the inequality of their size. He came to attach each one of these [strings] to one of the extremities of the reeds which was made by one of the "elbows", in the most appropriate way which occurred to his perspicacious genius. [He] probably [attached it] to that of the part where the legs emerged from above and below. This part ought to terminate in nodes and parts [which were] larger than the reeds, whether they were divided or whole, given, however, that there was a difference in size between them. In the other [extremity] above the front paws, that is, arms, he probably arranged the pegs, taking advantage of the hollowness of the reeds, where he could conveniently insert them, if, however, they were not divided through the middle from one extreme to the
other. This consideration would not have been unusual nor surprising in that case. It also seems more reasonable [to assume that] he arranged it in this manner, not in another, because looking at any body whose head faces the sky is a more proportionate object to the sight than regarding another body whose head, on the contrary, faces the center. The poet added and said, "but after he had built it [while he was] carrying the attractive plaything", that is, after he had finished it, he carried it around from place to place in order to divert himself like a young boy [does] although he was only a baby. "He explored it part by part", means the very same as saying, "and with the plectrum he carefully sought out string after string in order to understand well the distances which were found between one and another." Having
understood these distances, he began to play. However, the poet added this, that is, "and what under his hand sounded"—not under that which supported the lyre, but under that which gripped the plectrum, with which he plucked the strings. "Solemnly", that is, since the strings were touched with the plectrum in the hand of a god, each one of them (by way of poetic hyperbole) seemed to be a sonorous trumpet and a harmonious and extremely pleasing tone. "And the god sang sweetly, suddenly striving." [It is] as if he said, "and the god, though suddenly and newly born, striving, that is, proving himself, succeeded and sang, sweetly and euphoniously, wise, heroic, elegant verses." I now wish to present this lyre to you here below with all the features designated. Therefore, here it is.
[DIAGRAM XXIII]

THE LYRE OF MERCURY DESCRIBED BY HOMER
And in order to take away, afterwards, your doubt (which already occurred to someone else while I was speaking to him) about this question with regard to the size of this lyre, and also how its strings could resound, since there was no "rose" as it is customary to have in the lute, zither, and other instruments) I say that these instruments resound as much without the rose as when there is one. It is made there for no other reason by their builders than for the ornamentation and charm of the instrument. I will easily believe that on the lyre of Mercury, through the size and durability of the material of which it was made, it would produce some good effect there. Concerning, then, the size of the instrument, do not believe that all were so small, because one reads that the above-mentioned Mercury derived the first lyre from the skeleton of the ribs of one of the
oxen which he sacrificed to Apollo. Let us leave the fable, however, and consider history. We will see that not all the lyres of the ancients, like the auloi, which did not even do it justice, were so small, but were made larger and smaller according to the need, and according to [the purpose] they had to serve. With regard to this, one reads in Suetonius Tranquillus' \textsuperscript{128} life of Nero, that [the lyre] which he used to play on the stage had been erected at the time by prefects of the Praetorian soldiers. In this place, the history mentions several [Praetorians] and not just one. Others, concerning the invention of the lyre, claim

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\begin{itemize}
\item \textsuperscript{129} Polydorus Virgilius, \textit{De rerum inventoribus}, translated by John Langley (New York, 1868), pp. 34-35. "It is said, that Mercury found the Harp first. For as he walked by the River Nilus after an ebbe, he found a Tortoise all withered, and nothing remained but the sinews; which as he fortuned to strike
\end{itemize}
what Benedetto Egio\textsuperscript{130} [does in his book] on Apollodorus. He tells that, one time when the Nile had overflowed its banks and inundated all of Egypt and had afterwards returned within its limits, various kinds of animals were left dead in the fields, among which was a tortoise. When Mercury

on them, made a certain sound: and after the pattern of that, he fashioned an Harp, and according to the three times of the year, Summer, Winter, and Spring, he put to it three strings, a treble, a base, and a mean. This Instrument he gave to Apollo and Apollo delivered it to Orpheus. Some think Amphion found it. I find, that the Harp had seven strings, to represent the seven daughters of Atlas, whereof Maia, Mercury's mother was one. And then after that, were two other put to, to represent the nine Muses."

\textsuperscript{130}Apollodorus Atheniesis, Bibliotheces sive de diis libri tres, ed. by Tanaquillus Faber (Salmurii, 1661), employs the sixteenth century translation of Benedetto Egio of Spoleto. The part concerning Mercury is found on pp. 208-211. Apollodorus, The Library, 12 vols., trans. by Sir James George Frazer (London and New York, 1921), II, 5-9. In this version, Mercury was also credited with creating the pipe, which he traded to Apollo in return for the golden wand [caduceus].
found that the meat had already been consumed and there remained some nerves pulled and dried by the sun, striking it with one foot by accident, it sent forth the sound. In simulation of this, Mercury constructed the lyre and gave it to Orpheus. Others added that when Mercury had encountered Apollo, who was extremely angry with him for having secretly taken, I do not know what, [perhaps] his oxen. Since, therefore, he had arrived and was right at hand, he was going to put him, as the proverb goes, in a bad way, if the charm and novelty of his lyre had not saved him from such fury. When Apollo had seen the lyre, it pleased him extremely well and he desired it. Mercury, having noticed this, offered it to him as a gift (although grudgingly), making the necessary gesture in order to save himself from the peril which impending. This, Apollo very willingly accepted. For this courtesy he pardoned
him for the injury with these conditions, that is, he was to attribute entirely to [Apollo] the invention of this thing, which Mercury fully promised to do. Apollo also gave him the caduceus\(^1\) as well in that exchange. The author of this tale claims in addition that the instrument constructed by Mercury was first called chelys by him, but since it had been used for ransom he called it, because of the event, lyre, almost litra, for this the Greeks call the prize with which a man is ransomed. Others, however, have said that it took this name from the strings which were stretched over it, because they resembled the furrows of the fields which were called "yrin" by the Greeks. Censorinus,\(^2\) on the other hand, claims that Apollo, not Mercury discovered

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\(^1\)The caduceus, or winged staff, is the traditional symbol of the god Mercury.

\(^2\)Censorinus (238 A.D.) De die natali, translated by William Maude (New York, 1900), p. 9, mentions Apollo as inventor of the lyre, but there is no mention of Mercury nor of the bow of Diana.
the lyre and that between them [they discovered] the sound which the string rendered when he plucked it, from the bow of Diana. Nicomachus of Gerasa,\textsuperscript{133} a Greek author, relates this story in another way, for he claims that the same Mercury built a lyre of wood, on which he strung four strings (others have said three) made also of sheep-gut, alluding with the three to the three stages of the year, that is, hot, cold, and temperate. He applied the high string to the summer, the low [string] to the winter, and the middle (in order not to say insultingly, from the autumn to the spring) to the temperate. For this reason, some have been accustomed to saying in their proposals, heavy sound [instead of low sound] and light sound instead of high sound. The four, then, which

\textsuperscript{133}See Janus, \textit{Scriptores}, p. 266. Compare Polydorus Virgilius, \textit{op. cit.}, p. 35 (See p. 771, n. 129 above.), with regard to relating lyre strings to seasons of the year.
Boethius also mentioned, he applied to the four elements. From the agreement of these, results this difference between Bryennius and Boethius, his interpreters. Boethius claimed (as has been said and shown above) that from the first and lowest string to the second, there was a diatessaron, and from this to the next to last, a tone, which sounded as another diatessaron with the highest [string]. It could easily be [possible] that Pythagoras, with this [very] disposition, had proceeded to philosophize the musical proportions with his divine intellect, and from them [to philosophize] the reason of numbers, alluding, then, that he had derived this invention from the weight and sound of hammers struck on the anvils of some blacksmiths, rather by chance than by the process of thought. Others, however, together with Suidas would have it that not Pythagoras, but

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134 See Bower, Boethius, p. 44.

135 See Bekker, Suidae Lexicon, p. 297, under the name "Diocles".

Where Pythagoras derived the musical proportions.
Diocles investigated that particular invention. When passing [liquid] from a bottle to a vessel, he accidentally struck some vases with a large stick, and because of the diversity of their sounds, concerning high and low, he proceeded, then, to investigate the musical proportions. It is more probable that they were derived from this situation, rather than from the weight of hammers, but in whatever way they were discovered, there was more of the divine than the human involved. I come [now] to the opinion of Bryennius\textsuperscript{136} concerning the disposition of the lyre of Mercury. This [man], on the contrary, claims that from the first and lowest [string] of all to the second [string] was a minor semitone (or limma), from this to the third was a tone, and that the fourth and last, which was highest of all, sounded as a

diatessaron with the first and lowest. Of these opinions regarding the inventions of the lyre, although it was told to us as a fable, that of Benedetto Egio, in his [translation of] Apollo- dorus (because of its simplicity) is more suitable than that of Homer, not only because [that of Homer] is too artificial and ingenious, but as much because of the diminutive size of the instrument. With regard, then, to the distribution of the strings, most of the learned and scientific men in this profession of ancient music are more inclined to the opinion of Bryennius than of Boethius, since it is more simple and natural, and we will be inclined also to this opinion for various reasons. The first [is] because the same names which are given to them in the very same text of Boethius manifest what those strings actually were, and what distance was found between them. [This is also
manifested] by seeing that the ancient musicians in their singing and playing, being imitators of nature, used to proceed rather by conjunct steps than by separated leaps and to employ (as you have learned) [only a] few pitches. In this manner were disposed the four strings of the lyre of Amphion, son of Jove and Antiope, when before anyone he discovered the mode of playing on it, although previously, the fabulist poets told us otherwise. In his time also, Linus of Negroponte, a most celebrated musician and poet was born. He was succeeded by Philammon of Delphi who found new methods of singing, and

137 Plutarch, On Music, p. 357, seems to be Galileo's source of information on Amphion, Linus, and Philammon. “Heracleides in his Collection says that the first invention in music was that of singing to the cithara and of poetry thus sung, and that it was made by Amphion, son of Zeus and Antiope, evidently taught by his sire. This is attested by the document preserved at Sicyon which provided Heracleides with the names of the priestesses at Argos, the composers and the musicians.”

138 Ibid., Plutarch credits Linus with the composition of dirges.
was also the one who instituted choral singing at the temple of Delphi and who composed in verses the birth of Latona [Leto], of Diana, and of Apollo.

Strozzi: One sees clearly that the famous musicians of ancient times were all poets as well, and the poets must not have been ignorant of music. Returning, however, to the distribution of the strings of the lyre according to the opinion of Boethius, I cannot imagine why in those early times they were unable by means of the aid of frets to proceed by step using tone and semitone as is customary today, particularly on the lute.

Bardi: That was actually impossible, because the lyre of those times not only was deprived of frets but also of a neck, speaking of those which are seen in modern instruments (due to the

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The stringed instruments of the ancients did not ever have frets.

\[139\] Ibid., p. 358. According to Plutarch, Philammon composed verses about the wanderings of Latona [Leto], not her birth. He did, however, compose about the birth of Diana [Artemis] and Apollo.
fact that that is needed), nor were these frets ever known unless it was after the time of Guido d'Arezzo.

Strozzi: Did the ancient lyre, therefore, not have frets?

Bardi: I am not certain.

Strozzi: Or in what manner do we understand the words of Asconius Pedianus\textsuperscript{140} [in his commentary] upon the third oration of Cicero versus Verres? The words are as follows:

When the citharoedists play, they employ both hands. The right works the plectrum, and that one he calls "playing outside". The left [hand] touches the strings with the fingers and this is "playing inside".

He added to this, saying thus:

It was a very difficult thing which Aspendio did. It happens that he was not accustomed to play with both hands, but everything.

That is, he encompassed the entire song with the left hand only and played it "inside". From these words it seems to

\textsuperscript{140}Q. Asconius Pedianus, Expositio in IIII. orationes M. Tullii Cic. contra C. Verrem (Venice, 1522), p. 34.
me that one could derive an argument that the ancient cithara had frets, and consequently a neck.

Bardi: So much for the place in Asconius! Let us lay aside the opposition which is given to his interpretation concerning the matter and reason only about the way of "playing inside" and "playing outside". Since the right hand which held the plectrum did the playing, and the fingers of the left hand touched the strings, it was necessary, when the lyre was held in that way that it remained upright. One sees that it could easily do that by means of the brackets which appear on both sides of the frame, and that it was held in the same way which the harp is held today. It is not, however, held on edge, because the face where it was struck with the plectrum ought to be seen more than the other [face] when the instrument was being played. From this it was called "[playing] outside".

How one should understand "playing outside".
Consequently, the opposite was called "[playing] within". Therefore, [the latter procedure] became more convenient for the left hand and the [former procedure] more convenient for the right hand. Now the ability of Aspendio must have resulted from his having accustomed all five fingers of the left hand industriously to find that quantity of strings which they best fitted, since he availed himself of only the left hand in playing. According to myself, it is a difficult thing to believe this industry of his was as perfect as that of the other great artists who used both hands. This particular thing, however, was a novelty and unsuitable to be put into proper operation at all times. Even if that man did succeed in it, either because his left hand was naturally as quick as his right [hand] or through long and industrious practice, and the others
did not succeed, his work was considered much more for its rarity (as far as I am concerned) than for the excellence and perfection of the effect which it made. If this is true, there is little indication of it in the fact that one never reads about others (as far as I know, however) who have undertaken to imitate it. With regard to claiming that in those days the fingerboard was in use on their instruments as it is used in our times, I know of no authority, nor writer, nor antiquarian who describes it to us, and I do not believe it in any way. I freely tell you and I have told you continually whatever I have in mind, rather as a cultivator than as an author, because I believe that this is what you desire of me. One must believe, moreover, that if a fingerboard and frets had existed, they logically would have

Frets were not used by the ancients.
had names. In Julius Pollux, who named all the parts of the instruments there would probably be some indication, but that has not come to my attention. You must add there, in addition, that the order in which the strings of their instruments were strung and disposed was, for example, according to that of the harp, and not like that of the lute or viola d'arco, since in both of them, frets are necessary if one wishes, according to the need, to derive four or six precise, sonorous pitches from one of them. In [the harp], on the contrary, where each string makes its own particular, specific pitch without falling short of any momentary need, frets would be vain and useless, just like holes [would be] to the

141 See Robert W. Smith and others, Ancient Greek and Roman Rhetoricians (Columbia, 1968), p. 64, for biographical data on Pollux. His thesaurus, the Onomasticon, contains in ten books an index of Greek words, synonyms, and especially technical rhetorical terms. Books two and four contain much information about music.
reeds of a well-ordered syrinx. The words which Vergil used above speaking of Orpheus also persuade us that this is true. In addition, frets would have caused those same effects in their instruments as they have caused in ours, that is, of changing the diatonic ditone species and any other species involved into the intense [diatonic] of Aristoxenus, since it was not naturally capable of [containing] another. I do not intend to omit this other consideration, that while Pythagoras, the greatest of philosophers (or whoever else it was) was given so much praise for having investigated the musical proportions, if the instruments of their times had had frets, then any man of ordinary, mediocre talent was apt to investigate [these proportions] by means of them without any difficulty, because the lute with frets is nothing else but a harmonic ruler with many strings. In order to tell you, in this regard,
another particular worthy of consideration, I say that from here one can
derive an effective argument that our
way of playing originated from those
instruments which had no frets. Con-
sequently, because frets were necessary
to them, they were the last to be
discovered. Returning [now] to the
consideration of Aspendio, [I say, with
regard to what] you alleged, that he
openly manifests (to those who might
examine the situation with rational
intellect) that on the ancient lyre
frets did not in any way exist.

Strozzi: What form did it have,
then, and in what manner were the strings
on it arranged?

Bardi: The form was similar to
that which is sometimes seen in the hands
of ancient statues (and of modern ones
made in imitation of them) of Apollo, of
Orpheus, or of some other [being] to whom
this instrument is appropriate. One also
observes it on the reverse sides of some
old coins, particularly in those of Nero,
in addition to its being seen in bas-relief on many columns and ancient marbles. They are no different from that which is held in the left hand of the statue of Orpheus made by Cavaliere Bandinelli, the noblest sculptor of our city, which is seen publicly in Florence today in the courtyard of the Medicis. Its design is this [Diagram XXIV.].
[DIAGRAM XXIV]

FORM OF THE ANCIENT LYRE
We will append to these diverse opinions about the invention of the lyre that of Philostratus, who insists that the first one was made from the horns of a goat, together with the bone in the middle of its forehead. [He also claims] that the boxwood therein employed was the best wood which could be used for any need. Hyginus, then, in the book which he wrote concerning the constellations, designed [the lyre] in this form [Diagram XXV.].


143 Hyginus, *Astronomica* (Paris, 1909), p. 47. Hyginus' description is that of the constellation Lyra, specifically how its stars outline the shape of a tortoise shell rather than the horns of a goat.
[DIAGRAM XXV]

FORM OF THE ANCIENT LYRE DESCRIBED
BY HYGINUS IN BOOK THREE
OF THE CONSTELLATIONS
A similar one is described by Lucian\textsuperscript{144} in the hand of Polyphemus, made of the horns and the middle of the forehead of a stag. The form of this (according to the opinion of Plutarch)\textsuperscript{145} was later improved and arranged in its true proportion by Cepion, pupil of Terpander.\[\text{The lyre}\] was also called the asia, because the players of Lesbos, [who were first] inhabitants of the Asian state of Lydia, used it in that form. It was transferred from Lydia to Lesbos by the said Cepion in much better form than that which is seen here. Because of this, the divine Ariosto\textsuperscript{146} perhaps

\begin{verbatim}
144 Howard Williams, Lucian's Dialogues, p. 62.
\end{verbatim}

A stripling he, who such sweet music vented
Accorded to the horned lyre's soft tone;
That at the dulcet melody relented
The hearer's heart, though harder than a stone.
said, "concerns to the sound of the horned cithara", although Julius Pollux calls horn those two branches at the apex of this lyre which protrude outward like ears.

Strozzi: You put it all very well, and your reasons please me greatly, but that is hard for me to believe, because I cannot imagine how the bow could have room to perform its function in that resultant form; [it is] thus because the wood of the frame which composes and encircles it shows from each one of its parts that it is larger than two fingers in size, in the middle of which the strings are strung and held erect by bridges. The surface of these is plane, and not curved like a hemisphere or a semi-oval. It is also thus because if the strings were, on the contrary, more taken up with the material of which the frame of the lyre is composed, with all this the plectrum, or bow as we want to say it, would not be
able to touch one [string] at a time, particularly those in the middle. First, this is because the bridges over which the strings are fitted do not have, as I have said, the form of a semi-oval or of an ear as those do which are customary today for greater convenience, but they are entirely plane, and second, the strings are very close together.

Bardi: In what manner do you honestly believe that the plectrum of the ancient citharists and citharodists was made, and what form did it take?

Strozzi: I believe that it was a bow similar to that which is employed today by players of the viola da gamba and the viola da braccio, which are called lyres in modern parlance.

Bardi: Here, you are completely wrong.

Strozzi: How, please?

Bardi: The plectrum of the ancients was an instrument as long as the palm
[of the hand], or approximately one quarter of an arm's length, in the form which you see here in the design. Sappho (according to the opinion of Suidas)$^{147}$ was the inventor of it, but I do not know how that could be [true]. It happens that Homer, who attributed this invention to Mercury, lived before Sappho, the creator of the Mixolydian [mode].

[DIAGRAM XXVI]
THE PLECTRUM

This [plectrum] was gripped with the right [hand], and with the left [hand] was held that part of the lyre where the pegs were fitted. The other part where the strings were attached, which was, as you have seen, somewhat larger, was

$^{147}$Bekker, Suidae Lexicon, pp. 935-936.
leaned up against the chest, to that part, however, which provided greatest comfort. In earlier times, then, when they began to play in consonance, as you said that Epigon and Aspendio used to do, they placed it on its feet on top of a table or stool, and the strings of this lyre were plucked, and not stopped, with the two tongues which projected above and below the fist (or on the sides of it as we intend to say) in the manner which Vergil and Ovid told you shortly before. These same poets and others, in order to show more force in playing them, used this expression, that is, "wound the strings instead of plucking them". In those early times, they were accustomed to making these instruments from those bones which goats have between the knees and the hooves of the forelegs, having been washed and polished on the lathe or in some other way. Their builders gave them the form which you have seen,
[since it was] more convenient than any other for its function. Others claimed, however, that the same hoof served to pluck the strings, [which was done by] gripping the paw after it had been detached from the goat and dried. If you wish to see a very close likeness of it (which I never view without wonderment), then envision the superb temple of Santa Maria Novella in the chapel of one of your ancestors, painted by Filippo di Fra Filippo. On the front of this on the left side, two women are seen, one of whom is singing and the other is supporting with her hand an ancient lyre made according to what I demonstrated to you above. In the right [hand], she has in her grip a thing similar to the design of the plectrum which I showed

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148 Filippo di Fra Filippo, or Filippino Lippi, flourished around 1480 in Florence.
you, that is with regard to the form and importance of its function. From this one can argue for the great judgment of that excellent painter should it happen that he had not been aided by some literary man, for instance by someone like the Poliziano who was flourishing at the same time and place, who easily could have had some information concerning this instrument, because he was a literary man and left written in his various offerings some important things related to music, and [could have] communicated it to the said Filippo. In order that you know, it has not been more than two years since unquestionable knowledge was attained of a few particulars, thanks to an extremely ancient column finally found in Rome, which today is in the palace of Cardinal Santacroce.

Angelo Poliziano was a member of the Plato Academy sponsored by Lorenzo di Medici in the late fifteenth century in Florence.
There one sees the muses sculpted in bas-relief. In the hand of one [is] the form of [a plectrum] with the instrument close by. The knowledge and certainty of this causes one to notice today on many reverse sides of ancient coins, that it was first known by every other thing than by [the name] plectrum. One also sees another [one which is] also similar in Rome on a very old sculpture which is in a niche of the courtyard of the palace formerly belonging to Cardinal Montepulciano and today belongs to the Cievoli, gentlemen of Pisa, in the hand of a figure in female attire with an instrument for singing. [So that you will know] at last that the strings of the ancient lyre were plucked and not bowed, I [now] confirm it to you with the example, told to us by Lucian, of one Evangelo, a noble of Tarentum. It will do no harm

150 No discourse with this or any such title appears among the bona fide works of Lucian nor apparently among the spurious ones known to this author.
to anyone to understand his story. Once upon a time, therefore, either because he had a heavy hand or because he wished the strings to render a sound greater than their nature would allow, he broke three, not through a particular defect of these [strings] nor because of their tightness, but through the violence done to them with the plectrum. Here is the story. One time during the youth of Evangelo, a noble of Tarentum, the desire came to him of winning in the Pythian competitions and games, which are customary in Greece in honor of Apollo. In these [games] one exercised [not only] the force and dexterity of the body (called saltation by the ancients) but also playing and singing to the lyre and to the aulos. Since the said Evangelo realized that he was not greatly suited to physical effort and consequently [not suited] to win in the part which required agility and vigor of the body,
he determined to learn to play and sing to the lyre, thinking that the aulos was not a suitable instrument for nobles, which it actually was not. After a few months, he was persuaded to compete by the admirers who surrounded him (thanks to his great wealth which he willingly shared with such friends) and by the burning desire which he had of being considered (rather than actually being) intelligent and wise, for he believed too well that he had become a very great citharoedist, a vice which is incurred by most of those who have a great deal to spend and accomplish little. It was (as has been said above) permitted to the noble poets and musicians of those times—these two diverse professions were many times found in the same person, as much because of the conformity which they had together as because it had not been determined which of them ought to occupy the primacy and the place of architect—it was, I say, permitted to
them to dress in the manner that kings dressed, that is, with purple robes, with a laurel crown on the head, and with knee-length stockings. One reads in the histories about Orpheus and Arion, among others, dressed in this attire. Therefore, the above-said Evangelo, in order to appear richly dressed and sumptuously adorned, had made himself a purple outfit woven with gold and a crown of purest gold which resembled live laurel to the sight of the beholders, by means of the glazes and the other artifices. Instead of berries and pips this [crown] had set in their places the finest of emeralds and other valuable jewels. The stockings corresponded to the rest of the habit. The lyre, then, was a most superb and marvellous thing to see, because it was [also] made of purest gold, ornamented in each part by an infinite quantity of different jewels, all of value. We saw in the [example] of bas-relief made
by an industrious craftsman, the image of each of the nine muses, that of Apollo, and that of Orpheus. He traveled, therefore, to Delphi, where these games were supposed to be exercised. Having arrived there, and the day for proving his value having come, he appeared in the theater on the stage erected for that [purpose] in the outfit which you have learned. This Evangelo, in addition to the awe which he brought with him, created in the minds of the spectators the greatest desire to hear him play and sing, each one of them hoping that [his] knowledge (in addition to his grace and wisdom) ought to correspond to his dress. On the same day and for the same reason, two other citharodeists came into the theater. When their names, [along] with that of Evangelo of Tarentum had each been separately inscribed on three small briefs, they were placed, according to the custom, in the usual urn, and by chance (after Delphi, a Greek island.
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his knowledge even more as some of the modern musicians have been used to doing and are used to doing now, not unlike those who everyday proceed to praise themselves in order that those who are more simple than they are (in order not to say ignorant) will greatly esteem their worth. He therefore began to sing along with those [strings] which had remained, but in a manner so stupid, brutal, and sickening that he, like Polyphemus,151 simultaneously moved all the spectators to laughter and to scorn, the exact opposite of what he would have done today in that outfit and with those abilities. Thereupon, the officials of the theater, having experienced his insolence and temerity, publicly expelled him from the stage to the tune of whips. Such, then, was the punishment which the place gave by law to presumptuous, arrogant [persons] in those happy times when they loved virtue and not riches. It

151 See Williams, Lucian's Dialogues, p. 62.
was indeed a ridiculous thing to see so rich and pompous a citharoedist being dragged, unfortunately for him, across the stage by those who were beating him indiscriminately in such a way that the parts of his legs which were not protected by gold and purple poured blood. In order to manifest the vileness of his mind, he proceeded to gather the scattered remains of his fine clothing, lyre, and crown which, due to the whipping by those who showed little respect, had been broken and crushed in various ways, almost as if he did not care, due to greed, that he had been defeated. After he had been given the deserved punishment, the third and last citharoedist, called Eumelos the Aeolian appeared on the stage. He had an old, worm-eaten lyre with wooden pegs, which, computed together with the crown and stockings, was not worth a half-crown, but he played and sang with the greatest excellence one could possibly desire and was understood and reputed by everyone as
such. Therefore, when he had been declared the winner by the judges and [this fact] had been proclaimed by the trumpeter, he carried off the prize [he had] earned, which was a crown of olive, just as that of the Olympic competitions done in honor of Jove was made of celery, and not of gold, since at that time honor was their only goal and not the winnings as is most often customary today. At that moment each one once again began to laugh at the stupidity of Evangelo of Tarentum, whose beautiful lyre had not availed him a thing in the world, nor the crown together with his many possessions. The author of the story says further that the winner turned to the vanquished and said:

You are adorned with a crown of gold, but what wonder is that since you are rich? I who am poor need

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The reward of Eumelos.

Archias\textsuperscript{152} in one of his epigrams explains what the said prizes were.

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\textsuperscript{152}Galilei's reference is to Aulus Licinius Archias, Epigrammata. A copy of the 1596 Rome edition of this work may be found in the Newberry Library, Chicago. The book is non-circulating.
to be content with that of Apollo. This utility alone has occasioned your sumptuous ornament. Since no one can be found who has compassion for you, you are hated, for no other reason than for the overabundance of your riches.

I do not wish to leave this topic without considering that from the words of Lucian one deduces that the crown which was given as a prize to winners of the Pythian games was [made] of laurel, rather than olive. Such a case, however, would not even be surprising. It happens that these prizes were changed many times, as one can comprehend from the variety of writers who lived at different times. Coming at last to the end of our discussion concerning the invention of the lyre, I say that Boethius claims that it was discovered by Mercury, but not that it was derived from a terrestrial tortoise nor from an aquatic one. He believes unequivocally that [Mercury] communicated it to men, without speaking at all about the material or the form in

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153 Galilei's reference to Boethius I, 2 is erroneous. It should read Boethius I, 20. See Bower, p. 73.
which it was made, but only [saying] that it was disposed with four strings in the proportion which you have learned previously, in the distributions of which there results among the writers another discrepancy of no little [magnitude]. Concerning this, some claim (and among these is Plutarch$^{154}$ that the lowest string rendered the sound of hypate, the one which was next, that of the mese; above this a tone followed, which represented the paramese, and the extreme high [string] rendered the sound of the nete. [These men] applied to the first [string] the number six; to the second, eight; to the third, nine; and designated the fourth and last with the [number] twelve, in order that from these numbers one [might] know manifestly in what proportion one string was found with another. Others, among whom is the Reverend Monsignor Gioseffo Zarlino$^{155}$ (although in chapter six of the first part of his Institutioni he understands it in another way) claim that the

In the opusculum De musica.
first and lowest string, following the order which was observed in enumerating that according to the opinion of Plutarch, was parhypate hypaton; the second [was] parhypate meson; the third, lichanos meson; and the fourth and last, tritediezeugmenon. They applied to the first of these, for the above-mentioned reason, the number twelve; to the second, the nine; to the third, the eight; and to the fourth, the six, which is exactly the opposite of that which had occurred to the first [strings]. We will attempt to adjust this contrariety of the order in which the numbers are placed, at least by the amount which is found to be better. Initially, with regard to the diversity of the strings, their entire difference is inherent in being higher or lower. Nevertheless, those who proceed to examine both opinions rationally will find that that of Plutarch is much

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more suitable than those of the others. This is because it is more reasonable
to have to draw one of the seven species
of the diapason from a quantity of fif-
ten strings where they all are found,
taking, for example, that which is not
only more valued, but that which is more
common. Plutarch, however, with finest
judgement as in all his other matters,
takes the fourth species, which specif-
ically belongs to the Dorian, that mode
which is reputed and valued more than
any other. It is that [fourth species],
as you know, which comes in the middle
of the natural, ordinary system without
spoiling or breaking the two tetrachords
which compose it, since they have been
separated naturally from the tone of the
disjunction. On the other hand, that
which includes the other part is the
species of the diapason of the Lydian
mode, which is found only a semitone
distant from the extreme low [mode],
which is, according to the opinion of
Ptolemy, that of the Mixolydian, but transposed an octave higher, in addition to the fact that the tetrachords in it become broken up and incomplete. This did not occur to the ones mentioned above. The numbers, therefore, with which Plutarch accompanies his strings cannot in any way be considered as these, or parts of the monochord, but only as weights added to some sounding subjects, and the others as measures of some similar things. Plutarch could have considered them mainly as weights, applying them to the Pythagorean hammers, because the very same proportions were found among them, for that which weighed twelve

\[1\text{56} \text{See Sir Thomas Stanley, History of Philosophy (1701), 387, quoted in Sir John Hawkins, A General History of the Science and Practice of Music, 2nd ed., 2 vols. (London, 1853), I, 9-10, for a translation of Nicomachus' account of Pythagoras and the hammers. Although the relationship of the weights to the pitches is scientifically inaccurate, both with regard to hammers and to Pythagoras' related experiment of weights attached to strings, the anecdote was nonetheless perpetuated for many centuries. At last, in the sixteenth century,}

Which of the Pythagorean hammers made the high sound and which the low.
pounds compared to that which weighed six sounded as an octave when struck, but that of the twelve made the higher sound, which is the nature of bodies which have not been made hollow. The low [sound] was made by that which weighed six, which was different from what the hypate produces with the nete, and the same proportion which is found between the other numbers occurs in the different weights and in the same order. One sees the same thing every day happening also to thin, hollow bodies, which, when struck, make a low sound, and if large [bodies] were even of the same capacity, the sound would be higher, or less low as we want to say [in this case]. One can consider this particularly in some ancient bells, which, although little, make a low sound in comparison with the smallness of the body, as has been said. That this unsound theory was disproved, oddly enough by Vincenzo Galilei's famous son, Galileo, in a treatise called Discorsi e dimostrazioni mathematiche intorno a due nuove scienze.
happens for no other reason than because of the thinness of the vessel, by means of the small quantity of the material which the craftsmen of those times put into the form of their bodies. One can also consider the same thing, and for the same reason, in the modern lute. If [the lute] has thin strips, or staves as we intend to say, it makes a low, sweet sound, and if they are large, it makes a harsh, high sound. The very same thing can also happen to it regarding the variety of the material of which it is made, for ebony and ivory are suitable through their nature to render a higher sound than fir and beech, but excellent craftsmen have the power with their skill to oppose and resist in great part some of their natural qualities. I call them natural qualities because the immediate cause of the sound is the intensity of the air which, having been enclosed in the middle of those instruments which strike it, splashes from the How sound is produced.
middle of them almost outside as a result of the force, and with its total impetus, since it has been squeezed together by that force so that it is contiguous to the inside, always pushing until it is nearest to the sensory, having been forced by that motion, almost wounds those cartilages, which wounded cause the feeling. This blow, when felt, is actually the sound. In the second place, Plutarch was able to consider the same numbers applied to weights, attached to four strings, equal in length, size, and quality. When these were plucked, one would hear from them the same musical intervals, in the same order in which they were heard in the four hammers, but much more sonorous and distinct in than in [the strings], as the strings are more suitable (after being strung and plucked) than four mere pieces of iron to render an intelligible and rational sound. Those, then, that disposed the numbers in the opposite way to these, consider them,
as has been said, in proportions. These can be applied to vessels, to pipes, to strings, and to other [things]. They could consider them, first of all, in copper vases, or vases of another metal or material. [Here they would be] suitable, when plucked, to render a commensurable, distinct sound, and not a confused one. If these [vases] were of one size, bulk, capacity, material, and proportion, and if the same number of pounds of water as the hammers weighed in iron were placed [in them], when they had struck with a rod of iron or of another material, the same sounds would issue from them that issued from the four strings to which they had applied the very same numbers in the same order. [This is] because the hollow body in which there was a larger quantity of water would have a lower sound than that where there was less. This is no different from what occurs every day with children, who put a little water into an empty glass of the proper,
arranged proportion, and wetting the
tip of the middle finger of the right
[hand], revolve it gently in a circle
moving [it] over the edge of the mouth,
while with the left hand they hold
the bottom of the glass in order that
it stays straight. From this [instrument]^{157} softly issues the sweetest
and mellowest of sounds, similar to
that of a viol string when it is
sounded by the bow. However greatly
one augments the quantity of water and
the force of the finger which goes in
a circle over the mouth of the glass,
the sound will be made that is much
lower and bigger. By means of those
instruments, or similar ones, one can
arrange, without any expense and little
difficulty, to hear a perpetual harmony
in the vicinity of fountains. One can

157 This "instrument", although
limited to infantile improvisations in
the time of Galilei, provided a principle
which was later incorporated into a
genuine musical device. See Apel, Har-
vard Dictionary, p. 316, under harmonica.
also consider the above-mentioned numbers in pipes of different sizes, made by nature and by art. For example, if one takes an organ pipe which is twelve palms, twelve fingers, or twelve other quantities in length, and another [pipe] of the same size and the same hollowness, which is six of these [measuring units] in length, one will hear, when one pipe sounds together with the other, the consonance which is found between the parhypate hypaton and the tritesynemomenon. The low sound is made by that which contains the twelve parts, and the high sound by that which contains the six. Now the same thing will happen when one takes two strings of the same length, size, and quality, for if these are strung in unison over a plane surface and one of them is divided in half by means of a bench, fret, bridge, or with the fingers of the hand, one will hear, as has been said on another occasion, the consonance of the diapason every time that
they are plucked, [either] together or one after the other. When any one of these is deprived of its third part, one will hear the diapente with the entire other string. If any one of these is relieved of its fourth part, the diatessaron will be heard. Finally, if any one of these is lessened by its ninth part, the tone will be heard.

The parts which remain will always render a high sound, and the whole [string] a low one, and the greater the part which is taken from the string may be, the higher the sound will be which is rendered by that which remains.

The usage of the monochord probably originated from these speculations.

You, however, did not mean by this that musical instrument used by the Arabs,158 to the sound of which— it had only one string—they sang their compositions, but that discovered by Pythagoras, which was also called the harmonic ruler. I

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do not want, with regard to gut-strings, to omit in this case an important observation, which is that many times, when [a gut string] from the part of the duodenum is attached to one of the bridges of the monochord, there will be a different sound when it is played, with regard to highness and lowness, than with one from the part of the rectum, although they are of the same quality, size, and length. This is one of the reasons that when lute players many times (for example) compose a song upon the lute which produces diminished intervals when played, by turning it upside down, it renders perfect [intervals] and another time, augmented [ones]. This is because in moving away from the duodenum of the intestine and proceeding toward the rectum, it enlarges little by little and also hardens, so that in its whole length there are trebles, altos, and means. Therefore, having placed [a
string] from the part of the rectum on the bridge of the lute, being larger and harder, it comes to make greater resistance, when tightened, than the part opposed to it, which is, in comparison with that, both soft and fine. This resistance, because of its frigidity (so to speak) is the reason for making a higher and more vigorous sound, no differently than what has been said about Pythagorean hammers.

Strozzi: I am entirely satisfied, but, I desire next to know for what reason it happens that when a string is false, it manifests its defect more when it is played than when it is arbitrarily touched, and if in addition, theorists have speculated about two organ pipes of equal length and different size of hollowness, regarding how much one should exceed the other, wanting to hear the diapason consonance issuing from them.
Bardi: The reason that the sound of the string, when it is false, manifests itself more to the ear in that way when it is struck during playing rather than touched at random, results because in being sharpened even more (since it is more taut) it comes to strike [the ear] with greater force. With regard, then, to the proportion of the pipes\textsuperscript{159} of the very same length and different size, I have never found any record [of it], but I firmly contend, rather, I am completely certain, that when two pipes are sounded together, each one of which is two arms in length and the hollow of one, through which the air passes in playing it, is a half arm in circumference, the same throughout its entire length, and that the circumference of the other is three-fourths [of an arm], one will hear between

\textsuperscript{159}Galilei's ensuing statements with regard to the acoustics of organ pipes are inaccurate. Two simple resonators of equal length but different diameter will emit the same pitch, but with diverse qualities of sound. See F. E. Kirby, \textit{A Short History of Keyboard Music} (New York, 1966), p. 2ff.
them the consonance of diapente, the second one rendering the low sound and the first one, the high. For the very same reasons, most of the musical intervals could be obtained from pipes of equal length and unequal capacity, but not all of them, therefore, would be obtained in that [state of] excellence and sonority where the length also concurs according to their proportion. I warn you here, however, that the capacity of the hollow of the pipes, considered in this second manner, will not have the very same aspect between them as in those early [cases] where we considered the difference in length of the same capacity, because [concerning] those which sound as an octave, the hollow of the low pipe, no matter what its form, necessarily contains four times that of the high [pipe], although each one of the sides, the diameter, and the inner
of these have between them a duple proportion, so that those which sounded together, contain the diapente, are in dupla sesquiquarta proportion in their hollow part, and those which sound the diatessaron are in superseptima partiente nono proportion \([16:9]\), from which one knows part of the imperfection of this interval. Those, then, which contain the major third should be in supernonopartientesextusdecimus proportion \([25:16]\), and that of the minor [should be] in the superundecimuspartientevicesimus quintus proportion \([36:25]\), [all of] which one can clearly understand from the following examples [Diagram XXVII.].
THE PROPORTIONS OF VARIOUS SOUNING BODIES

DIAGRAM XXVII
You will find that each one of these intervals is produced from the multiplication of ordinary [proportions in] lowest terms, multiplied by themselves. One can also consider that their proportion corresponds to numbers, to strings, and, according to what has been said above, to pipes of the very same hollowness and of different length, and consider the excellent property of the diapason, which, having been considered in any manner and in any form, has always had its being among the multiple proportions, where it was produced originally. This situation has not occurred to two larger superparticular intervals. These considerations would be an effective means of opening the way to some person of fine intellect, versed in mathematics, to find [that which] has already been mourned for dead, the squaring of the circle.
Strozzi: Very well, but tell me [this] if you please. If we took two sheets of lead of the type which are used to make organ pipes, after they had been completely beaten, planed, and polished, which were in rectangular form but each one of the longer sides of these were, for example, an arm's length, and the shorter sides were four fifths of an arm's length, do we believe that in adding and soldering together with the proper care the longer sides of one and the shorter ones of the other, they would respond as a unison when they were played together?

Bardi: Undoubtedly, but, as I have said another time, I wish to make a particular discourse concerning the question of instruments, in which many important matters will be treated in order, which, perhaps, are things which have never been told, nor heard, unless it is by just a few, where the reason for everything will be given. Let us
say, therefore, in this case, that, finally, if there were two organ pipes of equal length, with the very same degree of hollowness within, when a mouth is attached to the top of one of these, through which the air then issues, one will hear, when they are sounding together, the same consonance which is found when the hypate and the nete are sung, the one which is closed making the low sound and the one which is open, the high [sound]. It is true that the one which is closed will have need of very little wind in being played, and a large opening. One could also blow into this in such a way that it would ascend a disdiapason above the other, so that from the very same hollow of the same pipe, one would have, by means of the quantity and quality of the air which blows into it, the proslambanomenos, the mese, and the extreme nete, but as much as is necessary has been said about it for now.
Strozzi: Having heard you many times naming [them] merely hypate and nete, without any further explanation, I do not know what particular strings ought to be understood by these. It happens that in the disjunct greater perfect system, one plainly reads the name of each one twice in the Greek language in this manner, that is, hypate hypaton and hypate meson, and also netediezeugmenon and netehyperbolaion, omitting that of the synemmenon, which I do not believe in any way that you have [ever] needed to understand. This is because, in the species [called] diatonic ditoniaion, it is in unison with the paranete diezeugmenon, since it must also serve the conjunct system.

Bardi: Speaking in such a way in the case of these two strings has been the custom, not without reason, of most of those who have written about about music, particularly by Aristotle, What strings are understood by the terms hypate and nete.

Aristotle in problem 35 of of the [Problems of Harmony].
by Ptolemy,\textsuperscript{161} by Plutarch,\textsuperscript{162} by Suidas,\textsuperscript{163} and by Boethius.\textsuperscript{163} They have commonly understood these to be the two extreme strings of the lyre of Terpander, or, to say it better, those of the octochord of Lycaon of Samos, which are hypate meson and netediezeugmenon. With regard to these, Aristotle said that the nete is sesquialtera of the mese, from which he probably derived \textsuperscript{[the fact]} that the octave was called diapason by the ancients, and not "diocto" from the number of its strings like the diapente, the diatessaron, and the hexachord. Instead, they called it diapason, which means "by one" and "by the other", or "by each one", as was said above. This opinion of mine agrees with that which the philosopher \textsuperscript{[Aristotle]}\textsuperscript{164} said in Problem 31.

\textsuperscript{160} Aristotle, \textit{Problems}, I, 399.
\textsuperscript{161} During, \textit{Ptolemaios}, pp. 57-60.
\textsuperscript{162} Plutarch, \textit{On Music}, p. 419.
\textsuperscript{163} Bower, \textit{Boethius}, pp. 74-75.
\textsuperscript{164} Aristotle, \textit{Problems}, I, 397.
the Problems, when he sought the reason why the octave was called diapason rather than diocto. He said that it was derived for no other reason than from seeing, as I have said, that it one time contained six strings and sounds and another time seven, which were also called phthonguses by some in differentiation from the intervals. But here someone could doubt from the words of Aristotle whether the extreme strings of the cithara of Terpander would sound as an octave, or else by a minor seventh, as Boethius affirms, granted that the octave took the name of diapason from the cithara of Terpander and not from that of Lycaon. If it were a seventh, however, I do not know how e la mi could be the Dorian nete of Terpander. Therefore, I wish to reserve for a better occasion the disputing of this particular

The meaning of phthongus
Glarean, 165
book 1, chapter 9 [of the Dodecachordon].

curiosity. Therefore, enough has been said.

Strozzi: Tell me, if you please, what thing was understood by the ancient musicians as "greater harmony"?

Bardi: It was the opinion of the ancient musicians that the "greater harmony" was that discordant concord which was found virtually in every proportionality that consisted of five numbers, which were disposed among themselves in such a way that between their members the form of every consonant interval ordinarily was found in effect, and afterwards, that of the tone, deservedly called "guide of the harmonies", because by means of it they had knowledge of both semitones, of the division and separation of the tetrachords of each other interval lesser or greater than it, and consequently of the diversity of genera and of species. Without the aid of [the tone], if I do not deceive myself, any human labor devoted to investigating
that would be in vain. In conclusion, there was found, by means of it, all that which was and is good and wonderful in the music of today and of those early times, the value of which has been noticed by now by each one who does not wish to back-bite stubbornly. In all, the consonant intervals of the ancient musicians, together with the dissonant tone (but suited, however to singing) ascended to the number of six, and they were these, that is, the diapason; the diapente, also called hemiola; the diatessaron, also called epitritos; the diapason plus diapente; the disdiapason; and the tone, also called epogdous, which are the same ones which were considered by Ptolemy a little while ago among the aspects of the errant stars. The form of each one of these should be found among the parts of the said proportionality. They considered, in addition, that there were three suitable divisors and

The number of consonant intervals according to the ancients.
that each one performed the particular function which agreed with its nature. These [divisors] were the arithmetical, the geometric, and the harmonic, so that if between the five numbers written below, that is, 24, 12, 9, 8, 6, were found all the particulars designated above with each of the conditions which they were seeking, they would come, consequently, virtually to contain the afore-said "greater harmony". Now, in order to see clearly and know if all six of the intervals just now named are contained among the proposed five numbers and limits, together with the circumstances which necessarily must proceed from them, we will tell, according to the usage of those [ancient musicians] the cases which they considered in each division. Then we will see if they are found there, reserving for another time

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telling you why one [divisor] more than another required the geometric mean, the harmonic mean, or another, and why the geometric [mean] was the second, and not the first or the last proposed. They considered, initially, that the interval of the arithmetic division, when separated, contained among its larger terms (and always in the bottom term) the smaller part of it. In addition, the differences which existed between numbers that contained each part of the whole were always equal. The particulars which they considered in the interval which was divided by the geometric mean were made thus: the larger terms above contained the same quantity of the whole as the smaller terms above, and their differences, being unequal, were disposed so that having the same relationship between them which each one of the extremes had with the middle, the larger necessarily came
to exceed the smaller by its greater part, and the divisor multiplied by itself gave the same number as one of the extremes multiplied by the other. They considered, finally, that the interval divided by the harmonic divisor was that which contained between its larger terms (and always in the bottom one) the greater part of it, and which contained the lesser part of it between smaller terms above. The same proportion in which the extremes had compared together was found between their differences and in the same order. These, among many others (which I omit telling you for the sake of brevity, since they are of lesser importance) were the principal cases which the ancient musicians considered in these divisions. I told these to you first in order that I will be more easily understood when I come to prove to you that the five proposed limits actually contain in themselves that

The greater part of the whole is the half.

Cases of the harmonic divisors.
which the ancient musicians understood as "greater harmony". Initially, one finds the diapason twice among the proposed numbers, not in their lower terms, and the places are between 24 and 12, and between 12 and 6 in duple proportion. The diapente likewise is found there two times in the sesquialtera proportion; and the first [place] is between 12 and 8, and the second [is] between 9 and 6. The same is seen happening to the diatessaron within its sesquitertia proportion, that is, between 12 and 9, and between 8 and 6. One finds the diapason plus diapente located between 24 and 8 in tripla proportion, and the disdiapason comes to be contained between the extreme numbers of the five proposed, which are, as has been seen, 24 and 6, having been disposed in quadrupla proportion. To these five consonant intervals there is added the sixth, which is dissonant, and this is the
tone, which comes to be, in lowest terms, between 9 and 8, in sesquioctava proportion. Having proved sufficiently that any of the above-mentioned six musical elements is contained between these five numbers and terms, we will come to demonstrate also how one finds each divisor between them, and afterwards, we will come to demonstrate them with all the pertinent conditions.

In this progression of numbers, that is, 12, 9, 6, one sees, initially, the 9 which divides arithmetically the diapason which is contained between the 12 and the 6. This divisor is derived from half of the product which the extremes make, being added together, while, however, they are between numbers composed among them or related numbers suited to that purpose, and not between prime numbers. Therefore, the

167 Bower, Boethius, pp. 137-139.
interval which 9 divides into two
equal parts is, as we have said, a
diapason, in the bottom part of which
one finds between the 12 and the 9,
which are its larger terms, its
smaller part, which is the diatessaron;
and in the top part, one finds the
larger, which is the diapente, between
these numbers, that is, 9 and 6, and
the differences which are found between
numbers that contain these parts are
unequal, because the 12 exceeds the 9
by as much as the 9 exceeds the 6,
which is 3. One sees, then, that the
12 divides geometrically into two
equal parts the quadrupla proportion
which contains the 24 and the 6 in this
proportionality, that is, 24, 12, 6,
whose divisor is also extracted from
the extremes in this other manner:
one multiplies one by the other and
the square root of that product comes
to be the desired divisor. Now let us

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\textsuperscript{168}Bower, Boethius, pp. 137-139.
come to examine carefully the proposed proportionality, and let us see if all the conditions which you sought are in it. Initially, one sees that the same interval is contained in larger terms toward the low, but in smaller ones toward the high, since they are all disposed in dupla proportion. This is also found in its differences, which are 12 and 6, since the greater [number] exceeds the lesser by its entire half. When the divisor, which is 12, is multiplied by itself, it will give the same product as the extremes, one multiplied by the other, and these are 24 and 6. One can divide all the intervals composed of two equal parts in the same manner, when, however, they are contained by known, rational numbers like the ditone, the semidiatome, the minor heptachord of the ancient diatonic, and others. They are, however, all dissonant with that which consists of more than an octave.
Finally, considering the 8 in between the 12 and 6, one sees that these two numbers are divided by it harmonically into two unequal parts, as the arithmetic divisor does in the same interval contained by the very same numbers, but with different considerations and effects. Therefore while the diapason, having been divided arithmetically, had the lesser part between its larger terms below, the harmonic, on the contrary, has the greater part there, and while the former had the greater part in the high, the latter has the lesser there. In addition, while the differences of the arithmetic proportionality were equal, these of the harmonic are unequal, as clearly appears in its description, that is, 12, 8, 6. One finds its divisor in this manner. First of all, the extremes are added together, from which one obtains 18. The difference of the extremes is

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169 Bower, Boethius, pp. 137-139.
then multiplied by the smaller term, and this product is obtained, that is, 36. When this has been divided by the 18, the result is 2. When this \[2\] is added together with the smaller term, which was 6, it makes 8, which is the desired divisor. Anyone who looks closely notices that in this proportionality the same interval which contains its extremes is found between their differences. Therefore, the 12 exceeds the 8 by 4, and the 8 exceeds the 6 by 2, and the very same proportion which is between the 12 and the 6 is also found, as you know, between the 4 and the 2, and this 4 and 2 come to be in the same order as that 12 and 6, because the difference of 4 is found between 12 and 8, and that of 2 between 8 and 6, but not the contrary. Now all these are the principal circumstances which were considered by the ancient musicians to happen concerning the subject of
"greater harmony". We have also proved that these are in the above-demonstrated progression and proportionality of five numbers which had been proposed and, in practice, it would be more suitable to find it among the four strings of the lyre of Mercury, following, however, the opinion of Boethius as a truer one rather than that of Manuel Bryennius, if beneath the lowest of these [strings] were added [another] which corresponded with the extreme high [string] in quadruple proportion. A similar concentus would likewise be heard issuing from the sound of Pythagorean hammers, if the same one of the five which had been rejected by this Pythagoras had been with that which weighed eight pounds in tripla proportion. It would, however, be less sonorous than that of the lyre of Mercury to whatever degree was tolerable and suitable to the different property and form of the materials which, when struck, rendered
the sound. Some have also believed and still believe that the "greater harmony" is found among the four strings, when strung according to the proportion of the said lyre, with each one of the conditions mentioned. One can refute this opinion for various reasons. These certain men show that they have observed and taken warning from that which Boethius specifically stated in this regard in chapters twelve, thirteen, and fourteen of the second book of his De musica, in addition to that which he first said in the final chapter of the books which he wrote on the subject of arithmetic. Initially, one can refute the opinion of those men with regard to the number of the intervals, since neither the disdiapason, nor the diapason plus diapente, nor even the geometric division with the circumstances which

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170 Bower, Boethius, pp. 128-131.
agreed with its nature and quality were found in use there. That which was lacking among these [circumstances] was [the fact that] the operation of its divisor had to be done by a term or number, and not by two. What is [even] more important is the fact that they want to extract two parts from a whole which the whole is actually incapable [of containing]. In addition, the differences do not contain the same interval which contains one of the means considered as a divisor with the farthest extreme. The whole is divided into these [differences] in a manner suitable to its decorum, which we will demonstrate in this manner. These certain men consider the geometric proportionality between these terms or numbers, that is, 12, 9, 8, 6, which contain virtually the same intervals, and in the same order in which they are found in the cithara of Mercury. They say that the diapente
in its sesquialtera proportion is found between 12 and 8, and between 9 and 6, which is completely true, but it is neither true nor possible to derive them both from the interval which contains the extremes, which is a diapente, unless we add a tone. Besides, the difference which is between the 12 and the 8 is 4, and that which is found between the 9 and the 6 is 3. These, when compared together have a sesquitertia relation, and not a sesquialtera, as reasonably agrees with the nature of this proportionality. Moreover, one does not find nor could there be found in any way between these strings the diapason plus diapente, nor the disdiapason. This is made clear by the extremes, which are tuned in dupla proportion, and the largest interval which one finds among them is the least multiple \([\text{interval}]\). One may well consider this "greater harmony" in the system of fifteen strings by applying to the proslambanomenos the
number 24; to the mese, the 12; to the paranete diezeugmenon, the 9; to the nete diezeugmenon, the 8; and to the netehyperbolaion, the 6. This system acquired the name of "greater perfect" in the times of the ancient musicians for no other reason than the fact that each of their consonances were found in it, and the same occurred to that progression of numbers which was demonstrated above [showing that they] virtually contained it. Others, full of ignorance and presumption, said that the "greater harmony" of the ancients was the octave with the fifth and the third in between. And this is as much as occurs to me to tell you now about this material.
Strozzi: I have only one more doubt, Signor Giovanni, which, with your permission, will serve as the seal of our discussion, and it is this. How does it happen that the compositions of those who are reputed by the general public as great players, both on the lute and on keyboard instruments, do not succeed when they themselves play them? Why is it, also, that others, still of reputation, have left no memory other than their names? Why do some, on the contrary, although they are not well known to the general public, nevertheless succeed excellently when they write in their chosen profession? Why, also, do we find wise, learned musicians who, for all this, fail to write compositions
which are at all satisfactory, at least from the standpoint of practice? On the contrary, when there are others who hardly can read, who know very little of worldly affairs, and who have only the slightest knowledge and experience, particularly of music, why, with all this, do they succeed admirably in counterpoint? And finally, which of these are to be more or less reputed and valued, and why?

Bardi: In order to clear up your doubts effectively, it will be necessary for you to permit my speaking freely—as you said in the beginning of our discussion was appropriate to those who seek the truth of things—but since, according to the flatterers of today, it is ill-bred to name anyone and reprove him with reason, so that knowing his error he will correct it, I shall go over them discussing what I feel about them in whatever order happens to occur to me, and [I shall do so] with the greatest modesty possible, not because what could be said about any [of these matters] would not be the pure truth, but in
order not to be called—although it would be grossly unfair—a slanderer by the jealous and malicious. I say, therefore, that in our times there have been and [still] are many excellent players, both of the lute and of keyboard instruments, among whom some have indeed known how to play well and how to write well, or let us say, how to compose well, for their instrument, for example, Annibale Padovano in the area of keyboard instruments, and Fabritio Dentice, noble Neapolitan, in that of the lute. There have been others and there are others who have written and now write excellently, and who have also known very well how to play but could not play well.

1Gustave Reese, Music in the Renaissance (New York, 1954), p. 415, numbers Annibale Padovano (1527-1575) "among the lesser madrigalists of the Venetian orbit." Reese also states that Annibale "made more important contributions in the field of keyboard music."

Strozzi: How can it be that the same person at the same time can know how to play well and not play well?

Bardi: It happens in the same way with the learned orator. [He possesses] great knowledge and [only a] little grace which nature has granted him when he demonstrates it with his full voice, so that he quite often remedies this defect with the pen, demonstrating with it his excellent worth.

Strozzi: I have understood [this] very well. Please proceed, however, and tell me in detail all that is necessary in order to understand this fact, and afterwards [tell me] some particulars about the wind and stringed instruments of our times with regard to their excellence and antiquity.

Bardi: I will not fail to satisfy you in all that I possibly can with what knowledge I possess. The same thing which occurs to orators sometimes happens also to wise, scholarly players and contrapuntists, who know how to write and demonstrate their knowledge excellently.

A defect which some players and contrapuntists have.
and observe each minimal, particular detail which pertains to playing well and composing well. In another case, however, you will find that the imagination of one player is so devoid of invention, and the fingers and hands of another, either through a defect of nature, or through having practiced [too] little, or through some other eventuality, are weak and ill-suited to obey what reason commands them, so that he is unable to express with them those affections in the manner which he understands them and has impressed them upon his memory. These are the causes why neither one performs his function in an entirely satisfactory way, and why they abandon the attempt, also seeking, like the orator, to remedy this defect with the pen, with which some have succeeded admirably in doing so. There have been and still are others who play well on some instrument or another, and write badly nevertheless. Part of these, who are more prudent, have never bothered to show their knowledge to the world with the pen. Indeed,
if they have composed or written anything, they have not published it, being cognizant of the fact that it had little or no value, and knowing also the blame which would follow when it came into the hands of one or another person of intelligence. There are others who have not known how to do either thing. Nevertheless they have been and are [now] greatly reputed as men of worth. And the same [thing] which has happened to players has also occurred—as you will learn—to ordinary contrapuntists. Men like Annibale Padovano, who have known how to play and [also] write well, are extremely few compared with the existing number of players of keyboard instruments. In all Italy, where [players] are more plentiful than in any other part of the world, I do not believe in any way that they exceed the number of four. Among these are numbered Claudio

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³Reese, Renaissance, p. 415, after citing him as an important keyboard composer, states that he "had preceded Andrea Gabrieli as second organist at St. Mark's [Venice], holding the post from 1552 to 1564."
da Coreggio, Giuseppe Guami, and Luzzasco Luzzaschi. We will speak of the other one, whoever he may be, at another time. The reason why these are satisfying both with the pen and with their playing is because, initially, they have been for many, many years under the discipline of the first-ranking men of the world in that profession and have seen and carefully examined with great convenience all the fine compositions of the famous contrapuntists. By these means, they have acquired an extremely pure and

4Reese, Renaissance, p. 417. "Claudio Merulo (b. Coreggio, 1533; d. Parma, 1604) became a colleague of Annibale's at St. Mark's, succeeding Parabosco as first organist in 1564. Although Merulo's most original works are for keyboard, he was also a madrigal composer of merit."

5Ibid., p. 416. "The Guami brothers, born in Lucca and active there during part of their careers, were for a time court musicians at Munich. Gioseffo [Giuseppe], the more important of the two, became first organist at St. Mark's in 1588. Both published book of madrigals."

6Ibid., p. 411. "Luzzaschi (d. 1607), a pupil of Rore's at Ferrara--himself the teacher of Girolamo Belli, and eventually of Frescobaldi--became first organist there at the court chapel of Duke Alfonso II. He composed seven madrigal books a 5."
exquisite counterpoint. They have studied on their instrument all that time with the greatest diligence and assiduousness which one could possibly imagine, and they continually go on studying and learning. They have been in most parts of the world and have practiced [their skills] with different worthy men of their profession. They have, in addition, been endowed by nature with the finest talent, with great judgment, with apt memory, and with a fair and altogether graceful disposition of hands. In addition—and deservedly—they have had occasion to serve not only great, extremely rich princes, but most knowledgable and judicious ones, particularly about music. In addition [to all these attributes they are] liberal [as well]. You know how much that means and what a stimulus it is to noble, virtuous minds. There are others—still of this first circle—who actually do and understand the things of theory, and perform excellently. For this they are reputed by every intelligent man who knows
of them, but they are so slow of wit and so devoid of invention on account of a defect of nature that the things which they have composed have so little grace that they not only do not delight, but produce satiety and boredom in the hearer with the first two lines. Nevertheless, they discuss those materials and demonstrate them admirably. These men can be compared to that inconstant whetstone, or let us say rock, which sharpens and refines some hard bodies, which then pierce and cut to the extent that one can say they gleam. With all this, [the whetstone] during that time becomes more blunt. Others who are desirable and appear to merit being numbered among these because they have only in their playing such fire and manual dexterity that they fill most people who hear them with wonder. These, when they sit down to write their knowledge are so slow to put on paper that which they have played before, that some who later see and examine their writings take them for those of someone else. That happens for Comparison.

Another sort of player.
no other reason than the fact that the pen does not have the same privilege in writing that the fingers have in playing and the tongue has in speaking, and the fact that there is need of a clearer sign of valor—like the case of brave captains who wish to be considered good cavaliers—than placing one's lance gracefully in rest. From this situation, one can also render judgement of how important those things are which they perform so readily for the ears of the vulgar, when they do not dare to write them and reveal them to the discriminating hearing and judgement of intelligent men, through the fear which they have of them. I will not deal with many particulars concerning the matter of the lute—although I could—since our own Galilei has treated [that subject] at length in his dialogue entitled Fronimo, which he published several years ago. According to what he has told me, he wants to re-publish it right away with a greater

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7 Vincenzo Galilei, Fronimo Dialogo (Venice, 1584). This work was originally published in 1568.
store of secrets than the first impression and with other things [which are] most useful and most necessary to that subject which he treats.

Strozzi: I would like you to tell me, if you please, a single particular [which is] common to instruments with keys [and with frets].

Bardi: Tell me what it is.

Strozzi: Are these two famous instruments equally suited to produce in the hearer the same affections?

Bardi: No, signor.

Strozzi: What is the difference between them?

Bardi: This. All the stringed instruments like the gravicembalo, harpsichord, spinet, clavichord and others like them are very well suited to express the actions both of the body and of the soul, for instance, the Phrygian and Lydian harmonies which contain agitated and orgiastic elements. On the contrary, the lute and the viola d'arco [are suited to express] grave, serious [elements] like the Dorian mode.
This--besides what [actual] experience tells us about these matters--can teach us sufficiently, provided that we forego [any] admonitions concerning the diverse quality and size of the intervals which are found among them. There is, however, one thing of no little importance, that is, what is the material which when struck, renders the sound in both [classifications] of instruments, and what is the genuine cause of that [sound]. The principle of the sound in both of these is--as you know--the strings which are stretched over them, but those of the harpsichord and of the above-mentioned keyboard instruments are [made] of brass and of steel. They are then struck by the poles--here we are comparing degrees of hardness of bone--made from the feathers of ravens and vultures. Those of the lute and of the viol are [made] from the intestines of dumb animals, but even if they were made from those of reasoning [animals], I seriously doubt because of the great conformity and convenience which they have with our nature that they would make other Considerations of the author.
effects better than those [of dumb animals]. The agent, then, which cuts is the bow and that which plucks is a man's finger's. Now consider what the difference is between the strings and the genuine agent of one kind of instruments and the other, that is, how [they are different] with regard to the material from which they are made, where and how they are produced, and the conformity or lack of conformity which they have with our nature. With no further discussion concerning this topic, you yourself will find without much labor, if any, all that additional information you desired.

Strozzi: What is to be said next concerning the organ?

Bardi: Since the organ has many, many pipes of different sizes and bulks fitted with various devices, and since it has an abundance of registers, it is suited to express not only all those affections which agree with the three famous, principal species of harmonies
mentioned previously, but also with those which are higher than the Lydian, and the three which are lower than the Dorian. I come now to deal with that sort of man who writes well and also knows [well] how to play but [does] not [play] well. Such men have acquired their intelligence and knowledge in the same way and perhaps with greater industry than the first [kind], since they have been little favored by nature in manual dexterity and in invention, which are the principal considerations of players and of contrapuntists. Many of these men of both sorts have sought by practice and long study to remedy these defects. Nevertheless, nature has had greater force than art. Therefore, they have also remedied this defect with the excellence of their writings. There are others who in playing a certain instrument, either a stringed instrument or a wind instrument, have the finest dexterity of hands, tongue, and lip that one could possibly desire, accompanied sometimes by good
counterpoint. For all this, they have such coarse, insensitive hearing that it is never possible with regard to the intervals and the meter for them to be in tune even when they are playing a solo. The same thing sometimes occurs to a number of those who have the name of great singers. It happens, for this reason, that some hardly know how to read—let alone speak—and are in addition so rough and so ignorant of practical matters that they could not possibly know any less. All the same, in the subject of counterpoint and particularly in madrigals they succeed so [well] that anyone who hears them is amazed, and this is the reason. These men, in order to adorn their compositions and fill them with spirit, have been endowed by nature with the finest, most gracious passages and the newest and most ingenious inventions that one could possibly imagine. They are, in addition employed by these [men]—speaking with regard to meter—with such charm that it would be Another sort of contrapuntist.
impossible to delight the ear more in that genera. Since many have played well and written badly, one can respond boldly that that has happened because of the vigor and dexterity of their hands, and because they have labored their memories in learning various good things from one excellent composer or another without knowing in addition about the science and the art [of composing]. When these [players] then performed upon the instrument which they had practiced for a long time they delighted [their hearers] greatly, because with their frequent study and assiduous practice, in addition to their natural inclination, they played with a great deal of grace and charm. Part of these players, however, impelled afterwards by an ambitious desire also to be considered learned [men], set out to write down something derived from their instrument without having any knowledge—or, if so, very little—or counterpoint, and as their creations seemed beautiful to them and they loved
them, without thinking further they published them. They made it known that everyone who was to see them would have to consider them according to the interest and knowledge of those [who wrote them]. When [such a composition] comes to the notice of intelligent men, after having examined it they render between them that judgement which the value of the thing and the knowledge of its composer warrants, without precisely caring to understand—since it pertains to them very little—if its author plays it or has played it well or not. It does not seem inappropriate that it is possible to find someone who plays and composes well, but does not know anything because—as I just now told you—it is one thing to practice and another to comprehend. The former is the goal of art and the latter is that of science. The reason that those [players] do not lose their reputation and standing, since after having published their writings they are declared not well-versed in the science
of music—in order not to say ignorant—[a name] which, on the contrary, those who have written and done well but have not played well have not acquired, results principally from this. Each one who hears them play is apt to tell his opinion concerning whether they are pleasing or not pleasing and to what degree, but yet, any man at all is not sufficient to render true, correct judgement of the value of a book, because in order to do this one must endeavor to have a command and knowledge of the subject he treats, but some men are content with only the fact that they are not deprived of hearing. In addition, out of the thousand [persons] who hear them play, not one book will come which is not suited to take nor give a name or a reputation to anyone whenever the author so desires, even though there is no lack of malicious and envious people who, in order to be famous in the darkness of their [own] ignorance have kept buried the good Envy having resulted from ignorance.
[aspects] of many subjects. Many times they have also endeavored to honor themselves, privately demonstrating these things as their own. Therefore, those who are less learned than they are accept them and are satisfied. The average person who hears one player or another performing, since he himself is not in a position to know if he is a worthy man or not, sooner or later asks some true friend who knows of such things or has the same inclination as the one about whom he is asking. When he is told the man is worthy, he reputes him accordingly and listens to him [favorably]. Thus, on the contrary, if his [friend's] reaction to the performance is otherwise, he will repute him accordingly and listen to him unfavorably.

While he is listening to [this player] attentively, his sole criterion is if the fingers are in position, if they glide rapidly along the keyboard, body, or neck of the instrument, and if the things he plays are like theatrical music, or to
use the names which they use, if they are "airy" and "joyful". He expects, in summation, nothing else but to derive what little diversion and amusement he can in order to delight his sense of hearing, probably without thinking--thanks to his indisposition--of feeding his mind also on virtuous sounds and honest songs. He has not thought a thing in the world of the way in which those things which concur--if one can put it this way, however--with the perfection of harmony ought to operate, namely: if the parts of the composition are each heard entirely and with equality of sound; if each one has been played in its proper place; if the fingers hold the note its entire value; if the parts stand in the proper relation to one another; if they continually have a harmonic relationship; if the fugues and imitations are expressed so that they emerge, according to the intention of the composer, entirely comprehended by the ear; if repetition of the notes is used where and when it agrees with the proper means; if the Precepts of the author for being observed in order to play well.
passages which the performer adds to it are observed according to the rules of the said contrapuntists, and the parts in that instance are all heard; if the cadences are diminished, where, when, and how they agree; if those notes which, because of the conception, need to be altered by means of accidental signs to be played sharper or flatter than their normal positions, are actually arranged with the proper care at a convenient time and place; if the impertinent difficulties are judiciously removed by him; if the low part of the composition which he plays has, according to the intention of its author, the third or the fifth or any of the replicates; or, [at last], if the harmony proceeds continuously in the same measure and proportion. [I say that] he does not think a thing in the world [about these things] nor is this possible since he is in no way capable of thinking of them although presumptuously he wishes to give judgement of everything and secretly to tear to pieces one virtuoso or another, Since the vulgar man does not understand [something], therefore it is not valued by him.
and to debase and despise all the things which apart from him are known, said, and discovered by others. To understand and operate these [things] mainly requires intelligence in the player, and when he finds it he admires him, and much more when there is added to this speed, sonority, and the graceful disposition of the hands which has many times been mentioned. But merely intelligence without those other things he not only does not value, but he makes fun of it, and there is a reason which impels him to do that. If we happened to hear a lesson of philosophy or of another noble subject, and if the lecture were carried on with the greatest possible excellence with regard to perceiving in it lofty, difficult conceptions which were clothed with choice words, pronounced with the greatest grace desirable with sonorous voice, suitable gestures, and with marvellous order, I believe that everyone of the hearers would say in the end that [the speaker] was a rare, divine man, and he would be
admired by all as one of the greatest literary men in the world in that subject. But if afterwards an intelligent, famous man came along and pointed out that the other man had memorized that lecture and that he was [actually] extremely ignorant of matters pertaining to philosophy or to that subject which he had discussed, each one who had placed complete confidence in that speech would—in my opinion—suddenly change his verdict and would praise in him only those parts which were truly his, for example, his sonority of voice, his fluent pronunciation, the sweetness of his accents, his grace in speaking, the beauty of his gestures, the capacity of his memory, and, in summation, everything except his knowledge. Such things as these are seen and heard everyday happening to countless very young children on the stage, in cathedrals, and upon pulpits. Those other men, then, [who are also] reputed by the vulgar as great players, never write, or to say it better, do not publish anything of their own. This happens because they do
not feel suited to give satisfaction with it as they do with instruments, because in writing it they do not have to please the general public who ordinarily have—as you know—little knowledge of the good in things, but they do have to please particular ones, very often more learned than themselves. Therefore, being shrewder than those others of the same order, they remain [aloof] without caring at all to reveal to the world by means of writings what their fine knowledge of playing may be. They are no different from those who make clever improvisations. When they sing these at random they make—in a manner of speaking—whoever hears them marvel, without otherwise valuing [the idea] of bringing forth and publishing that which they said in their songs, knowing very well that the conceptions and the quality of the words, of the rhymes, and of the verses would probably arouse to laughter the greater part—if not all—of those who read and heard them, which did not occur when they recited them. This
was because they have not given time to
the hearers to understand them, let alone
consider them and [also] because--as has
been said--their readers are different
from their hearers. I am able to give
you clear examples of each one and point
out to you what they are, which I will do
when it is convenient.

Strozzi: You have depicted them so
naturally to me in your discourse that I
recognize them distinctly one by one with-
out even writing their names\(^8\) there.

Bardi: I did not mean by this to
speak of anyone in particular, and if per-
haps there is someone who took on that
scent as a result of my reproach I would

\(^8\)It has not been possible to establish
definitely the identities of Galilei's con-
temporary musicians who, according to his
allegation, belonged to this category, with
the possible exception of Luca Marenzio.
See Alfred Einstein, *The Italian Madrigal*,
3 vols., translated by Alexander H. Krappe,
Roger H. Sessions, and Oliver Strunk
(Princeton, 1949), I, 241. Speaking of
Marenzio, Einstein asserts that "Galilei's
invective is presumably directed chiefly
against him, as is perhaps also another
passage of his *Dialogo*, in which he speaks
of highly gifted but 'uneducated' com-
posers of madrigals."
prefer for this man to consider me, not in terms of men, but in terms of proper reason. Before I proceed to discuss the fourth and last species of musicians of our times which are, calling them by their proper names, dance-players, loved and favored by the vulgar, it is appropriate, also according to your desire, to tell you something about artificial instruments and some particulars concerning those who play the trombone, the cornet, the viola d'arco and the violone. We will put in first place, deservedly, the professors of the viola [d'arco], in second [place] those of the cornet, and in third and last place those who have devoted effort to studying the trombone. Speaking in general, I say that each one of these professors deserves to be reputed whenever his work is of that excellent standard which it is desirable to establish. I warn you, however, that those who have need of this sole particular, in order to show the disposition of the lips, the agility of the tongue, and the speed

The author discusses concerning the origin and the excellence of the instruments of his time.
of their fingers, believing that knowledge consists of these, will thus detract from the true being, air, semblance, effigy, and natural beauty of any composition which they may have in hand, enveloping it from head to foot in the confused fog of their "winged" passages, or tirades, as they are called. Due to this disproportionate and unbecoming disguise—in order to know it by name—there occurs the same difficulty which existed in the times of Cimabue and Giotto, that is, discerning in their pictures many principal and most important differences, for when these men depicted


10Giovanni Cimabue (1240?–1302?) was a Florentine painter, a lesser contemporary of Giotto.

11Giotto di Bondone (1276?–1337?) was a Florentine painter and architect. See Bernhard Berenson, The Italian Painters of the Renaissance, 3 vols., (London and New York, 1952), p. 1ff. Berenson tells us that Giotto, a wit and versifier in addition to being a painter, differed from most of his Tuscan successors in having peculiar aptitude for the essential in painting as an art. His paintings appeal to the tactile imagination, particularly human figures, but convey a keener sense of reality than the objects themselves.
simple plants, volatile animals, aquatics, terrestrials, and finally reasoning animals, it was most difficult if not impossible to tell the borage from the nettle, the sparrow from the linnet, the trout from the spider, the hare from the cony, and Julius from Alexander. Being discreet and well-intentioned men, however, in order to remove each doubt from those who did not regard them without wondering, they wrote their names beneath them. There is no less need of this in pieces played by the hands of those for whom it is customary, wishing to distinguish one from the other. Therefore, one sees immediately an overly long arm on one of these and another time they are given ill-fitting clothing draped to mid-leg. The above-mentioned painters, however, are not only worthy of forgiveness but—because of their simplicity and that of the century and the novelty of the thing—[worthy] of infinite praise, having by their hands restored beauty to life and [revived] noble painting. On the contrary, those players are worthy,
through their temerity, of rebuke, even punishment, and not a light one. There is also no lack of persons like these among players of the lute and of keyboard instruments, but enough has been said. The cornets and trombones were invented and introduced into musical concerts rather through the need for sopranos and basses, or let us say in order to provide more substance and noise in these concerts, or else for both reasons, than because of some good, necessary effect which they make there. In order to prove that this is true, observe that these instruments are not ordinarily heard elsewhere except where it is necessary for such voices. In those places, then, where sound is abundant or sufficient, they are never heard, that is, where musical conceptions are produced in order to relish that good aspect which the music of our times has, provided, however, that such an aspect is found. They will indeed be heard many times in masquerades, in the theaters, upon the balconies of the public squares.

Why cornets and trombones were introduced.

Employed for the satisfaction of the common people.
for the satisfaction of the plebeians and the people, and, against every propriety, in choruses and in organ lofts of sacred temples for the solemn feasts. The vulgar foolishly believe that the gods more willingly hear the artificial noise which is made by pipes of bone, of wood, and of metal when filled with air than mere voices, words, and human conceptions. [Voices] were given to man by the gods mainly in order for him to praise them, to honor them, and to render them thanks. Such instruments as these [cornets and trombones] are never heard in the private chambers of judicious gentlemen, lords, and princes where those who indeed possess refined judgement, taste, and hearing reside, because they are totally banished from these [chambers]. This does not happen to the viola d'arco due to the agreement and proportion which its sound has with the human voice and nature. The cornet, in my opinion, is an instrument more to be used in armies, in the same manner as the Spartans used the aulos,
than in private chambers. Since the trombone possesses a sound quite similar to the bellowing of bulls—in order not to say buffaloes—and since it is consequently formidable, it would be very appropriate in forests in order to chase the wild beasts from their homes and lairs and frighten them like Astolfo Galigorante used to frighten them with the horn, in order that they would easily yield themselves into the nets and snares set for them. One could not or should not, for various reasons, compare such professors as these to any of the reputed players of the lute and of keyboard instruments, first because of the great facility of the latter and the great difficulty of the former, and also because trombones play only one part, ordinarily using the music. In addition, only one of these is not worth a thing in the world, since four to six are needed—according to the usage of today—for the perfection of the harmony, and since in addition

\[\text{Astolfo Galigorante is a character in Ariosto's epic poem, Orlando Furioso.}\]
their professors are unable to speak, let alone discourse while they are playing them. In addition the one playing them can very easily remain not only without any knowledge and practice of counterpoint and theory, but also without the "mother of music" or that of another good, important thing. The trombone in particular—in addition to most wind instruments—is an instrument less employed by nobles than any other, and they, being well-born, do not wish to practice on it, perhaps moved by the example of Minerva, or indeed of Alcibiades, or else in order not to be considered sons of Aeolus by those.

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13 Minerva was the ancient Roman goddess of wisdom, technical skill and invention. She corresponds with the Greek goddess, Athena. See p. 884 below.

14 Alcibiades was an Athenian politician and general in the Peloponnesian War; he lived ca. 450-404 B.C. Plato in his dialogue Alcibiades I points out through Socrates that Alcibiades refused to learn the aulos but not the lyre.

15 Aeolus was the mythological Greek god of the winds.
who see them play and come to injure their mothers in the same way that Alexander the Great did to Olympia, when he said that he was the son of Jove. These instruments are also worthy to be disdained for the reason which Aristotle gave in refuting the aulos, and this is what he said. "It happens that the aulos produces a contrary effect to erudition by impairing the use of reason." And therefore, they forbade the practice of it to youths of noble birth. In addition, he said that "the mark toward which those who play them have aimed is not good because the spectators, being vile men, are accustomed

16 Alexander the Great (356-323 B.C.) was a military conqueror and king of Macedonia who helped to spread Greek culture through the East and in Egypt. See Plutarch, Regum Et Imperatorum Apophthegmata, Vol. III of Plutarch's Moralia, 15 vols. (London and New York, 1931), p. 61. "In the shrine of Ammon he [Alexander] was hailed by the prophetic priest as the son of Zeus. 'That is nothing surprising,' said he; 'for Zeus is by nature the father of us all, and he makes the noblest his own.'"

to wanting a variety of music, and, therefore, those who employ them make themselves and their persons similar by means of the emotions." "This thing is not for free men, but for servile ones", as he said on another occasion, "and for artificial mechanics." One cannot give a definite answer [as to] which of the modern instruments was first or afterwards discovered by men, since no writer exists--that I know about--who has left any reference to this. The same difficulty results--as you have seen--among those of the ancients, unless we want to say, together with the fabulous poets, that Apollo, full and ornate with every virtue and science, was not only inventor of music, but of the lyre, the aulos, and the reed-pipe, that is of wind instruments, of stringed instruments, and afterwards of singing, arguing through the testimony of Plutarch together with Alcaeus and others that

\[\text{Apollo \[was the\] inventor of playing and singing.}\]

\[18\text{Plutarch was a Greek biographer and moralist who lived ca. 46 to 120 A.D.}\]

\[19\text{Alcaeus was a Greek lyric poet who lived from 620-580 B.C.}\]
the men of those times, in memory of this benefit received from him in offering him sacrifices, were not without the chorus and the above-mentioned musical instruments. Besides, there was also seen in the temple of Delphi, in perpetual memory of the things [he bestowed], a statue of the very same god, sculptured in this manner. The said statue of Apollo supported the bow with the right hand, the arrows to which hung on the left side, and with the left hand he held the Graces, each one of whom held a musical instrument, one having the lyre, the other the aulos, and the one who stood in the middle continually held the sampogna\textsuperscript{20} to her mouth. The makers of

\begin{quote}
The sampogna, or bagpipe, has been the source of philological and musical speculation for many years with regard to a certain Biblical passage which reads, "... when you hear the sound of the horn, pipe, trigon, harp, bagpipe and every kind of music, you are to fall down and worship the golden image that king Nebuchadnezzar has set up. ..." See The Holy Bible, (Daniel 3:5, Revised Standard Version). See also Willi Apel, Harvard Dictionary of Music (Cambridge, 1969), p. 817 under "sumponyah". The rendering of the word sumponyah (or sumponia) as "bagpipe"
\end{quote}
this statue are said to have lived at the time of Hercules, although others claim that Apollo learned this art from Minerva, to whom the invention of the auloi is attributed, particularly by Aristotle, according to whose opinion they had later been disdained by her and thrown away, not because holding them in the mouth and inflating the cheeks in playing them made her ugly, but because the discipline of such instruments, he said, did no good to the mind, and science and art are attributed to Minerva. Leaving to one side, however, the inventions of the artificial instruments, the ancient poetry, and the fables, and coming to the origin of those of our times, I say that anyone who would allege the existence of that instrument in those early times. Another possible translation of that word would be as an adjective meaning symphonious, used to modify a preceding word, that is, symphonious psaltery. See Curt Sachs, The History of Musical Instruments (New York, 1940), p. 84-85.

proceeds to conjecture the matter shrewdly
and rationally and to examine it with care
will easily find enough concerning their
origin to point out convincingly the pro-
bable location, if not the actual one,
where they were derived. [It will also be
possible to show] which was introduced
first and which [was introduced] later,
as well as why and by whom. Among the
stringed instruments which are in use
today in Italy, there is first of all
the harp, which is none other than an
ancient cithara with many strings, al-
though somewhat different in form. [This
change] was effected by the artisans of
those times only because of the quantity
of these strings or their intensity,
since the extreme low strings with the
extreme acute string contain more than
three octaves. This extremely ancient
instrument—commemorated by Dante
22

22 Dante Alighieri, La Divina Commedia
(Paradise, XIV, 118-123), 3 vols., ed. by
Giacomo Poletto (Rome and Tournay, 1894),
III, 319. "And like a viol and harp with
harmonious strings make a sweet tinkling
to someone who does not comprehend the
meaning of the sound, thus, by means of the
Cross, I perceived a melody, from lights

The harp comes to us from Ireland.
was brought to us from Ireland\textsuperscript{23} where they are made excellently and plentifully. The inhabitants of that island practiced on it many, many centuries ago. In addition, it is a national institution. They paint it and sculpt it on public buildings and on their money, alleging, for that reason, to be descendants of King David the prophet. The harps which the said people [of Ireland] use are much better than our ordinary [instruments] and commonly have strings of brass, and a few of steel in the high range like the gravi-cembalo. The players of these [instruments] are accustomed to letting the nails of both their hands grow very long, decorating these [nails] artificially in the manner which one sees the quills in the jacks which pluck the strings on spinets. The number of which appeared to me there, which filled me with rapture without my understanding the hymn."

these [strings] is fifty-four, fifty-six, and up to sixty, although, according to the Hebrews, one does not read that the cithara or psaltery\textsuperscript{24} of the prophet [King David] exceeded ten in number. I obtained the distribution of the strings of this harp a few months ago—by means of a most genteel lord of Ireland—after having examined it carefully, I found [it] to be the same as that which was introduced with double strings a few years ago in Italy, although some—against every proper reason—say that they have newly invented it, seeking to convince the vulgar that others besides themselves do not attempt to play it nor understand its tuning. They hold this tuning in so much esteem that they have ungratefully denied it to many. Unfortunately for those [men], I want to describe it in this place for the convenience of those who desired it and also to remind

\textsuperscript{24}The psaltery is a medieval term derived from the Greek word "psalterion". See Sachs, History of Musical Instruments, p. 292. Ibid., p. 106. "The kinnor was the famous instrument on which . . . King David excelled, and which for a thousand years has erroneously been called 'King David's harp'.
them and all the others of such a bad
nature that if the men who were excep-
tional in the world in different noble
professions had not so laboriously
left written for the benefit of posterity
many, many volumes with regard to these
[professions], these men of today would
have been through their fault extremely
ignorant, and the fame of those [writers]
would have been obscured, while by means
of the excellence of their writings,
they live eternally in the memories of
others and each one can [in turn] become
most learned and also--if one can say it
truthfully--happy, if, however, the
happiness of this world consists of
nothing else but knowing and understanding
the truth of things. Since the noble,
virtuous minds of our times have been
invited by the example of these [men],
they willingly apply themselves to learn-
ing the sciences, for no other purpose
than to facilitate them and to illustrate
them with their writings, without ever
denying or concealing a single important
thing which they know from those who do not do it and desire to know it. The ungrateful do not notice that what little they know, they have learned from someone or other, and if [that person] had been stingy or had denied it to them, they would have been most unhappy. But returning now to the tuning of the harp, I want, for the greater benefit of those who seek to understand it, to give some advice concerning it. Therefore, I say, initially, that the extremes of the fifty-eight strings with which they have strung it contain within their limits four octaves and a tone in addition, not greater or less as some have dreamed, but of the measure which I have said is the one in which the keyboard instrument contains it. The extreme low string, then, [proceeding] through h mi as well as through b molle is CC, and the extreme high string is ddd. When one wants to tune [the strings] through b molle, the sixteen low strings on the left hand are distributed according to the common diatonic, and the fourteen [strings] opposed to these which come on
the right side—omitting, however, the unisons of d and of a—must yield—so to speak—the chromatic genera, conformed in its nature to the said diatonic. The fifteen which then follow these toward the high [range] are tempered diatonically according to the manner of the sixteen lower [strings] of the left side. Then the thirteen which follow above the first sixteen come to perform the function of the lowest strings of the right [side] as one sees in the example [below]. Then, when one wants to play through h durum, one takes away the b molli from each diatonic and places [them] in both chromatics in place of the h dura, and the latter are put in the places of those [b molli] in the diatonic on the right and left side. This method of proceeding was so ordained by its author for the convenience and facility which the fingers of both the hands have, particularly in performing diminutions and tirades.
[DIAGRAM XXVIII]

THE TUNING OF THE IRISH HARP

<table>
<thead>
<tr>
<th>High side</th>
<th>Left side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ddd 1</td>
<td>3 X Ccc</td>
</tr>
<tr>
<td>Ccc 2</td>
<td>5 hhh</td>
</tr>
<tr>
<td>Bbb 4</td>
<td>7 Aaa</td>
</tr>
<tr>
<td>Aaa 6</td>
<td>9 X Gg</td>
</tr>
<tr>
<td>Gg 8</td>
<td>11 X Pf</td>
</tr>
<tr>
<td>Pf 10</td>
<td>13 b E</td>
</tr>
<tr>
<td>Ee 12</td>
<td>15 Dd</td>
</tr>
<tr>
<td>Dd 14</td>
<td>17 X Ce</td>
</tr>
<tr>
<td>Cc 16</td>
<td>19 hh</td>
</tr>
<tr>
<td>Bb 18</td>
<td>21 Aa</td>
</tr>
<tr>
<td>Aa 20</td>
<td>23 X g</td>
</tr>
<tr>
<td>g 22</td>
<td>25 X f</td>
</tr>
<tr>
<td>f 24</td>
<td>27 b c</td>
</tr>
<tr>
<td>E 26</td>
<td>29 d</td>
</tr>
<tr>
<td>d 28</td>
<td>31 c</td>
</tr>
<tr>
<td>X c 30</td>
<td>33 b</td>
</tr>
<tr>
<td>h 32</td>
<td>35 a</td>
</tr>
<tr>
<td>a 34</td>
<td>37 G</td>
</tr>
<tr>
<td>X G 36</td>
<td>39 F</td>
</tr>
<tr>
<td>X F 38</td>
<td>41 E</td>
</tr>
<tr>
<td>b E 40</td>
<td>43 D</td>
</tr>
<tr>
<td>D 42</td>
<td>45 C</td>
</tr>
<tr>
<td>X C 44</td>
<td>47 B</td>
</tr>
<tr>
<td>h 46</td>
<td>49 A</td>
</tr>
<tr>
<td>A 48</td>
<td>51 Γ</td>
</tr>
<tr>
<td>X Γ 50</td>
<td>53 FF</td>
</tr>
<tr>
<td>X FF 52</td>
<td>55 EE</td>
</tr>
<tr>
<td>b EE 54</td>
<td>57 DD</td>
</tr>
<tr>
<td>DD 56</td>
<td>58 CC</td>
</tr>
</tbody>
</table>

Low
One finds, moreover, that the said strings each recur a given number of times, that is, c recurs five times, d recurs five times, e recurs four, f recurs four, g recurs four, a recurs four, b recurs four, and h recurs four. There are four unisons of d and four unisons of a. There are four dieses of c, four dieses of f, four of g, and four b molli of e. In all they make a total of fifty-eight strings. In addition, those which are lacking for the perfection of the variety of concetti are the four dieses of d and the four b molli of a. Because of this, their unisons, which are among the chromatic strings, are placed in those compositions where these strings occur. These unisons impart the greatest facility to the diminutions, which is clearly manifested in practice. This facility is the reason that they are distributed, ordinarily, as I have told you and shown you by example. The harp is so similar to the epigoneion and simikion that one can say with justification
that it is one of these [instruments].

I also think that the one who believes it true that the strings are tuned in the same manner and proportion on the harp as on the epigoneion and the simikion is utterly incorrect. It happens that these instruments had not been introduced until after people began to play in consonance, and that distribution is more suited to that [manner of playing], as you have learned extremely well. In order to remove the doubt which could result to you if the harp were tuned according to the usage of the lute or of the keyboard instruments, when you remember what has been said previously, it will be removed at once. I do not want to ignore the blame which some seek to give to the lute when they say without any reason that the keyboard instrument

25Sachs, History of Musical Instruments, p. 137, infers that the epigoneion and the simikion were ancient members of the zither family.

26Zarlino, Istitutioni, p. 344. "One should know, if not perfectly, at least fairly well how to play the monochord, or harpsichord, because it is the most stable and the most perfectly tuned of all the instruments."
is more perfect in its harmonies than
every other instrument, and consequently
better than the lute. How far this state-
men is from the truth can be openly com-
prehended from that which was said above
with regard to the temperament of their
intervals. Returning to the invention
and origin of modern instruments, I say
that the harpsichord probably originated
from the harp because of the similarity
of its name, of its form, and of the
quantity, disposition, and material of
its strings, although in Italy the pro-
fessors of it say that they have invented
it. This instrument is nothing else ex-
cept a harp lying down, and from it the
other keyboard instruments were derived.
Before each one of these, however, the
organ [was introduced]. This instrument

27Sir John Hawkins, *General History
of the Science and Practice of Music*, 2
of the *Dialogo*, Sir John Hawkins says,
"At the close of this work he gives a
probable account of the inventors of many
of the instruments now in use." Galilei's
account frequently specifies places where
these instruments supposedly originated.
His source of information may have been
travelers from those places, like the
"most genteel lord of Ireland" mention-
above (see p. 887).
was first used in Greece, and from there it was brought by way of Hungary into Germany among the Bavarians. I say that because I saw one among the others in the cathedral church of Monaco, the most important city in that province, with pipes of buffalo [i.e. ivory] all in one piece which were greater and rounder than our ordinary ones made of metal. It is the most ancient of its kind and size of all the others that are found, not only in all Germany, but perhaps in every other part of the world, and is therefore held in veneration by those people. Among the ancient references of authority which I have found with regard to the authenticity of this noble instrument, there is one in a most elegant epigram of Julian the Apostate, nephew of Constantine,


A strange growth of reeds do I behold. Surely they sprang on a sudden from another brazen field, so wild are they. The winds that wave them are none of ours, but a blast leaps forth from a cavern of bull's hide and beneath the well-bored pipes travels to their...
a tyrannical emperor of Constantinople who reigned in 363 A.D. In that epigram he describes the organ carefully as a new, wonderful thing. I find no other difference between ours and that one but the material of which the pipes are constructed, and consequently the quality of the sound, because, according to [Julian], those pipes were copper and rendered an extremely shrill, vehement sound. I also believe, through my familiarity with the material, that the organ which Dante mentioned was not precisely like that which is usual today, but instead different in many respects.

roots. And a dignified person, with swift moving fingers of the hand, stands there and handles the keys that pass the word to the pipes; then the keys leap lightly, and press forth the melody.

29Dante Alighieri, La Divina Commedia, (Purgatory, IX, 140-145), 5 vols., ed. by Giacomo Poletto (Rome and Tournay, 1894), II, 218. "And I seemed to hear the Te Deum laudamus sung by sweetly blended voices. The precise image was rendered to me by what I heard of what one customarily receives when people stand and sing with organs, that the words were one time understood, another time not understood."
for example in the great number and size of the pipes, in the distance of the extremes, in the abundance of registers, and in many other details which I omit in order not to be tedious. The organs, then, which are commemorated by Suetonius Tranquillus\textsuperscript{30} in his life of Nero and by Vitruvius\textsuperscript{31} in reference to the hydraulic music of the same [Nero], and [also]

\textsuperscript{30}Caius Suetonius, Lives of the Twelve Caesars, translated by H. M. Bird (London, 1930), pp. 291. "...during the remainder of the day [Nero] led them about with him to view some musical instrument of a strange device, not hitherto known, which was played by water..." Ibid., p. 300. "Certainly, a little before the end of his life, he had publicly vowed that if he continued in power in the state, he would exhibit in his own person, at the games which would be held in honor of his success, a performance upon the organ, as well as upon flutes and bagpipes."

\textsuperscript{31}See Vitruvius Pollio, Ten Books on Architecture, translated by Morris Hicky Morgan (Cambridge, 1914), pp. 299, 300, for a complete description of the hydraulis, or water organ. See also Willi Apel, "Early History of the Organ", Speculum, XXIII (April, 1948), pp. 191-216.
Gioseffo [Zarlino], 32 when he speaks of David in reference to Hebrew antiquity, do not—as far as I know—have a thing in the world to do with ours except for the name. Although the term "organ" is read countless times in the ancient writers with reference to musical instruments and to other [things], it happens because they have understood by this any one of these because its significance is "instrument" and "to ascend up high", which is the nature of every sound and voice. Finally this has remained the specific name of that instrument which has power to produce even more the effect which it signifies. I have said that the organ was the first to be invented of all the keyboard instruments, since the making of strings for the others, which are brass and steel, is a modern discovery of which no reference is found—as far as I know—by the ancient Greeks or the Romans. Although I have said that the people of

32 Zarlino, Istitutioni Harmoniche, p. 7.
Ireland use these metal strings in their harps, I do not mean by this that they used them before they had been discovered by their inventor, since they first used gut-strings. I now come, however, to deal with those wind instruments to whose sound tragedies, comedies, and satires were recited—as I mentioned on other occasions. The ancients also practiced every kind of saltation to their sound, and there were many kinds of saltation.

Strozzi: You have told me many times that the ancients sang their tragedies and comedies to the sound of the aulos and the cithara and you have also shown me what authority has moved you to say and believe this. Next, tell me why they were induced to do that. My desire, if it pleases you, is to understand better how the wind instruments of our times and of other times were derived.

Bardi: You are quite right to ask. Now let me advise you that the tragedies and comedies actually had been sung by the Greeks in the manner which you have
learned. Aristotle[sic.] said it--in addition to the other trustworthy authorities--in the section on harmony at problem forty-nine [sic.]. It is true that in the Poetics, when he comes to the definition of tragedy, he seems to forget that first opinion in some respects.34

[The fact] that this usage was later accepted and followed by the Romans is

33 Aristotle refers to the choruses in tragedies, which avoided the Hypodorian and the Hypophrygian modes as inappropriate. These modes, being more noble and active in character, were more suited to the actors on the stage who portrayed heroes, while the chorus represented mere men. See Aristotle, Problems, 3 vols., translated by W. S. Hett (Cambridge and London, 1961), p. 413. The Problems are numbered among Aristotle's spurious and doubtful works.

34 See Aristotle, Poetics (1449b24-31), ed. by Richard McKeon (New York, 1941), p. 1460. "A tragedy, then, is the imitation of an action that is serious and also, as having magnitude, complete in itself; in language with pleasurable accessories, each kind brought in separately in the parts of the work; in a dramatic, not in a narrative form; with incidents arousing pity and fear, wherewith to accomplish its catharsis of such emotions. Here by 'language with pleasurable accessories', I mean that with rhythm and harmony or song superadded; and by 'the kinds separately' I mean that some portions are worked out with verse only, and others in turn with song."
something we are convinced to believe by reading the inscriptions of the comedies of Terence, in addition to the other authoritative references. I believe, then, that the reasons for that were the ones I now state. Since all sorts of different verses were sung by only one person, it seems more suitable and reasonable that [this soloist] would be accompanied by the sound of some instrument rather than

35See Edward St. John Parry, ed., Publirr Terentii Comediae Sex (London, 1857), pp. 5-6. Terence gives instructions at the beginning of his plays for the use of particular musical instruments. Parry tells us that "the 'tibiae dextrae', called also 'incentivae' were held in the right hand and set the tune, and answer to our treble. They were the smaller, and made of the middle part of the reed. The 'sinistrae' were made of the lower and larger part, and were held in the left hand, answering to our bass. They were also called 'succentivae', as playing only the accompaniment. 'Tibiae pares' were two of equal size, with the same number of stops [holes], for the grave Doric measure. These were also called 'sarranae'. 'Tibiae impares' were unequal in size and stops [holes], suited to the sharp Lydian measure, and also called Phrygiae. The expression of the text, 'tibiis paribus dextris et sinistris' meant that the play was acted with flutes of equal size, right-handed flutes being used in one part of the play, and left-handed in another; the play being serio-comic, requiring a mixture of measures."
deprived of it. One also notices this
suitability in the instrument whenever it
is playing the air of some canzona and is
joined by the voice of someone who sings
along with it. It seems, also, that the
dance is unsuitable without the sound. In
the same way one does not obtain full satis-
faction from hearing some air played with-
out the singing which goes with it nor
from a solo [voice] without the sound of
the instrument. Now this—in my opinion—
happens to be one of the causes which in-
duced the ancients to sing the verses of
their tragedies and comedies along with
an instrument. Besides, when the actor
sang in unison—not in consonance, as it
has been said and proved—with the instru-
ment, whether it was the aulos, the cithara,
or another instrument, his voice came to be
understood even more by the spectators, and
what was more important was that the aulete
or citharist, being skilled in the art of
music, came, by means of a well-tuned
instrument, to maintain the actor on that
pitch and tone—speaking of high or low—
and to cause him to utter the syllables of long and short verses one time with great volume, and another time with a little, according to what agreed with the quality of the conceptions which he was seeking to signify with the words. These conceptions ordinarily were not always understood by the actors, nor would they have expressed them fully with the proper circumstances without the aid of practical musicians. Now if you desire to understand why the actors availed themselves of only the Dorian and Phrygian harmonies and the chorus used only the Lydian, you will learn it from the problem of the philosopher we have cited, provided, however, that the errors in the text, which are numerous and important, are removed. Coming to deal with the origin of the wind instruments as I promised you, I say that among those of the Greeks one first of all finds the aulos, which is the same thing as the tibia of the Romans and the same as our
pipe. Only one difference between those and our own can be found. While on the aulos and the tibia the holes were distributed according to the species of the diatonic ditoniaion, those of the pipe are ordered according to the syntonon of Aristoxenus or that of others, even though it is not very difficult for practical players of this instrument and of the other wind instruments from the organ and trombone on to cause a semitone to be heard between those holes which as keys are ordinarily a tone apart. On the contrary, when one finds that they are able easily to cause a tone to be heard between those holes which as keys are a semitone apart, this practice when well performed brings to professors of these instruments the greatest reputation and convenience to those who employ it in their concerts. The other difference which can result between ours and those

36 Apel, Harvard Dictionary, p. 678. "Pipe [piffero] is the old Italian term for various wind instruments, such as the shawm, fife, and bagpipe, all of which were used by shepherds."
is in the quantity of these holes, because it is probable that the aulos and the tibia did not play as great a number of pitches as the pipe of our time does, with reference to the usage of playing in consonance, and having for that reason the need of many. From this sprang the pipe, or bag-pipes, as it is called today. This is actually an extremely ancient instrument, as Dionysius Longinus\textsuperscript{37} with the testimony

\textsuperscript{37}Cassius Longinus, On the Sublime, translated by W. Hamilton Fyfe (Cambridge, Massachusetts and London, 1965), p. 129, describes "an affected creature, blowing as Sophocles says, 'on scrannel pipes, yet wasting all his wind'." Compare Cassius Longinus, On the Sublime, translated by Benedict Einarson (Chicago, no date), p. 7, that is, "on little pipes, but uses not the mouthpiece." The quotation comes from a lost orithyia of Sophocles. \textit{Ibid.}, p. 7, n. 11, cites Cicero (Letters To Atticus ii, 16.2) where the same quotation appears in fuller form. "No longer does he blow on little pipes, but with wild blasts, and uses not the mouthpiece." Although the version of Longinus used by Galilei uses the term "sampogna" for "pipes", the implication of "bagpipe" at the time of Sophocles would seem insupportable. The Greek word rendered by Einarson as mouthpiece actually refers to the chin-strap characteristicly used by auletes. According to Sachs, History of Musical Instruments, p. 141, "the first bagpipe of which one can be sure existed in the first century A.D." He refers to the one Nero proposed to play, as related by Suetonius. See p. 897 above.
of Sophocles tells us when referring to a loquacious, little-known orator of his times in these two lines.

[146]

[His cheeks] well filled the pipes to sound
That bag yet swells not halfway round.

This instrument has been used a great deal by the people of Ireland whose sound is employed by those indomitable, fierce, war-like people to move their armies and animate them to come to blows bravely against their enemies, also accompanying their dead with it to the tomb, playing modes so lugubrious that they invite, even force, the bystanders to lament.

From the pipe, moreover, all the other wind instruments were derived, including direct flutes, which were perhaps the first to be found, since in being played, these [direct flutes] had, in comparison with the other instruments, a great deal of artificiality and difficulty. This was true also because the sound of both instruments was much more gentle, delicate,

38 Sophocles was a Greek tragic dramatist who lived 494?-406 B.C.
and delightful to our ear than that of the pipe, although [the pipe] is more agitated and querulous, and suitable through the quantity and vehemence of the sound to produce with greater effectiveness those affections which agree with its nature. It is not believable that the ancients had knowledge of these two kinds of flutes, as some commentators have believed and accepted them in place of the aulos, since not the slightest trace of them has been found in any important author, nor in old curiosities.

Strozzi: I am accustomed to believe, having read the fact, that Gaius Gracchus\(^\text{39}\) always kept behind him a servant-musician, when he had to speak to the people, who cleverly supported him with a flute or flageolet of ivory or some other material, playing in a mode suitable to the expression of the conception which he had in hand.

\(^{39}\)For accounts of Gaius Gracchus and his flageolet player, see Zarlino, *Istituzioni*, p. 5; Valerio Massimo, *De' Fatti e Detti Degni di Memoria*, translated by

Bardi: In reference to this, the writers make mention of the syrinx\(^{40}\) and of the fistula\(^{41}\)—which means the same thing—and not of the flute. This syrinx is nothing else except those seven pipes—which in progress of time ascended to a greater number—of different lengths and thicknesses with heads [bound] together with wax and string. They are ordinarily depicted in the hand of the god Pan\(^{42}\) in memory of his beautiful, well-beloved Syringa turned by Jove into a reed. Its form is similar to the wing of a bird or to a small organ. The invention of [this syrinx] is attributed to the Celts.\(^{43}\)

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By whom the syrinx was discovered. Julius Pollux in the 2nd chapter.

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\(^{40}\) The syrinx, or panpipes, is described in Zarlino, *Istitutioni*, p. 301.

\(^{41}\) The fistula is a reed-pipe or shepherd's pipe.

\(^{42}\) Pan, in Greek mythology, was a god of fields, forests, wild animals, flocks, and shepherds, represented with the legs (and sometimes the horns and ears) of a goat.

\(^{43}\) See Eric Bethe, ed., *Pollucis Onomasticon*, 3 vols. (Leipzig, 1900-1937), I, 279, for an account of the invention of the syrinx by the Celts.
Strozzi: It has been very agreeable to me to learn these particulars. Proceed therefore, weaving the rest of your well-planned canvas.

Bardi: The direct flutes were introduced into Italy by the Gauls and the transverse flutes were introduced there by the Swiss. It is probable that cornets and trombones were discovered after [the flutes], since they are more artificial and require more effort in being played, although our rule in the matter of the invention of musical instruments is known to tolerate exceptions many times. They were, however, not discovered before people sang—according to the usage of today—several melodies together in consonance. Their inventors had been moved by the above-mentioned necessity, and also because men devoted their strength first to learning how to sing well, for there was a need in those early times, because of the coarseness of the century and the novelty of the affair—or let us say because of the simplicity of those who up
to this time have administered them—to spend much time there, so that boyish voices were lost before they were able to enjoy them. The inventors of the trombone were the Saxons, although in Nuremberg, famous city of Franconia, they were built excellently. The cornet was brought to us from Styria, and the best in general use today are made in Venice. The trombone has a particular excellence, for it has no need of holes or keys in set places, but it is left to the discretion and judgement of the skilled trombonist. By increasing and diminishing the hollow of its pipe, each species of the three genera of harmony can be played upon it with the greatest accuracy one could possibly desire, since good professors of this instrument are able, without effort or difficulty, to raise and lower the pitch by any interval, however small and unusual. The viola da gamba and da braccio, the zither, and the lute, being more artificial than the stringed instruments of

The trombone came to us [from the Saxons].
the ancients, due to the matter of fretting them and deriving from one [string] alone, four, six, and more different pitches, they probably must have been found one after the other. [The fact] that the lute was in use prior to every other one of these, although it is even more difficult, can be believed easily when they have been persuaded by the authority of Dante, who mentions one M. Adamo, counterfeiter, in reference to whom he says, "I saw one like a lute", in order to denote with this comparison the thinness of the neck and the swollen condition of the body of a victim of dropsy. Nevertheless, it may well be

Zarlino\textsuperscript{44} claims in chapter 35 of the 4th part of his Institutioni that the keyboard instrument is more perfect in its harmonies than the lute. How far this is from the truth has been demonstrated in its place. In the 30th canto of the Inferno.

\textsuperscript{44}Zarlino, Istitutioni Harmoniche, p. 344. "One should know, if not perfectly, at least fairly well how to play the monochord or harpsichord, because it is the most stable and most perfectly tuned of all the instruments."

\textsuperscript{45}Dante Alighieri, The Divine Comedy (Inferno, XXX, 49-57), 3 vols., translated by Courtney Langdon (Cambridge, Massachusetts, 1918), I, p. 343. "And one I saw, who like a lute was shaped, if he had only had his groin cut off down in the region where a man is forked. The heavy dropsy which unmates the limbs in such a way with ill-digested humor, that face and paunch no longer correspond, was causing him to keep his lips apart, as doth the hectic, who, because of thirst, turns one lip chinward, and the other up."
that in that time they did not have as many strings. Not even those few were disposed in their present order. It seems important to me, therefore, since [the lute] had been considered by men and practiced with that quantity and disposition of strings which is generally used today, only fifty years ago, that they had not begun to learn something about it, and [yet] it had been brought to the excellence in which it is found.

This noble instrument was brought to us by the Pannonians46 with the name of lute, which had been given to it by its inventor--whose fame was obscured by his death--with no little judgement. He wanted to denote with this name that it was capable of the extreme musical sounds, and with the aid of frets, also [capable] of those in the middle. I do not intend to omit the consideration

46 The Pannonians were the inhabitants of the ancient Roman province of Pannonia, between the Danube and Sava rivers.
of the fact that] Guido d'Arezzo,\textsuperscript{47} who gave new names to the musical notes, lived some ten years before Dante. He derived these notes from the first and sixth syllables of the three first verses of the hymn to St. John the Baptist\textsuperscript{48} so that they made the number of six. From two of these syllables and names of the notes, the name of lute [\textit{la ut}] was composed by its inventor—as you have learned.

Strozzi: Why is it that Guido d'Arezzo did not give at least a new name to each one of the seven lower strings which are in the fourth species of diapason, but only to the six first ones?

Guido d'Arezzo gave new ways to musical notes.

\textsuperscript{47}Guido lived from 995(?) to 1050(?) A.D. Galilei is in error to say that he pre-dated Dante by ten years, for Dante lived from 1265-1321 A.D., over a century later than the death of Guido.


\textit{Ut queant laxis resonare fibris}
\textit{Mire gestorum famuli tuorum}
\textit{Solve polluti \textit{labii} reatum.}
\textit{Sancte Joannes}.
Bardi: If I may venture a guess, I believe that the reason was what I shall now tell you. Since [Guido]—as you know—had named one new string beneath the lowest string of the Greeks, called proslambanomenos, forming, with the extreme high string of the hypaton tetrachord, a major hexachord—according to the numbers, however, which he uses in his Introduction in designating the strings—he came to name his strings with the names which you have learned. Because he said that the lowest of these was the first, having given it the name of ut, seeing, then, that in the second string of the very same tetrachord—in relation to each other, yet second of all the others in the disjunct system—there was also the principal note of

\[\text{Why Guido d'Arezzo names only six notes.}\]
another hexachord, which also terminated in the extreme [pitch] of the other [hexachord] which was contiguous to it—still toward the high part—and seeing that this quantity of names was sufficient to [accomplish his purpose], he did not admit any others. One should add to this consideration that antiphons were the first things which were sung using notes during that century in sacred temples. These [antiphons]—according to what I have seen in some extremely ancient books, particularly in those which are conserved even today in our abbey of Montepiano—employed at that time, the fewest [possible] strings and pitches. For this reason, Guido did not need a greater quantity of names.

Returning to the philology of the lute, I say that there have been others of the opinion that it had been called lauto, that is, sumptuous, magnificent, noble, and splendid. Enough has been said, however. The zither\(^{50}\) was used earlier among

\(^{50}\) Sachs, History of Musical Instruments, p. 137, equates zither with the epigoneion and simikion described on pp. 259-260 above.
the English than by other nations. In that island they were once made excellent-ly, although today the most famous ones are those which they make in Brescia. For all this, it is employed and valued by nobles, and it was called zither by its inventors, perhaps in order to revive the ancient cithara. The difference be-tween ours and that ancient one is easily learned from that which has been said earlier. I firmly believe that the viola da gamba and [the viola] da braccio were invented by Italians, perhaps those of the kingdom of Naples. The cause which influences me to believe that, I shall now explain. In Spain they are not made, and few are used there. The same happens in France and England and thus also among the Flemings and in Germany, though some have doubted that they were their inventors. Even among these peoples, they have been employed fewer times than in any of the provinces named, omitting, however, the courts of those princes in which they have indeed

The originators of the viola da gamba.
been practiced, but they have originated in Italy, and thus also most of their players. It is no wonder that in Germany they have been little used by the general public, for it happens that the greater part of the country is—as you know—extremely cold. For this reason the inhabitants remain most of the time in a state of boredom, allowing themselves to venture out of doors very little for eight months of the year, and consequently they are rarely found together due to this situation, ordinarily attending to those things which one man can practice alone without the aid of another. In Italy, on the contrary, particularly in the kingdom of Naples, it happens exactly the opposite, due to the benignity of the air, in addition to the fact that the music of these instruments was studied and practiced excellently many, many years ago. Men perhaps began to investigate these in order to have also among those stringed instruments one which had the power to hold pitches according to the value of
the notes, and [hold them] as long as the discreet player pleased without striking them again, in the same manner as that which the organ does among keyboard instruments and the other wind instruments. These instruments were played with the same bow—although not precisely the same—as the viola da braccio, called lyre not too many years ago in imitation of the ancient [one] with regard to name. This gives clear indication that the viola was in use before the violone. This, rather, was the last to be invented, omitting, however, that instrument which, as I told you above, the Duke of Saxony had given to that of Bavaria. We can convince ourselves of this by means of the quantity of players which assemble for the perfection of the concert. However, should you not have first explained that they comprised at least four [players] and that there were also a reasonable number of singers, unless we wished to say that they were first used in dances in the same fashion as pipes? I have, however, no

The viola was first called lyre.
authoritative information which convinces me of this. Having expedited as much as I want to discuss with you at present concerning artificial, modern instruments, with regard to their invention, origin, and antiquity—according to my opinion, however, which I submit to whoever understands better than I—I come to deal with the fourth and last kind of players of the lute, of keyboard instruments, and of musicians of our times [who are] reputed by the vulgar. These are the ones who actually do not produce, nor write, nor play, nor sing, anything of importance, but will have, only superficially, like colored glasses compared to jewels, a slight appearance of...—I do not know what I should say—and will play a galliard, a saltarello, and a passamezzo, 51

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51 The galliard, the saltarello, and the passamezzo are Renaissance dance forms which are often paired. The galliard and saltarello are similar in form, but different in execution; both are vigorous dances. The passamezzo, or pavane, is slow and stately, and may be linked with either of the former two. See Apel, Harvard Dictionary, p. 340 under "Galliard". Galilei himself was a composer of all three forms.
making a loud commotion on the extreme strings of the instrument they have in hand, particularly in the low range. The vulgar man, who is all intent upon that racket, becomes stupid and awe-struck, and instead of sending for Hipponax, the aulete who taught him, according to what Aelianus\textsuperscript{52} relates, he admires him and celebrates him for his miracles. Others, also of this same order, have been undeservedly numbered by the vulgar man among musicians because they sing on these instruments a thousand foolish, foul, dishonest things and move him with such means to laughter, but never to tears, for other industry and knowledge are required to move this affection in the hearer rather than that one. This hearer goes along through the conformity which those conceptions have with his genius, being insane. They are therefore celebrated as new Orpheuses and Amphions and since they are clever and they consent

willingly to be so reputed by the inexpert element, they become so insolent that they want to correct and set a norm for the world without knowing the why of anything, however insignificant. They do not consider themselves merely the equals of the foremost men of erudition and learning, but their superiors. Nothing ever happens of any kind that they do not wish with the greatest seriousness and reputation in the world to tell you how the matter appears to them also, deprecating and degrading all those things which are beyond them. They can be justly compared to that miller's mouse which the moralist Aesop\textsuperscript{53} tells in his fables. This mouse, one time having inadvertently spilled flour on his tail and fancying himself, because of that, to have become master of the mill, entered into such a state of pride that he not

\textsuperscript{53}The fable of the miller's mouse does not appear in any available collection of Aesop, either authoritative or secondary. It is possible that the "tale" in question pertains to one of the many imitators of that author, perhaps one not committed to paper.
only wished to administer everything in his own way, but to tell the master that he no longer would allow him in the house. If one could also compare these particular musicians to that shoemaker of Argos who, having seen a statue made by Praxiteles,\textsuperscript{54} the most beautiful and famous one he ever made, blamed him greatly, together with his techniques. The statue represented a shepherd who was struggling with a small ram. \textsuperscript{Example.}\textsuperscript{The shoemaker} blamed it for no other reason than the fact that the shoes were reversed, which that excellent, judicious sculptor had done deliberately, perhaps in order to denote the simplicity of the youthful shepherd. There is also no lack today of these petty tyrants who, full of envy in seeing and examining the work of some virtuoso, consider and preach only that thing which deserves correction, however small, although all the rest is most ingenious.

\textsuperscript{54}Praxiteles was an Athenian sculptor of the fourth century B.C.
excellent, and worthy of highest praise. They value only that, and nothing else which they understand and do, which pleases them for that reason. On the contrary, they deride all that which they do not do and do not understand, only because they notice it in others and see it highly reputed by the intelligent, showing outwardly that it displeases them, although deep in their hearts they admire it and would consider themselves fortunate if they knew even a thousandth as much as the author of that particular work. There are, in addition, among these some sersillabe if you can call them that—who profess themselves singers and [claim] to know how to demonstrate this practice excellently, without having any knowledge, not only of numbers, of proportions, or of the monochord, but [none] concerning

55 The meaning of "sersillabe" is not known. It is possibly a combination of "zirlo" (whistling of a thrush) and "sillabe" (syllable). Hence, it could signify one who "sings like a bird".

Singers known in our times.
the measure of any musical interval, nor of the quantity of the sound which is enclosed between one string and another, in addition to not even knowing what genera and species is that which is sung today. Without this knowledge only wise God knows how things will result. They have at hand instead of this for an argument of what they know more judgements of Burchiello\textsuperscript{56} and Bernia\textsuperscript{57} than of any other pedagogue of our mother tongue. Now I ask you, what do the buffooneries of these ridiculous poets have to do with knowing how to demonstrate the distances and the proportions of musical intervals? They remind me of some of our matrons who go around during the coldest season of the year walking through the house with one of their overcoats or shawls which they call

\textsuperscript{56}Vincenzo Caputo, I Poeti Italiani dall' Antichita ad Oggi (Milan, no date), p. 122. "Domenico di Giovanni Burchiello, a Florentine of modest origin (he was a barber), died in Rome (1404-1449). [He was a] satirical poet. There exists a volume of his sonnets and comical rhymes."

\textsuperscript{57}Galilei is probably referring to Francesco Berni (1497 or 1498-1535), a Tuscan poet who was also famous for his comical verses. See Ibid., p. 82.
sieve or light material, which will only have around the hem a suggestion of pelt, no larger than a finger, being, however, assembled haphazardly underneath, persuading themselves that the appearance of it and their bearing are suited to defy not only the force and power of the north wind, but to frighten it and scoff at it in the same way that the sight of some simple people deceives them from a distance. [With] this vain thought, they pretend to be within their houses where the force of the north wind cannot entirely reach and the eyes of the lynx cannot penetrate, but going out in that attire through the public streets in the open air, they are driven back by it into their houses with the greater fury of the elements and do not leave there [again] while they do not have power and force to compete and to resist their might, or until the courteous Apollo, moved to compassion

58 Galilei is probably referring to Lynx, a northern constellation between Auriga and Ursa Major.

59 Here, Apollo is the sun-god driving his fiery chariot, the sun itself.
for them, opposes himself to avenge them to Sagittarius. Finally, concerning which of all these sorts of men are more worthy of esteem than the others, I feel secure in saying that those who play, compose, and also write excellently, not only deserve the highest praise, but merit, being greatly esteemed and valued by any man of rational intellect. I say also that those [who possess] more [knowledge] than these are of equal merit, although they may have been little favored by nature in the prompt dexterity of their hands, and even in contrapuntal prowess. This is true], however, everytime their knowledge not only remedies this imperfection, but when it surpasses those of the first variety. For the ones who teach us a virtue are much more to be respected, and even more so in proportion

60 Sagittarius is the ninth sign of the Zodiac which the sun enters about November 23. Galilei's astrological symbolism seems to possess a certain logic, since Apollo, as the sun, opposes himself to a northern constellation, representing the raging north wind, and a winter constellation, representing the bitter cold, ice, and snow of that season.
to their rarity and excellence, than those who merely amuse us with their clownish absurdities. It is, first of all, a greater, loftier goal to know what others do than to emulate the very actions they perform, and then, because we are at last satiated by mere sensual pleasure, due to its inconstancy, and never more thirst for [the fount of] knowledge. I tell you that those whose knowledge is united with noblest demeanor are more worthy still, since these [traits] are mainly to be desired in the perfect musician and in every other cultured man, so that, with his example and knowledge, he may make men of character and wisdom of those who frequent him and listen to him. I say that it is impossible to find a man who is intrinsically a musician and yet is vicious. And if he has a vicious nature, it will be difficult, even impossible to make him virtuous and for others, in turn, to be made virtuous through him. I tell

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you besides that the man who employs in his youth every proper means and suitable care to learn the science of true music with his every work and effort, all that which is dignified and honest he will praise and accept, and that which is not he will vilify and avoid. Then this man will be far indeed from every brutal, faithless action, and having culled from music most plentiful fruits, he will be to himself and to his republic infinitely convenient and useful. Never in acting or in speaking in any place and time will he be or say anything inconsiderate, but he will observe continually [the virtues of] dignity, modesty, and reverence. I turn to those of the third circle and say that they should and can be content to be [highly] regarded by those who are inferior to them in learning. Their worth may be compared to the singing of boys who are loved and coddled by everyone while they still possess their beautiful voices and throats, but if by chance their instrument is injured and they lose for a day or
forever that small amount of grace, beauty, and sonority of voice, they lose, all at once, their credit, reputation, and skill. Nevertheless, whoever considers it well cannot negate the skill, nor can he remove the hoarseness nor the change of voice. And the knowledge of these things is similar to the evanescent beauty of a woman, for while she maintains in her countenance that desirable proportion of lines and colors which mingle to form her beauty, all the world admires her, not for her erudition or acumen in any art or science, but for her beauty, through the coalescence of those individual features. As these lines begin to blur and lose that symmetry which once attended them, and those vivid hues begin to fade, that beauty dwindles like a hapless blossom plucked. With this conclusion, then, the most illustrious Signor Giovanni Bardi, a rare example of every regal virtue, brought his discourse to an end.

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