

ELEVEN

Greek Tonality and Western Modality



Nothing in Greek music theory so baffled Western students, from the tenth century to the Renaissance, as the system of tonoi and octave species and the so-called harmoniai. The first five hundred years of Western theory of the modes was founded on a misunderstanding of the Greek system. Only in the Renaissance was it recognized, and then only through a slow process, that the modes of plainchant and those of the ancient Greeks were altogether different. Yet the source from which the chain of misunderstandings arose was widely available and, to an open mind, could have yielded all that was necessary to dispel them. This was the *De institutione musica* by Boethius, an author whose name was on everybody's lips but whose music treatise was hardly ever read in its proper context.

Johannes Gallicus

The intensified study of Boethius both in Italy and the north in the fifteenth century, partly inspired by humanism, reopened the question of what the ancient tonalities were. The first Western writer to penetrate some of the unique qualities of the tonoi and appreciate the distance that separated them from the plainchant modes was a participant in this Boethian revival: Johannes Gallicus de Namur, as he is generally known, although his family name was Legrense.¹ He studied at the University of Padua and became a teacher in the school for patricians in Mantua founded by Vittorino da Feltré (1378–1446) under the patronage of Gianfrancesco Gonzaga. It was under Vittorino, Gallicus acknowledged, that he “diligently heard the Music of Boethius; I who earlier considered myself a musician saw that I had not

1. That, at least, is what his contemporary John Hothby called him. See Albert Seay, ed., Johannes Gallicus, *Ritus canendi* (Colorado Springs, 1981), p. iii.

attained the true practice of this art.”² France made him a singer, he admits, but Italy turned him into a grammarian and *musicus* in the Boethian sense, thanks to Vittorino, whom he extols as “imbued generously with both Latin and Greek letters.”³ Gallicus was aware that Boethius had translated a Greek source, for in one place he refers to the book as that “Music” which Boethius translated from the Greek (“ea namque musica, quam totiens allegatus Boethius de Graeco vertit in Latinum”).⁴ He introduces a chart of the Greek system as he understood it from Boethius with the following words:

I wish briefly here to represent [by a diagram] rather than describe [in words], therefore, these eight modes, for it has long been unknown to our singers in general that the gentile philosophers of antiquity judged their songs, chants, and cantilenas not to be in the ecclesiastical tropes, since there was then not yet a church, nor consequently had such modes or tropes yet been discovered. . . . Should not the ancient songs be judged, rather, by the species of diapason and the regular constitutions of steps previously described? For the gentiles did not possess other than the eight tropes or modes or tones before the advent of our Savior, nor any constitution besides that from proslambanomenos to nete hyperbolaeon, including the other intervening strings of the double octave, so that there was no difference among them, unless the varying measure [string length] of the notes and the height and lowness of pitch, as Figure 11.1 shows. This double-octave in whatsoever mode you please has altogether different constitutions, both of octave and octave plus fourth, something our church fathers did not overlook. Therefore, discovering a genre of making melodies to God—not vain or lascivious—they constructed out of the constitutions described above new modes, of which I shall speak in the proper place, not for secular songs but for divine praise.⁵

The legend in the border states:

These Greek tropes and modes shown, which they also called tones, expressed in Greek letters and made clear by the Latin letters, are rather put together by art than founded in nature: they differ only in location, and in the whole appear alike. In Boethius, however, diverse signs differentiate them, and the measurements [of their string lengths] were dissimilar, I believe, in all. Now our Latin tropes are certainly created by nature totally unlike one another, though arranged in a single system.⁶

By this diagram Gallicus aimed to show that the ancient constitutions all had the same intervallic pattern. It was as if the double octave A-a' were

2. Gallicus, *Ritus canendi*, III, 12; Coussemaker ed., IV, 345a; Seay ed., 78.21.

3. *Ibid.*, Preface; Coussemaker ed., IV, 299a; Seay ed., I, 1.16.

4. *Ibid.*, I, 4; Coussemaker ed., IV, 304; Seay ed., I, 11.13.

5. *Ibid.*, III, 10; Coussemaker ed., IV, 341b–342b; Seay ed., I, 72.6–73.11.

6. *Ibid.*, III, 10; Coussemaker ed., IV, 342; Seay ed., I, 73.12–13.

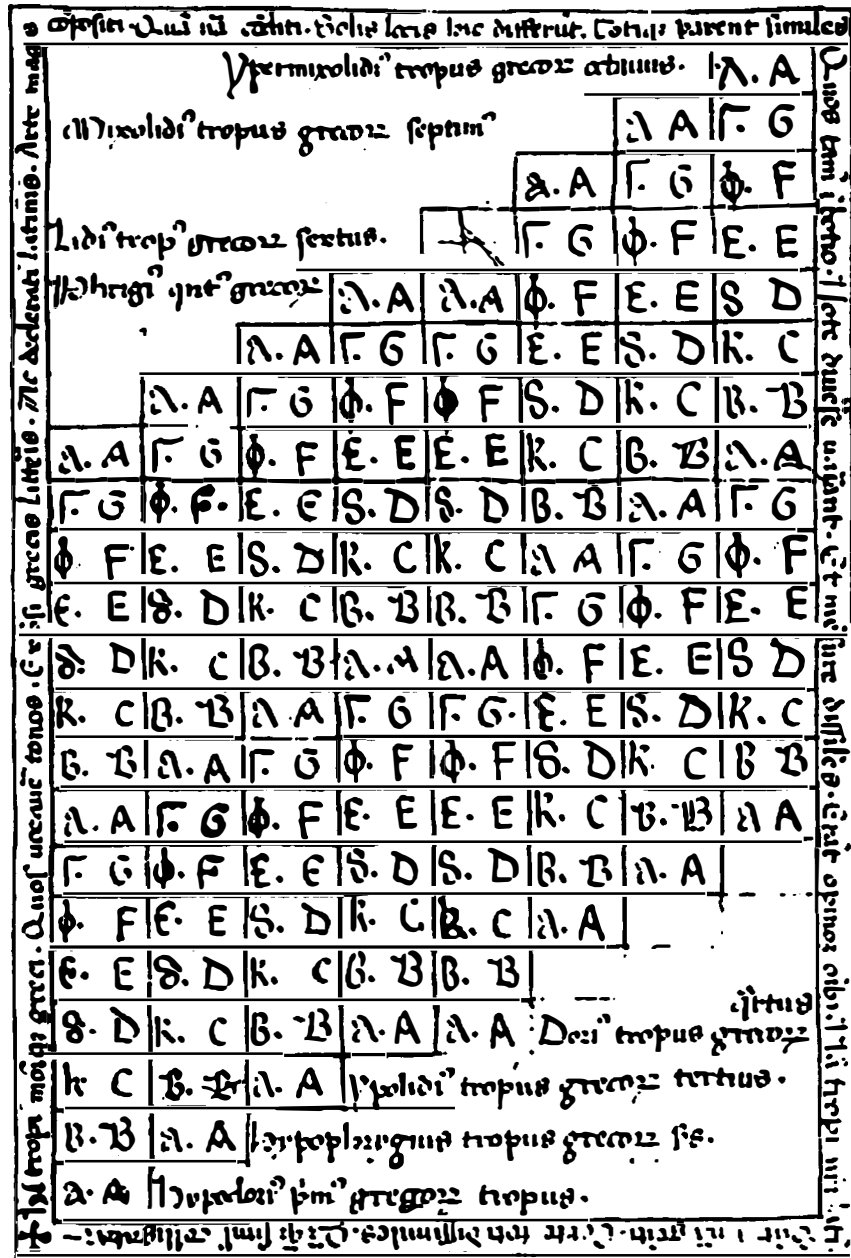


Figure 11.1.

The Greek modes according to Gallicus, from *Ritus canendi*, III, 10, London, British Library, MS Add. 22315, fol. 26. By permission of the British Library.

begun on successive pitches to form the eight tropi, from Hypodorian to Hypermixolydian. In an earlier diagram he showed that each double octave was higher than the preceding one by a tone or semitone, depending on which occurred in the natural series of steps, A, B, C, D, etc.—that is, they were separated from each other as tone, semitone, tone, etc.⁷ The Greek letters in the chart, Gallicus explains in the next chapter, can serve, as well as Latin or Hebrew letters, as notational symbols from which to sing melodies. Although Gallicus discusses the octave species in an earlier chapter and notes that the double-octave constitutions are made up by joining such species of consonances, he does not show how the octave species are related to the tonoi, tropoi, or modes.

Erasmus of Höritz

Independently of Gallicus, Erasmus of Höritz arrived at a similar interpretation of the tonal system described by Boethius. Erasmus was a mathematician and had attended and lectured at several universities where Boethius was read carefully, such as Vienna and Cracow. Like Gallicus, he was critical of earlier writers on music, including Boethius himself. Erasmus sought to place music theory on a surer footing by the application of the geometrical theorems of Euclid. His treatise, *Musica*, was completed between around 1504 and 1508 and dedicated to Cardinal Domenico Grimani. The author may have been in the cardinal's circle, but there is no evidence for his whereabouts after he registered at the University of Vienna in 1501. He may have gone to Italy after teaching in Vienna for a while.⁸

Although Erasmus was confused about the chronology of the various systems of modes—the Gregorian, Byzantine, and Greek—he understood that the Greek tonoi, which he called *toni* or *tropi*, were not the basis of the Latin *toni*, as he called them, but reproduced the same order at different levels. His diagram tells us more than his prose. The same Greek signs, those for the Lydian tonos, copied in a very corrupt manner from a perhaps faulty manuscript of Boethius, are assigned to each of the tonoi, perhaps to show that the form and name of the steps were the same and in the same order. The chart is a gross simplification and misrepresentation of Boethius' table of signs, but the general idea of a system of keys to transform a single octave scale is clearly communicated (see Figure 11.2).

7. Ibid., III, 9; Coussemaker ed., IV, 341a-b; Seay, I, 70.5-7.

8. Concerning his life and works, see Palisca, "The *Musica* of Erasmus of Höritz," in *Aspects of Medieval & Renaissance Music*, ed. Jan LaRue, pp. 628-48. The presentation copy of *Musica* dedicated to Cardinal Grimani is in the Biblioteca Apostolica Vaticana, MS Reg. lat. 1245.

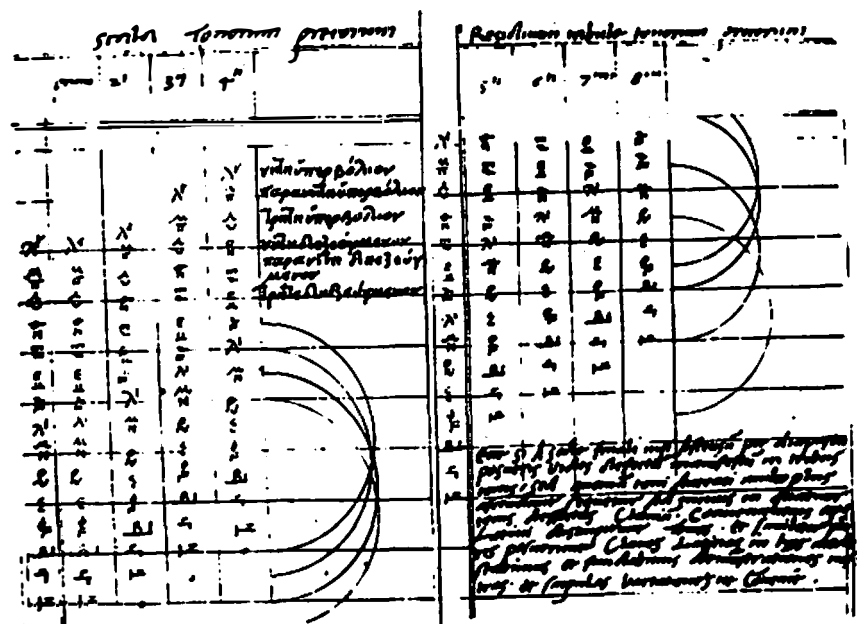


Figure 11.2.

The Greek modes according to Erasmus of Höritz, from Bibliotheca Apostolica Vaticana, MS Reg. lat. 1245, fol. 48r-v

Giorgio Valla

The first humanist who had all the necessary sources for solving the riddle of the tonoi was another nonmusician, Giorgio Valla. As we have seen, his collection of Greek manuscripts included the three authors who could have led him to a good solution: Ptolemy, Cleonides, and Bryennius. Of these he chose Bryennius as the basis for his treatment of most questions of harmonics. Valla dedicated two chapters to the tonoi in his *De harmonica*, a musical treatise within an encyclopedic work *De expetendis et fugiendis rebus opus*, published in 1501 after his death. The five books on music were already finished in 1491. In chapters 3 and 4 of Book IV Valla gives a translation of Bryennius' *Harmonics*, Book 2, chapters 3 and 4, which contain a full account of the tonoi. Valla follows Bryennius word for word, but the points he makes are worth recalling, because they were here revealed to nonreaders of Greek for the first time. Each tonos, Valla states, has its own particular location with respect to height of pitch. But all tonoi share the same division of the tetrachord, whether diatonic, chromatic, or enharmonic. Each tonos consists of two conjunct tetrachords and one *toniaeus* interval. The nete of

the higher tetrachord is the nete of the tonos, whereas the hypate of the lower tetrachord is its hypate. The nete of the lower tetrachord is the hypate of the higher one, and this common step is the mese of the tonos. Beyond the hypate of the lower tetrachord is a *toniaeus*, or 9:8, interval, leading to the *proslambanomenos*. Of the eight tonoi, one is highest, another lowest, and the rest lie between these extremes. The same step cannot be the nete of all, but each tonos has its own nete, and likewise for the mese, hypate, and *proslambanomenos*. The first and lowest of the eight tonoi has its nete at mese, its mese at hypate meson, and its hypate at hypate hypaton. Its *proslambanomenos* is on *proslambanomenos*.

Each of the tonoi has a beginning, middle, and end, but only one is complete in that it is possible to sing in the high, low, and middle, and this is the Hypodorian. It is a tetrachord lower than the Dorian tonos and has its nete on mese and its mese on hypate [meson]. Through this [meson] tetrachord, the two unmodulating tonoi can communicate. The second tonos has its nete on paramese, its mese on parhypate meson, its hypate on parhypate hypaton, and its *proslambanomenos* on hypate hypaton; it is called Hypophrygian. It is a tetrachord lower than the Phrygian.

In this manner Valla, translating Bryennius, describes the system of eight tonoi. A diagram illustrates the description in the manuscripts of the Bryennius treatise, and Valla reproduced the figure in his book (see Figure 11.3). However, either Valla miscopied his Greek source, which was Modena, Bibliotheca Estense, MS graecus a.V.7.1 (II.F.8), fol. 19r, or the printer did not follow precisely his layout. If the two diagrams are compared, it is evident that in the Greek source, the labels *hypodorios*, *hypophrygios*, etc., are centered within each of the bows, or arches, representing the octave spans of each tonos, so that *hypodorios* appears horizontally at the center of that octave span. In Valla's diagram (Figure 11.4) *hypodorios* is lined up with the arch representing the Phrygian tonos, and similarly *hypophrygius* and the subsequent labels are displaced. Although the prose is correct, the diagram is wrong. Either Valla did not understand the exposition he translated, which is not likely, or he was not well served by his draftsman or printer.

There is one error in Valla's Latin text. Where Bryennius states that the Dorian tonos is also called Hypomixolydian, Valla's text has Hypermixolydian. This must be a typographical error, since Valla correctly describes the highest and eighth tonos as Hypermixolydian.

Valla's next chapter (IV, 4; Bryennius 2.4) details the distances between each of the tonoi and each other. The *mesai*, as the diagram shows, rise tone, tone, semitone, tone, tone, semitone, tone.

Since Bryennius did not relate the species of octave to the tonoi, as Cleonides and Ptolemy had, Valla does not take up this question. However

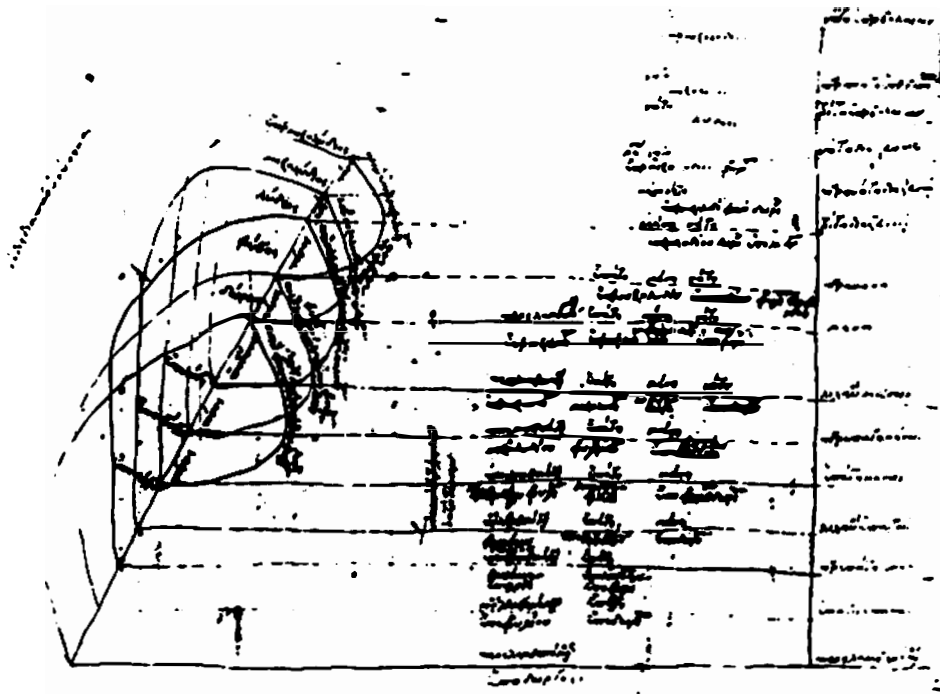


Figure 11.3.

The tonoi according to Bryennius, *Harmonics* 2.3, in Modena, Biblioteca Estense, MS gr. a.V.7.1, fol. 19r

Bryennius did devote a chapter (3.4) to another kind of species, and Valla translates this in Book V, chapter 4. These are the species of melody (*melōdias eidos*), which Valla translates “modulandi genera.” They are also called “echoi” by Bryennius and “sonitus” by Valla. There are eight of them, the first occupying the octave of the Hypermixolydian, and the eighth and last the octave of the Hypodorian. Since neither author gives the interval sequence, it must be assumed that Bryennius had in mind keys rather than modes. This chapter could not have sown anything but confusion in a reader’s mind, particularly since Valla says that the *sonitus* are also called *toni* or *tropi*.

Valla’s transmission of the theory of the tonoi according to Bryennius must have reinforced in the minds of those who read it the misinterpretations of Boethius already abroad. If proslambanomenos is thought of as A and the Hypodorian as occupying the octave A-a, then the Dorian is d-d’ and everything at first glimpse seems in place. The proslambanomenos of the

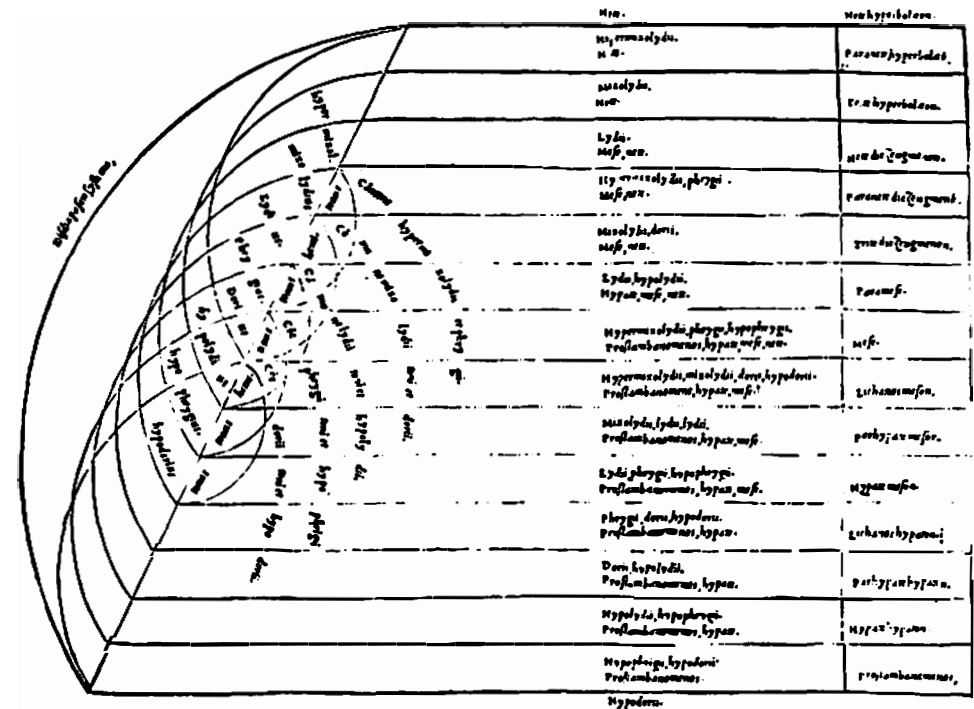


Figure 11.4.

The Greek tonoi according to Valla, *De expetendis*, “De musica,” IV, 3

Hypolydian, however, falls on c \sharp and that of the Lydian on f \sharp . But the same thing happens in Boethius if one reads him carefully. Indeed Bryennius and Boethius seem to stem from the same tradition. Valla’s book, therefore, was not likely to spur any new reappraisal of the Greek tonal system.

Valla’s translation of Cleonides’ *Harmonic Introduction* (Venice, 1497), on the other hand, transmitted quite a different system, one unadulterated by Byzantine or medieval conceptions. It has been assumed that this late classical author gave an account of a tonal system set forth in a lost treatise by the great fourth-century musicographer Aristoxenus. Although published before *De expetendis*, Valla’s translation of Cleonides was probably finished after it. Valla gives no sign in his encyclopedic work that he had studied Cleonides, and, since there are no annotations by him in the translation, it is impossible to tell whether he understood the implications for an understanding of the tonal system of Cleonides’ exposition. However Valla transmits clearly this extremely compressed survey. The tonal system that emerges was explained in chapter 2 and represented in Figure 2.5.

There are clearly two sets of scales whose ethnic designations overlap. Seven of the names—Hypodorian, Hypophrygian, Hypolydian, Dorian, Phrygian, Lydian, and Mixolydian—are applied to a set of interval species described as occupying octaves in the double-octave system from the highest (the Hypodorian) to the lowest (Mixolydian). The three root names, Dorian, Phrygian, and Lydian, are augmented by two more, Ionian and Aeolian, to form composite names with the prefixes “hypo” and “hyper” to designate a set of twelve keys, or transpositions, of the double-octave system. Cleonides does not explain why the nomenclature overlaps, but close study of the two systems would have revealed the link. It is that if the middle octave is carved out of the double-octave system and made to serve as a confined register for melody making, the octave species exhibited by a particular melody will bear the same name as the key or tuning that contains the pitches required for singing or playing it. Thus a melody within this middle range having the configuration of tones and semitones of the Lydian octave species will be in the Lydian tonos. This obviously works only for seven keys, beyond which the names will not agree. Had Valla or anyone else at this time perceived this relationship, it would have explained why Boethius could say that the tonoi arise from the octave species. Neither Valla nor his first readers apparently did so. However the base for such an advance toward unraveling the Greek tonal system was now laid in Valla’s translation of Cleonides.

Nicolò Leonicensino

The classic theory of the tonoi has been, at least in our own century, that of Ptolemy. The first Western writer to transmit this theory was Nicolò Leonicensino in his translation of Ptolemy’s *Harmonics* prepared for Franchino Gaffurio and finished in 1499. Unfortunately, it was known to very few and had negligible influence on theoretical thought or the historiography of Greek music. Still it is worth considering the interpretation that emerges from the translation.

Leonicensino probably did not see any of Valla’s work before embarking on or while engaged in the Ptolemy translation. Each knew of the other’s interest in musical treatises, because in a letter of 18 July, probably 1494, Leonicensino replied to one of Valla in which the latter had inquired about a commentary on Ptolemy. Leonicensino reports that Poliziano owned a copy of the treatise of Aristides Quintilianus but not a commentary on Ptolemy. Valla was apparently under the impression that Aristides had completed a commentary on Ptolemy, whereas the author of the commentary he sought was probably Porphyry.⁹

9. Letter no. 15 in Heiberg, “Beiträge zur Geschichte G. Valla’s und seiner Bibliothek,”

As we saw in chapter 2, Ptolemy introduced a dual nomenclature for the steps of the double-octave system, one simply naming the strings as if on a fifteen-string kithara, the other assigning functions to each step in a given tonos. The two coincided in the Dorian tonos, which may be thought of as the module being transposed to higher and lower locations or tunings. Leonicensino’s translation of Ptolemy’s *Harmonics* 2.5 conveys this duality of nomenclature clearly. Why there need to be two sets of names is explained in subsequent chapters.

Ptolemy’s next chapter (2.6) begins in a roundabout way to justify the transposition of the functional system from one site to another. There are two kinds of mutation (*transmutatio*), he says. Then, he continues, in the translation of Leonicensino:

Vna quidem, secundum quam, totum modulum, acutiore intentione, percurrimus uel rursus grauiore, seruantes semper, speciei consonantaneum [sic]. Secunda uero, secundum quam; non totus permutatur modulus, intentione. Sed pars aliqua, secundum eam, quae, ab initio, consequentiam, propter quod, haec potius diceretur, moduli quam toni, permutatio. Secundum illam enim, non permutatur modulus: sed, per totum tonus. Secundum hanc uero modulus quidem, euertitur á propria intentione. Tentio uero, non sicuti tentio: sed tanquam causa moduli. Vnde, illa quidem, non facit, sensibus phantasiam alteritatis, secundum potentiam, á qua, mos moueatur: sed solius secundum acutius uel grauius. Ista uero, ueluti excidere ipsam facit á consueto: et

According to the first we run through the whole melody at a higher pitch, or, again, at a lower one, preserving always the species of consonances. According to the second, on the other hand, not the whole melody is changed in pitch but some part, according to that sequence which obtained at the beginning. Because of this fact, it is better called mutation of melody than of tonos. According to the first the melody is not changed but the tonos entirely so. According to the second the melody is turned away from its proper pitch, but not in the sense of height of pitch but as cause of melody. The first, again, does not make on the senses an impression of change according to function, through which the moral character is stirred, but only with respect to high and low pitch. The second, though, makes this image escape from the usual and

p. 71 (423): “Dixit [Angelus Pollicianus] penes se esse musicam Aristidis, non tamen eiusdem commentationem in musicam Ptholomei.”

expectato modulo, quando plurimum quidem contrahitur consequens: transgreditur uero ab hoc, ad alteram speciem uel secundum, genus: vel secundum, tentionem.¹⁰

expected melody, when a consequent is strongly brought about. The melody deviates from that expected and goes into another species, whether with respect to genus or pitch [tonos].

Leoniceno gives the impression of having understood that in a change of tonos only the level of pitch at which the melody is sung changes, but that in the second type of mutation the melody runs along as before for a while but then turns in an unexpected new direction, altering the moral character. In the remainder of the chapter Ptolemy gives some examples of the second kind of mutation. The first is of a scale that goes up to mese in a certain tonos, but once there veers into a conjunct tetrachord instead of a tone of disjunction. This amounts to an upward modulation by a fourth, since a conjunction occurs naturally a fourth below at hypate meson. Thus the second type of mutation is really a change of tonos midstream rather than a transposition. His other examples are more complex changes of this second type.

In the next chapter (2.7) Ptolemy shows that, since it is possible to attach a tetrachord by conjunction at mese through mutation or modulation, the synemmenon system is superfluous. Ptolemy is bent on ridding tonal theory of any unnecessary duplication. He asks how far apart one tonos should be from the next, what harmonic relation should exist between tonoi in general, and what should be the maximum distance from the lowest to the highest. When a change of tonos is used just to get a higher pitch, as when changing from one instrument to a higher one or from one voice to a higher one, this is one thing. But there is another purpose to transposition or pure mutation of tonos. Leoniceno has captured the idea in his Latin only dimly, and the justification for it is also rendered darkly:

Sed propterea, ut secundum, unam uocem, idem melos, aliquando quidem, ab acutioribus locis, incipiens: aliquando uero, á grauioribus, conuersionem quandam, moris efficit: quoniam, non amplius, ad utrosque terminos, moduli coaequantur quae ad uocem pertinent in tonorum permutationibus: sed semper, praedesinit, ad

The reason is rather that in the course of one voice the same melody begins sometimes on higher, sometimes on lower steps, and accomplishes a change of moral character. This is because the limits of the melody are not made to correspond to those that pertain to the voice in the permutations of the tonoi. But the limit of the voice at one end

10. Ptolemy *Harmonics* 2.6, Leoniceno trans., fols. 27v–28v.

alteram partem uocis, terminus, á termino moduli. Ad contrariam autem partem moduli terminus, á modulo uocis: itaque, illud, quod aptabatur, ab initio distantiae uocis, partim quidem deficiens, in permutationibus, partim autem, recipiens, alteritatis phantasiam, praebat auditibus.¹¹

always stops sooner than the limit of the melody. At the opposite end, the limit of the melody [is reached] before that of the voice. Thus that which was adjusted from the beginning of the voice's interval, in part losing, in part added to during the permutations, offers the senses of hearing an impression of change.

The reason given by Ptolemy for the impression of a change in moral character or ethos is that when a given voice sings a particular melody, such as an octave species, at a higher than normal location, for example, some of the notes of the melody are too high for the voice's range and must be omitted, though they can be regained at the bottom of the voice's range. The changes that the melody thus undergoes affect the impression it makes on the listener's feelings. Leoniceno's expression of this thought is obscure, perhaps because he did not understand it.

In chapters 8, 9, and 10 Ptolemy answers some of the questions he posed earlier—how far apart the highest and lowest tonoi should be, how many tonoi there should be, and how far apart from each other. Chapter 8 proposes that the distance between the highest and lowest tonoi should be within the octave but should not include the octave, because it would duplicate a tonos already existing. Chapter 9 develops a proof for the limitation of the number of tonoi to seven, and chapter 10 defends their conventional order, separated by the distances tone, tone, semitone, tone, tone, semitone, ascending from Hypodorian to Mixolydian. The most significant revelation here is the rejection of the eighth, or Hypermixolydian, tonos, which Boethius and all his followers attributed to Ptolemy. Even Gaffurio, for whom this translation was prepared, continued to attribute an eighth “mode” to Ptolemy. The reason why the number of tonoi should depend on the number of octave species is not clear until chapter 11, which Leoniceno translates as follows:

Quod non oportet, secundum Semitonium, augere tonos. Cap[ut] XI. Manifestum uero, quod his suppositis, v[idelicet] nobis, tonis, eius, quae est in singulis, secundum potentiam, media,

That it is not proper to increase the tonoi by semitone. Chapter 11. These tonoi having been assumed, by us that is, it is evident, to be sure, that there is in each a middle note by function, a special

11. Ptolemy *Harmonics* 2.7, Leoniceno trans., fol. 30r.

propria aliqua uox, sit consonantiae diapason, propter esse, et ipsas, et species aequales, numero. Assumpta enim diapason, secundum inter media, quodammodo loci, constitutionis perfectae, hoc est, quae sunt, a situ mediarum, suprema, hypate, nominata, ad neten, disiunctarum: ut uox amicabilem reuertat, et uersetur, circa medias, maxime melodias, raro, ad extremas exiens, propter eius, quae est, praeter modum, remissionis, ut intentionis, uachementiam, et uiolentiam. media quidem, secundum potentiam, mixolydij, adaptabitur, loco paranetes disiunctarum, ut tonus, primam speciem faciat, in proposito diapason: media uero, Lydij, loco tertiae disiunctarum, secundum secundam speciem, media, phrigij loco, parameses, secundum tertiam speciem, media uero dorij loco mediae faciens quartam et mediarum speciem diapason.¹²

Ptolemy's explanation of how the tonoi and octave species are intertwined is here expressed for the first time in the Latin language. Although Ptolemy does not openly state that the purpose of the tonoi is to produce the seven different octave species within the central octave, this is implied, and Leonicensio's translation, "ut tonus primam speciem faciat in proposito diapason," conveys quite unambiguously the purposive tone of the construction "hin' ho tonos to prōton eidos en tō proskeimenō poiēsē tou dia pasōn" (Düring 65.7–8).

12. Ptolemy *Harmonics* 2.11, Leonicensio trans., fol. 32v.

step of the diapason consonance, because these [tonoi] and the species are equal in number.

We have adopted the diapason in the middle with respect to the locus of the perfect system, that is, the one from the supreme—the hypate—of the medians [hypate meson], as named by position, to the nete of the disjunct [diezeugmenon], for the voice willingly returns and revolves around the middle—rarely sending a melody out to the extremes because of the vehemence and force [required] for those [itches] that are beyond the normal in laxity or tension [lowness or height of pitch]. Thus the middle note by function of the Mixolydian will be adapted to the locus of the paranete of the disjunct, so that the tonos might produce the first species in the proposed diapason. The middle note of the Lydian [will be adapted] to the locus of the third of the disjunct [trite diezeugmenon] in keeping with the second species; the middle note of the Phrygian, to the locus of the paramese, in keeping with the third species, the middle note of the Dorian, though, to the locus of the middle note [mese], producing the fourth and middle [species] of diapason.

Franchino Gaffurio

Gaffurio was in a good position to bridge the gap between humanists and musicians with regard to the Greek modes. He was the beneficiary of translations of several major Greek musical authors. He apparently possessed a copy of Gallicus' *Ritus canendi*, for he mentions it in the *Theorica musica*.¹³ And he knew Boethius thoroughly. The delay in publication of *De harmonia* after its completion in 1500 gave him plenty of time to absorb the contents of Valla's *De expetendis*, which came out in 1501. He also knew Valla's translation of Cleonides, for he cites it.¹⁴ Despite these advantages, it cannot be said that Gaffurio added materially to the knowledge of the Greek tonal system.

Gaffurio's chart of the Greek tonoi in *Theorica musica* (see Figure 11.5) hints at a derivation from Gallicus' chart.¹⁵ Eight transpositions of the same A-a scale with the names Hypodorian to Hypermixolydian are represented on a grid. Each transposition has the identical letters A to a to indicate that they all have the same intervallic pattern. In introducing the chart Gaffurio explains:

The philosophers called these seven species of diapason modes from *modulando* or from *moderando*, since they observed that through them every progress of modulation is moderated through certain limits of tension and relaxation. Now the first species of diapason, going from the string proslambanomenos to mese, or from A re to a la mi re, they called Hypodorian. When every step of the Hypodorian undergoes a raising of a whole tone, the second mode, that is, Hypophrygian, results. If all the steps of this Hypophrygian are raised by a semitone, they form the Hypolydian. Raising this system in turn by a tone yields the Dorian.¹⁶

Gaffurio has here confused octave species, modes, and tonoi. The confusion started in his *Theoricum opus* of 1480, where he spoke of octave species, tropes, *maneries*, constitutions, and modes as interchangeable concepts. He also introduced there the post-Boethian method of dividing the octave into either a fourth below and a fifth above, or the reverse, which he said was the more consonant and perfect division. In both the 1480 and 1492 treatises the chart (Figure 11.5) and the discussion of the modes are part of a chapter entitled "Concerning the species of the diapason consonance," and this chapter follows a similar one on the species of diatessaron and diapente. Gaffurio demonstrates the octave species in the manner of the plainchant

13. Fol. a7r, I, 1: "musicæ facultatis libellum clericis perutilem descripsit." This remark is not in the earlier version, *Theoricum opus*, of 1480.

14. *De harmonia*, II, 16, 23.

15. The identical chart occurs in *Theoricum opus*, 1480, V, 8.

16. *Theorica musica*, V, 8, fol. 3kv.

Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Δωρικὴ				Ἰπποδωρικὴ
Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Δωρικὴ	Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Ἰπποδωρικὴ
Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Δωρικὴ	Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Ἰπποδωρικὴ
Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Δωρικὴ	Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Ἰπποδωρικὴ
Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Δωρικὴ	Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Ἰπποδωρικὴ
Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Δωρικὴ	Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Ἰπποδωρικὴ
Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Δωρικὴ	Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Ἰπποδωρικὴ
Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Δωρικὴ	Ἰπποδωρικὴ	Ἰπποφρυγία	Ἰπποδωρικὴ	Ἰπποδωρικὴ

Figure 11.5. The Greek tonoi according to Gaffurio, *Theorica*, V, 8

theorists. The first species of diapason is made up of the first species of diatessaron, A-d, and the first species of diapente, d-a; the second and third species of diapason are similarly constructed of the second and third species of diatessaron and diapente. But beginning with the fourth species of diapason, d-d', the diapente is below the diatessaron.

In the passage quoted above, which is only in the 1492 version, Gaffurio first says that the philosophers called these seven octave species modes. Then he shows that the first of these species could be transposed successively by tone, semitone, tone, tone, semitone, tone to produce further modes. Thus modes, it would appear, could be both different species and trans-

positions of a single species. (We shall see that in *De harmonia* Gaffurio eliminated this confusion.)

By introducing "the philosophers" Gaffurio makes a subtle transition from the plainchant theorists to Boethius, who called the transpositions *modi*. However Boethius reported a different scheme of transpositions: tone, tone, semitone, tone, tone, semitone, tone. Gaffurio's departure may have been deliberate, because he justifies it by the Guidonian gamut.

On the other hand Gaffurio may have been misled by the diagram in the edition of Boethius published by Joannes Gregorius de Gregoriis fratres in 1492.¹⁷ Otherwise Gaffurio follows Boethius. He recognizes the functional, or dynamic, nomenclature in that he sees each mode as rising from its proslambanomenos to its mese:

Thus the proslambanomenos or A re of the Hypodorian is surpassed by the height of a tone by that which is the same of the Hypophrygian. Similarly also the mese or a la mi re of the Hypophrygian exceeds that one which is the same of the Hypodorian by the height of a tone. Thus the intervening steps and the whole order of steps of the Hypophrygian happens to exceed the remaining intervening steps of the entire Hypodorian order by the dimension of a tone. The same order and process occurs in the others.¹⁸

Gaffurio then makes a cryptic remark that is also derived from Boethius: "It is agreed that these seven modes are deduced according to the seven species of diapason from the same strings and steps, one higher or lower than the other."¹⁹ Boethius did not explain how the modes could be derived from the species, and Gaffurio does not shed any light on this. Having by some process derived seven modes from seven octave species, Gaffurio, again following Boethius, adds an eighth, the Hypermixolydian, which, he says, Ptolemy "put on top" of the rest (*superadnexuit*).²⁰

In *De harmonia*, completed eight years later, after Gaffurio had had a chance to consult the translations of Bryennius, Aristides Quintilianus, and Ptolemy, the discussion of the octave species is separated from that of the modes. Indeed, they are in different books. He starts the chapter on the octave species (II, 32) with a citation of Ptolemy, but then proceeds to set them forth in the medieval manner, dividing them into species of fourths

17. In the reprint of 1499 that I have seen, the tonoi rise in the diagram as in Gaffurio: tone, semitone, tone, etc., although the text gives the proper sequence of tone, tone, semitone, etc. In the 1499 edition 4.15 is numbered 4.14.

18. *Ibid.*, V, 8, fols. k3v-k4r.

19. *Ibid.*, V, 8, fol. 4kr. Compare this to Boethius *De institutione musica*, 4.15: "Ex diapason igitur consonantiae speciebus existunt, qui appellantur modi, quos eosdem tropos vel tonos nominant. Sunt autem tropi constitutiones in totis vocum ordinibus vel gravitate vel acumine differentes."

20. Boethius *De institutione musica* 4.17; Friedlein ed., 348.3.

and fifths and numbering them as in his two earlier works. This system has no connection with Ptolemy, who numbered them: 1, b-B; 2, c'-c; 3, d'-d; up to 7, a'-a (2.3). The order in Boethius is similar except that he always names the lower note first, thus: 1, B-b; 2, c-c', etc. (4.14).

Inspired by Ptolemy (2.3), probably through Boethius (4.14), on the other hand, is the discussion of the species as terminated by fixed or movable notes (II, 32). This leads Gaffurio to consider placing all of the seven species within the extremes of two fixed notes, proslambanomenos and mese. The different arrangements of tones and semitones requires the division of the octave into a continuous series of semitones, or what Gaffurio calls the *genus permixtum*, a concept he borrowed from Anselmi. (See, for example, the first two species in Figure 11.6). Although Gaffurio expresses the location of the steps of each species in terms of string lengths in the Pythagorean tuning, the scheme of seven octave species may be thought of as the equivalent of the pitches A to a in the modern major keys of C, B \flat , A, G, F, E, and D. Just as Ptolemy's tonoi transpose his seven species into the central octave from hypate meson to nete diezeugmenon, so Gaffurio's species transpose his own medieval species into the A-a octave. Gaffurio does not relate either the ancient or modern modes to these transposed species. It is merely an interesting but abstract speculative exercise.

All of Book IV of *De harmonia* is devoted to the modes. Gaffurio draws from a multiplicity of sources concerning their history, ethical effects, and cosmic analogies. This literature is entirely about the ancient tonoi and harmoniai; yet Gaffurio applies it indiscriminately to the plainchant modes, to which the ancient names are assigned (IV, 3-7). Despite the fact that he now had Leonicens's very adequate translation of Ptolemy, Gaffurio baldly affirms that "Ptolemy, to bring the entire double octave system into accord with the modes, placed on top an eighth mode that would seize upon the highest species of diapason between mese and nete hyperbolaion and that would surpass in pitch the Mixolydian mode by a tone; he called it the Hypermixolydian, as if to say 'above the Mixolydian'" (IV, 9). In only one place does Gaffurio seem to return to the Boethian theory of the modes, which had been the basis of his treatment of the subject in his two earlier works of *musica theorica*. This is in a chapter entitled "By how great an interval any mode (*tonus*) is lower or higher than another" (IV, 11). Here he makes the statement: "The Hypodorian mode is the lowest of all; it is lower than the Hypophrygian mode in the order of its entire constitution by the interval of a tone." A little later he defines the location of the Hypophrygian in similar terms: "The Hypophrygian mode is higher than the Hypodorian in the entire order of its constitution by the interval of a toniacic [9:8] step. It is lower than the Hypolydian by the interval of a semitone (not by a tone, as some have laid down)." Gaffurio is deliberately

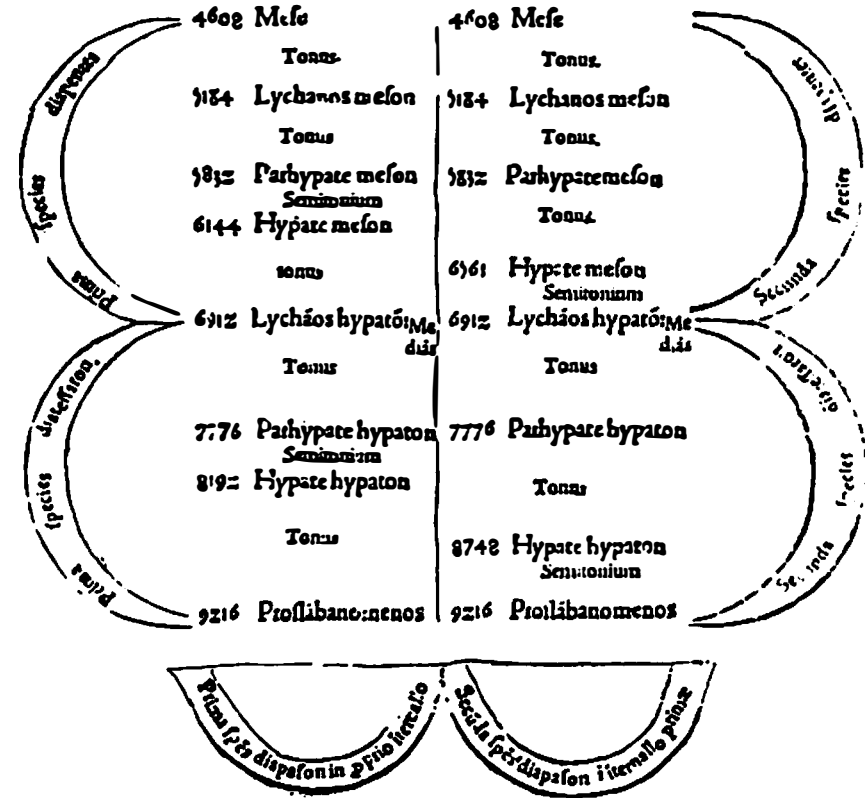


Figure 11.6.
The first two species projected on the octave proslambanomenos to mese, from Gaffurio, *De harmonia*, II, 32, fol. 57r

departing in the detail of the distances between modes from Boethius and his sources, yet modeling his discussion on them—that is, instead of Ptolemy's tone, tone, semitone, tone, tone, semitone, Gaffurio prefers, as in the *Theorica*, the pattern of the natural gamut from A to a: tone, semitone, tone, tone, semitone, tone, tone. Whether by raising the "entire order of the constitution" (*totum constitutionis ordinem*) or the "order of the entire constitution" (*totius constitutionis ordine*) Gaffurio meant to transpose the entire species of the Hypodorian octave to seven higher levels is open to question because of the inexactness of his language.

Gaffurio considered the system of eight modes perfect, because it completely filled the double octave. However he notes that Aristoxenus named in addition to the standard eight five more, namely, the Hypoiastian, Hy-

poaeolian, lastian, Aeolian, and Hyperastian. But Bryennius, he reports, considered them useless for an audible harmony of a full and integrated system and suitable only for display of erudition (*Harmonics* 2.4, Jonker ed., 164.3–8). In an addition Gaffurio made after the 1500 redaction of his treatise and before its publication in 1518 (fol. 91r), he points out that Martianus Capella spoke of fifteen modes altogether, a semitone apart from each other. But Gaffurio finds that these more than fill out an octave, which has only twelve equidistant semitones according to Aristoxenus. Also added just before publication was the chart showing this semitonal multiplication of modes (fol. 81v).

Gaffurio's modal theory does not do justice to the sources he possessed. In *Theorica musicae* he failed clearly to distinguish between octave species and tonoi, although he seemed to have grasped the difference between the ancient and the modern systems. In *De harmonia* he was evidently too eager to apply ancient erudition to the modern system of modes to show openly that the ancient Greek system was fundamentally different from the modern. It would have made the entire Book IV irrelevant to modern harmonics had he done so. Unfortunately both Glarean and Zarlino trusted Gaffurio and borrowed heavily from him concerning the ethos of the modes, their structure, the octave species, and the ancient nomenclature.

There is another side to the impact of Gaffurio's learning. Mistaken though he was about the ancient modes, he impressed even highly trained and sophisticated readers with the wealth of information about them that he had gathered. Rather little attention had been paid to the modes in treatises of composition or even speculative works. Gaffurio made them central to harmonic theory precisely at the moment when accounts of the marvelous effects of ancient music were daring modern musicians to recapture that power. By appearing to disclose the secrets of the modal system that was reputed to have fabulous powers, Gaffurio stimulated the revival of modal theory and the striving for modal consciousness and purity.

Giuseffo Zarlino

Zarlino had an ambiguous relationship with the Greek "modes," as he called them. Part IV of his four-part *Le Istitutioni harmoniche* develops a theory of modality for modern composition. But the first eight chapters survey the modes and modality in antiquity. For what purpose, one may ask, since Zarlino was convinced that modern composers used the modes "in a manner very different from the ancients" (IV, 10). How many modes there were, in what order they should be named, what intervals separated them, how many steps each had and of what size—things about which the ancient authors differed—did not matter to him, because those modes served dif-

ferent ends and a different kind of music from that currently practiced. Why then spend eight chapters on the ancient modes?

Zarlino did not venture into this thorny subject only to display his erudition, although he was not averse to doing so. I believe he did it to expose the naiveté of Glarean's boast that in his dodecamodal scheme he had reconstructed the ancient Greek system. Just as Zarlino invested nine chapters of Part III in refuting the position of Nicola Vicentino on chromatic and enharmonic music without ever naming him (III, 72–80), so without once dropping Glarean's name Zarlino makes the Swiss humanist's presumption the hidden agenda of these chapters of Part IV.

Zarlino had reason to feel uneasy about Glarean's *Dodekachordon*. Its central thesis obviously appealed to Zarlino, for he adopted it. He could not help finding Glarean's expansion of the traditional eight-mode system to twelve an eminently practical strategy. The literature of both monophonic and polyphonic music abounded with pieces that ended on A or C and exhibited the octave species identified with these notes. Theorists and apologists had gone to great lengths to fit such pieces into an eight-mode configuration, and that rather unsuccessfully. Glarean's proposal, therefore, made good practical sense. Glarean's proof of why there could be no more than twelve modes also convinced Zarlino, for he repeats it (IV, 11). The emphasis on the harmonic and arithmetic divisions of the octave as the essential characteristics of the authentic and plagal modes—concepts peripheral to modal theory before Gaffurio—became central to both Glarean and Zarlino. In numerous details, then, Zarlino copied Glarean's exposition of the twelve-mode system. But Zarlino could not abide Glarean's classicizing rationalizations. Glarean felt bound to legitimize the twelve-mode system by classical examples and concepts, perhaps because he assumed—mistakenly—that the eight-mode system rested on them too. Glarean erected an elaborate historical argument to prove that in naming the four new modes Aeolian, Ionian, Hypoaeolian, and Hypoionian he was restoring some of the neglected Aristoxenian modes. He also scoured Gaffurio's writings and those of Martianus Capella and others for ethical characteristics of the ancient modes that would fit his set of twelve. Zarlino recognized that this was a vain enterprise. Whatever the ancient modes may have been, they surely were not the modes of Glarean.

Zarlino's is the best analysis of the nature of ancient modality that anyone had made until then. It draws upon a wide range of Greek and Roman sources and practically leaves the medieval tradition out of the discussion. He inquires first into the meaning of the word and concept "mode." In ancient usage it did not have the restrictive meaning of a scalar pattern but united a panoply of characteristics within a poetico-musical medium of expression. He concludes: "We can truly say that in ancient times a mode

was a certain fixed form of melody, composed with reason and artifice, and contained within a fixed and proportioned order of rhythm and harmony, adapted to the subject matter expressed in the text."²¹

Zarlino shared with Boethius a preference for the term "mode" over "trope," "tone," and "harmonia." "Trope" was not a bad name, Zarlino believed, because it comes from *tropē*, which means turning or mutation, and this, in fact, happens to modes, which are turned from one to another when all the steps of a mode are raised or lowered. As for "tone," Cleonides (whom Zarlino calls Euclid) detailed the multiplicity of its meanings that made it unsatisfactory. Ptolemy, nevertheless, preferred this term and offered the opinion that the tones were so called because the ancient Dorian, Phrygian, and Lydian were a tone apart (*Harmonics* 2.10). Some writers—Plato, Pliny, and Pollux principally—called modes *harmoniai*, because a concinnity of elements made up melos (Zarlino: *melodia*). Indeed Fabius Quintilian defined *harmonia* as "that concordance which is generated by the conjunction of many things dissimilar among themselves."²²

Zarlino devotes a chapter to the names of the modes and their number (IV, 3). He surveys the views of Plato, Aristoxenus (through Martianus Capella), Cassiodorus, Cleonides, Censorinus, Ptolemy (through Boethius obviously, because Zarlino attributes to him the Hypermixolydian), Pollux, Aristides Quintilianus, Apuleius, and Plutarch. He concludes ruefully that "from the diversity of their ordering, the variety of number, and the difference in names found in all these authors, one cannot draw anything but confusion of mind."²³ In reviewing the affective qualities and ethical effects attributed to the individual modes (IV, 5) Zarlino judiciously confined himself to sources dealing with the ancient modes. The order in which the modes were arranged by various authors is the subject of another chapter (IV, 6). Zarlino gives a most interesting account of the very ancient *harmoniai* described by Aristides Quintilianus, some containing enharmonic intervals, scales consisting of less or more than an octave, and gapped scales in which the interval between some adjacent notes was greater than a tone. Zarlino quotes the passage in Greek and gives a creditable translation of it, although he suspects that the text is corrupt. When he comes to the modes as set forth by Boethius, he is puzzled by their semblance of being transpositions of a single pattern:

We shall not be able to find any difference in intervals from one mode to another, for Boethius claims that all the notes of the Hypodorian, as they stand,

21. *Le Istitutioni harmoniche*, IV, 1, in *On the Modes*, trans. Vered Cohen, ed. with an introduction by Claude V. Palisca (New Haven, 1983), p. 10.

22. *Ibid.*, IV, 2; Cohen trans., p. 13, quoting Quintilian *Institutio oratoria* 1.10.12.

23. *Ibid.*, IV, 3; Cohen trans., p. 16.

are moved higher by a whole tone to form the Hypophrygian mode, and that all the notes of this mode are in the same way moved higher by another whole tone in order to produce the notes of the melody of the Hypolydian. Boethius claims that if all these notes are then moved up by a semitone, the Dorian is formed, and so he goes on about the other modes. Under this procedure of obtaining the modes I cannot conceive of any difference between them.²⁴

Zarlino finds also another difficulty: the modes of Boethius do not match the modern modes in the intervals between them:

From the words and examples of Boethius, badly understood, we can understand why modern musicians speaking on this matter have been very much deceived, for they believe that the modern fifth mode is the ancient Lydian, and they make it one whole tone lower than the seventh mode, which they call Mixolydian. They propose that the Lydian is contained within the sixth species of diapason, F to f, and the Mixolydian within the seventh species of diapason, G to g. These, however, are distant from each other by a whole tone, whereas Boethius clearly shows that the ancient Lydian is distant from the Mixolydian by a semitone. He similarly claims that the Dorian is a whole tone away from the Phrygian, something which Ptolemy also claims, and that the Phrygian is another whole tone away from the Lydian.²⁵

Thus the moderns contradict what the ancients maintained. Modern musicians, therefore, fall into great error when they call their modes by the Greek names. Zarlino also wondered whether Boethius was reliable: "It might be that in practical matters he was not so knowledgeable."²⁶

Zarlino sees clearly that the Boethian modes, which he likens to those of Ptolemy, were not comparable to the modern. They also were of little use to a modern composer, since they afforded no variety of octave species, not to mention the other characteristics of the modern modes that Zarlino stresses in the ensuing chapters. Thus Zarlino's history of modality was an act of liberation from an alien and obsolete system, which could now be set aside in treating the art of polyphonic composition.

Francisco de Salinas

With Salinas and Girolamo Mei, who independently came to similar conclusions based on their reading of some of the same Greek manuscripts in Rome, we come to what might be called the philological phase of our history. Salinas began his studies of Greek music theory the earlier of the

24. *Ibid.*, IV, 8; Cohen trans., p. 33.

25. *Ibid.*, IV, 8; Cohen trans., p. 34.

26. *Ibid.*, IV, 8; Cohen trans., p. 35.

two, around 1538, when he accompanied Archbishop Pedro Gómez Sarmiento de Villandrando from his native Spain to Rome.

The *De musica libri septem* of Salinas was not published until 1577, about nineteen years after Salinas returned to Spain. It contained only three brief, though significant, chapters on the tonoi (IV, 11–13). How Salinas, blind from an early age, could have accomplished the research required to write this learned book, in which he cites the ancient treatises by book and chapter, is an object of both mystery and awe. He was fluent in Greek and Latin, but he must have had an equally fluent assistant who could read and write for him; if so, he never mentioned such help. Edward E. Lowinsky has suggested that Kaspar Stocker may have acted in that capacity.²⁷ Salinas clearly distinguished between a mode, or *harmonia*, and a tonos, or *tonus*. The key to this distinction was Ptolemy's differentiation of two kinds of mutation, or modulation:

In the second [book] of his *Harmonicorum*, chapter 6, Ptolemy asserts that the difference between mode and "tone" [*tonus*] is very different [from that described by Gaffurio and Glarean]. Concerning this so-called tone, he said, there are two primary kinds of mutation [i.e., modulation]. One is that by means of which we run through a whole melody at a higher or lower tension [that is, pitch] observing the proper interval scheme in the whole species; the other by means of which not the whole melody is changed in tension [pitch level] but part of it, the interval scheme corresponding closely only in the beginning, for which reason this is better called permutation of melody than of tone. For through the permutation of tone the melody is not altered but the tone totally, and through the permutation of melody the *harmonia* itself is varied. By these words Ptolemy meant, obviously enough, that mutation of mode was one thing, of tone, another.²⁸

Ptolemy was here explaining not so much the difference between tonoi and harmoniai, or modes, but two different kinds of mutation. In one a melody was simply transposed to a different key, as we would say; in the other a segment of the melody or scale remained the same, but through a common tone another segment shifted species by changing tonos.

Salinas claimed that none of the modern authors spoke of tonoi, only of modes. In this he was not altogether correct, for, as we have seen, both Gaffurio and Zarlino described them, if not with the insight that Salinas shows in this passage:

27. "Gasparus Stoquerus and Francisco de Salinas," *Journal of the American Musicological Society* 16 (1963):241–43.

28. *De musica libri septem* (Salamanca, 1577), IV, 12, p. 198. Most of this chapter is translated, somewhat differently, in Arthur M. Daniels, "The *De musica libri vii* of Francisco de Salinas" (Ph.D. diss., University of Southern California, 1962), pp. 349–53.

Concerning the tones, the moderns have nothing to say, since they do not believe it is pertinent to a vocal composition whether it is sung low or high, for the mutation solely according to tone does not change the affection of the soul. It is otherwise if the mutation is with respect to harmonia: the soul is differently affected when the first mode is changed to the fourth because of the different force of the harmonia. This is not present in the permutation of tone. . . . Those that the moderns call tones, then, are more properly called modes, as the lovers of propriety best observe who call them modes and not tones.²⁹

Like his predecessors, Salinas failed to appreciate the link in Ptolemy's theory between the tonoi and octave species. But by emphasizing that in Greek theory there existed both mode—*harmonia*—and tonos, and by showing how mutation could take place with respect to both, he drew attention to the dynamics of melody, raising the lifeless paper schemes to musical actuality.

Girolamo Mei

With Mei we meet the first critical history of the tonal systems of the Greeks. Although he did not publish his findings, the fourth and last book of his *De modis musicis antiquorum* was communicated to a circle of learned men in Florence in 1573, four years before the publication of Salinas' book. Mei began his researches into Greek music around 1550 while in Lyon, but after a year or two he was forced by the pressure of other work to drop the subject until ten years later in Rome, when he was able to devote himself seriously to it. He came to realize, as his predecessors and contemporaries failed to do, that the Greeks had not one tonal system but several, attributable to different periods and authors. He admired the logic of Ptolemy's system of seven tonoi coordinated with seven octave species, of which he set forth a rather special interpretation, but it seemed to Mei to have been too theoretically rational to have been based on actual practice. He could also appreciate the advantages of the system of Aristoxenus and the beautifully symmetrical system of fifteen tonoi of his followers, with its five principal modes, five hypo modes, and five hyper modes, but it also seemed too overrefined to be a product of common practice. Mei surmised that the common system was one of eight modes, as described by Ptolemy (*Harmonics* 2.11) but not approved by him.³⁰ Mei fully described and diagrammed these schemes in his treatise *De modis* and provided briefer descriptions

29. *De musica*, IV, 12, pp. 198–99.

30. The various systems are described in *De modis musicis antiquorum*, Biblioteca Apostolica Vaticana, MS Vat. lat. 5323, Bk. II, pp. 67–99.

without charts in his Italian treatise.³¹ He also enclosed in a letter to Giovanni Bardi of 17 January 1578 a set of charts that have not survived.³²

Of the system of Aristoxenus (Figure 11.7) Mei acknowledges that only an imperfect knowledge survived, though reliable testimony of the number and names of his tonoi and the semitone distances between them existed in Aristides Quintilianus (1.10) and Ptolemy (2.11; *De modis*, p. 68). (He does not name Cleonides in this connection.)

Mei gives a detailed account of Ptolemy's reasons for rejecting the Aristoxenian system (*De modis*, pp. 72–74). He then sets forth the eight-mode system which Ptolemy described with disapprobation. The closeness with which he follows Ptolemy's text may be appreciated by comparing the translations of Ptolemy (left) and Mei (right) juxtaposed below:

For they have simply laid as a foundation the three oldest—the Dorian, Phrygian, and Lydian—thus named from the peoples from which they came or however else one may derive their names—and let them be distant from one another by a whole tone, and for this very reason they called them *tonoi*, that is, tones. Departing from these they proceed through a symphonic interval from the deepest of the three, the Dorian, to that which is a diatessaron higher. This tonos they called Mixolydian because of its proximity to the Lydian. The distance between these two is not a whole tone but the remainder of a diatessaron [limma] after the ditone encompassing the Dorian and Lydian is removed.

Of the three that were the most ancient and first in use, that is the Dorian, Phrygian, and Lydian, they understand them to be exceeded one by another by a toniac interval or sesquioctave portion, by which magnitude the diapente exceeds the diatessaron, which I may call a tone, and for this reason modes were called tones by the ancients (for, to be sure, among our musicians something else is meant by this word), undoubtedly because one is established next to the other in height of pitch. From the Dorian, which among these [ancients] was the lowest of the three, by a space of a tone higher is the Phrygian; by the same interval higher is the Lydian. Thus the Dorian is a ditone lower than the Lydian. Since the highest is a diatessaron away from the lowest, the fourth is higher than the Lydian by a limma, which is the remainder of the entire diatessaron, and for the reason that it was closer to it than to the others

et acuta, atque acutissima—par numero proficiuntur
 quod diatessaron, ipsum idem est . . .
 Aristoxeni. modernis modo, ac nominibus.

Hypodorian. omnium gravissimus
 Hypodorianus, ac gravior Phrygius
 Phrygius acutior.
 Hypodorianus, ac gravior Hypolydianus . . .
 Hypolydianus acutior.
 Dorianus.
 Dorianus, ac gravior Phrygius.
 Phrygius acutior.
 Eolianus, ac gravior Lydianus.
 Lydianus acutior.
 Hypodorianus, ac gravior Mixolydianus.
 Hypodorianus, ac gravior Hyperphrygius
 Hyperphrygius, et Hypermixolydianus acutior
 Adiantidius . . .
 Hypodorianus . . .
 Hypodorianus. omnium acutissimus

Hypodorianus igitur, modorum omnium gravissimus constituto at
 ea, qua quilibet futura erat, apud Aristoxenum integra
 diatessaron acutius usquebatur. si enim, quod iam experimentis
 et sesquioctavam rationem ac toniacam in duas aequal
 scindi posse non dubitavit, et utraque semitonis nomine
 appellavit. qui nam ea de causa et diatessaron solum
 consonantiam e quinque semitonis, diapente vero e
 septem, diatessaron postremo e duodecim constat existimavit
 quam vero id recte, nihil ad nos. qua vero aduerta,
 illam dicta sicut, nec non qua pro illo dici possent,
 meliorem nacti occasionem fortasse non omittemus.

tonum autem

31. "Trattato di Musica, fatto dal Signor Hieronimo Mei Gentilhuomo fiorentino." Paris, Bibliothèque Nationale, MS lat. 7209/2, pp. 43–58.

32. The charts sent in the letter are enumerated in a postscript; see Palisca, *Girolamo Mei*, p. 154.

Figure 11.7. The tonoi according to Aristoxenus and his followers, from Mei, *De modis*, Biblioteca Apostolica Vaticana, MS Vat. lat. 5323, p. 69

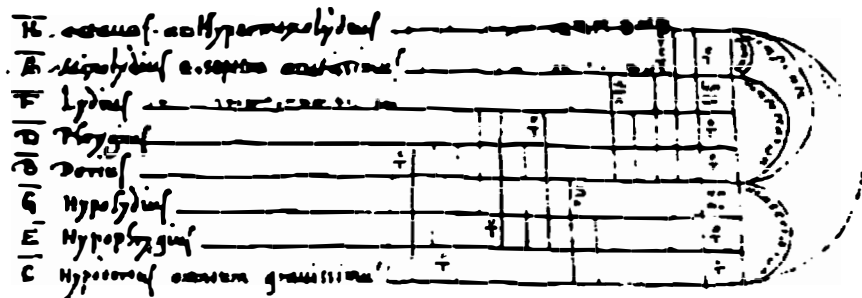


Figure 11.8.

The eight modes described by Ptolemy, from Mei, *De modis*, Biblioteca Apostolica Vaticana, MS Vat. lat. 5323, p. 77

(being a limma from the Lydian but a tone away from the others), and thus being mixed with the Lydian, it was called Mixolydian.”

Mei goes on to paraphrase the remainder of Ptolemy’s chapter and to give a diagram of the eight-mode system that represents more fully than those in the Greek manuscripts the distances between the various tonoi that are a diatessaron, diapente, or ditone apart (see Figure 11.8).

Mei now exposes, without any fanfare, for the first time in Western theoretical writing the error of Boethius, so often repeated after him, that Ptolemy added an eighth mode. With the help of the chart (Figure 11.8) Mei (p. 77) perspicaciously shows why Ptolemy rejected the Hypermixolydian as “futile” (*frustrum*) and “plainly superfluous” (*plane superfluous*). According to Mei’s accurate report of Ptolemy’s arguments, the

33. Ptolemy *Harmonics* 2.10; Mei, *De modis*, pp. 74–75: “Trium igitur, qui antiquissimi ac primi in usu fuerunt Dorius scilicet, Phrygiusque, ac Lydius, toniaeo interuallo, et sesquioctava portione, qua uidelicet magnitudine diatessaron consonantiam à diapente superari uiderent, et quam tonum uocitari possim; etiam à ueteribus (nam apud nostros alia illa nomine ne intelligitur quidem) non est dubium, unumquemque sibi proximo uel acutiorem, uel remissiozem constituerunt: quasi ea fortasse de causa modos a ueteribus TONOS appellatos fuisse uoluerint. Horum Dorio, qui apud ipsos extitit omnium grauissimus, sesquioctava eo toni spatio fuit Phrygius acutior; hoc uero eadem interualli portione intensior Lydius. Ditono igitur grauior fuit Dorius quam Lydius. Quibus, ut acutissimus a grauissimo integrae diatessaron spatio abesset, quartus est adiectus: qui lemmatis, et quod reliquum fuit de tota diatessaron, spatio esset Lydio acutior. quam cum proprius a Lydio abesset, quam ceteri a sibi proximis (hic enim lemmate à Lydio, ceteri uero tono a ceteris distabant) quia quasi ea de causa Lydio esset admixtus, Mixolydian appellauerunt.”

Hypermixolydian was, first of all, incorrectly named. It was wrong to measure the distance between modes by emmelic (melodic) intervals such as the limma or tone, for the relationship to other modes should always be made in terms of symphonic intervals—the diapente or diatessaron—and the differences of tone and limma are by-products of these, as the chart shows. Thus the relationship of the Dorian and the Hypodorian is a symphonic interval, a diatessaron, but that between Mixolydian and Hypermixolydian is an emmelic interval, a tone. Mei’s chart makes plain, moreover, that if the diatessaron and diapente intervals are calculated, BH is shown to be an octave, and the mode [i.e., species] on H would duplicate that on B.

Mei now backtracks to Ptolemy 2.7 to consider the limits that should govern modes. Potentially the number of modes is infinite, as is the number of pitches (*sonitus*). But there are limiting factors in that three things have to be distinguished: the difference in pitch among the modes, the number of such differences, and the boundaries set upon the mode. Or, as Mei otherwise puts it, one must consider the interval between the mode’s outer limits, the intervening intervals that comprise it, and the differences among these component intervals. With respect to the first, some believed a mode should be bounded by an octave—that is, it should be an octave scale—others that it should be less than an octave, others that it should be more. Here Mei glosses Ptolemy by means of Aristides Quintilianus, namely his testimony concerning the ancient harmoniai, some of which spanned more, some less than an octave. (This is the same passage that was quoted by Zarlino.) Mei, like Zarlino, has doubts about the accuracy of its transmission:

Nam, tametsi locus ille in omnibus, quos uidi, codicibus mendis omnino quam plurimis scaterere non est dubium, liquido tamen ex eius uerbis in primo è tribus, quos de re musica scriptis reliquit, elicitur, constitutiones has, quos modos ac tonos appellamus, non semper integram diapason iuste explere; sed earum nonnullus hac esse minores, alias uero et maiores: Dorium enim (ni mendum in uerbis subest, quod suspicamur) hanc ipsam superare, lastium uero ab eadem tono, et sesquioctauo ratione deficere, hic idem ratione subducta, expositis

For, although that place in all the codices I saw undoubtedly bubbled with all possible faults, yet in the first of three [books] that he wrote concerning musical matters and that survive from his words there ensues that these constitutions which we call modes do not always fill out an entire diapason but some are smaller than this, others larger. He attempts to prove that the Dorian (unless there is a fault in the text, which we suspect) exceeds the octave, the lastian is deficient by the same tone or the sesquioctave ratio, this ratio

que uniuscuiusque interuallis
probare conatus est.³⁴

being taken away, after some
intervals were set out.

Mei here refers to two scales spanning more or less than an octave—namely the Dorian, which, Aristides said, consisted of tone, diesis, diesis, ditone, tone, diesis, diesis, and ditone, the total exceeding the octave by a tone; and the Iastian, which he described as comprising diesis, diesis, ditone, trisemitone, and tone, remaining short of an octave by a tone.

This entire gloss of Mei's may not be to the point, however, because, when Mei thought Ptolemy was speaking of the range of a mode (at 2.7, Düring ed., 58.1), he seems to have been concerned with the distance between the lowest and the highest tonoi, for the new theorists, he complains, continually aim at an increase, which leads to the return of the identical harmonic relations. This consideration induces Ptolemy (2.7)—and Mei also, as he continues his commentary—to explain the purpose of the tonoi. They do not exist simply to move a melody higher or lower. Rather they exist for the sake of a change of affection. For when the same melody is begun higher or lower within a given voice, the ethos is altered, because one time the song will reach beyond the limits of the voice at the higher end, another time at the lower end. Mei demonstrates this phenomenon through a diagram that does not have a parallel in Ptolemy's treatise (Figure 11.9).

Mei explains that no voice is granted more than fourteen notes, which may be thought of as hypate hypaton to nete hyperbolaion. The fourteen steps of the voice in its normal location are represented by the scale in the middle of the figure. This range defines the absolute boundaries of the voice's capability, beyond which the singer would have to "summon a remarkable force" (illi uim plane uel ingentem student adhibere). At the bottom of the figure the fourteen-step system is shown starting seven steps lower, so that the melody, marked "cantilena," now goes beyond the low limit of the voice—that is, hypate hypaton—by three steps. In the uppermost scale, the system has been moved up seven steps, and the melody now exceeds the upper limit, nete hypaerbolaion, by three steps. Mei paraphrases Ptolemy:

in eiusmodi tonorum permutatio-
nibus non amplius cum utrisque
cantus terminis quadrare, atque
ad punctum omnino conuenire
perspicue sentiantur:
imo semper altera ex parte

In this kind of permutation of tonoi
the melody no longer squares with
both limits of [the voice],
which are believed clearly not to
agree altogether; rather,
on one end the boundary

34. *De modis*, p. 80. The passage in Aristides Quintilianus *De musica* is at 1.9.

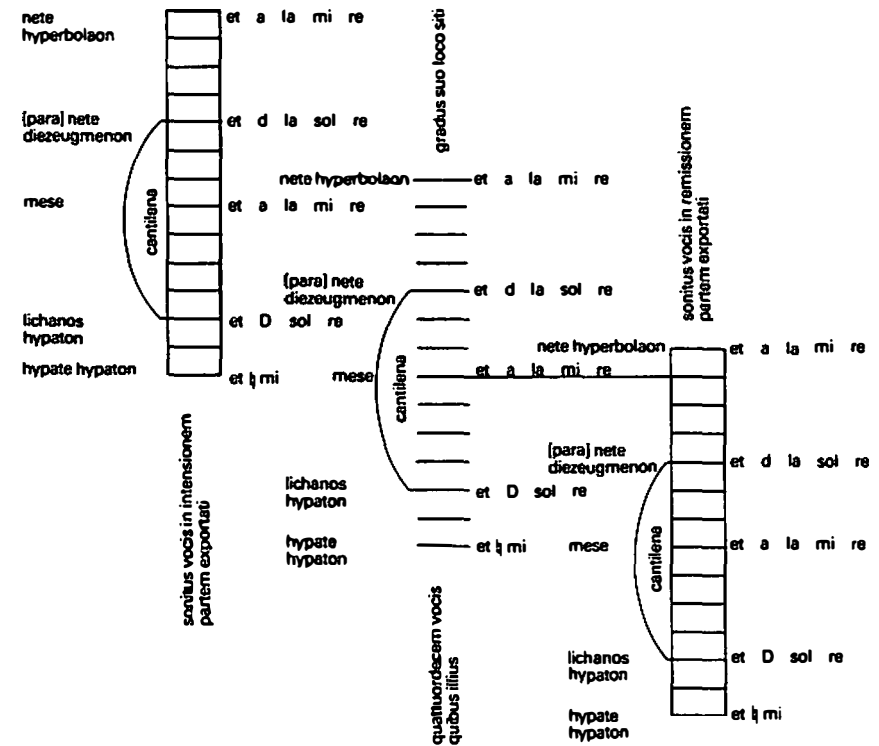


Figure 11.9.
The effect of the transposition of a melody, transcribed from Mei, *De modis*,
Biblioteca Apostolica Vaticana, MS Vat. lat. 5323, p. 83

uocis terminus
praesto magis adesse, quam
cantus; ex altera uero, atque
illi opposita cantilenae magis,
quam uocis.³⁵

of the voice is always nearer at hand
than that of the melody, whereas
on the other, opposite, side
the limit of the melody is reached
sooner than that of the voice.

Thus the limits of the melody do not agree with the range of the voice as they did when it was situated in the nonpermuted constitution assigned to it. This change is brought about by the tonoi. When such a change does

35. Mei, *De modis*, pp. 81–82; Ptolemy *Harmonics* 2.7, Düring ed., 58.15–18.

not occur, as in the transposition by an octave, the transposition is to be excluded, because the limits are then as they were in the original constitution.³⁶

It should be noted that Mei is not equating his nonpermuted fourteen steps with any absolute thetic system, a virtual standard polychord giving pitches from approximately B to a'. Rather, any one human voice will have its own such standard range, to which by the agency of the tonoi the mutation described in Ptolemy would be applied. All the mutations must take place, however, within the range between the voice's proslambanomenos and nete hyperbolaion: "tota modorum uis intra hos terminos sit locanda; quos cum forma, tum acumine et grauitate, id est loci positu inter se differre nemo dubitari" (the entire range of the modes must be located within these boundaries, which, no one can doubt, differ among each other both in form and height of pitch, that is, in location).³⁷

Through this discussion Ptolemy has provided a further reason for the limitation to the octave of the distance from the lowest to the highest tonos. This range may not reach the octave itself but must stop short of it. As there are only seven species of diapason, the number of tonoi must not exceed this number, for beyond that the same species is duplicated, just as after the number 9, the number 1 returns in the form of 10. Mei now enumerates the species of diapason. The first, between hypate hypaton, or mi, and paramese, or mi, Ptolemy assigned to the Mixolydian mode; the second, between parhypate hypaton, or C fa ut, and trite diezeugmenon, or c fa ut, to the Lydian, etc. The seventh and last was assigned to the Hypodorian. Thus the lowest species of diapason is assigned to the highest tonos and mode, the highest species to the lowest, and the median always remains the same. Now Mei digresses from Ptolemy to explicate in his own way the location of a middle step in each species of diapason. The fourth step in each diapason is called the median (*media*). Thus the median of the Mixolydian [species] is hypate meson, or E la mi; of the Lydian parhypate meson, or F fa ut; and so forth. Returning to Ptolemy (2.11), Mei notes that each tonos was assigned a step in the central octave to be its mese. Mei interpreted this placement of the mese in the light of his idea that the fourth step in each species was its mese:

ita tamen, ut paranete diezeugmenon et D la sol re esset, quae uim media Mixolydij omnium acutissimj obtineret: qua in loco ipse modus primam diapason formam, ciectis

Thus paranete diezeugmenon or D la sol re is the note that the median of the Mixolydian, the highest [mode] of all, acquires. At that place this mode produces the first species of diapason, which

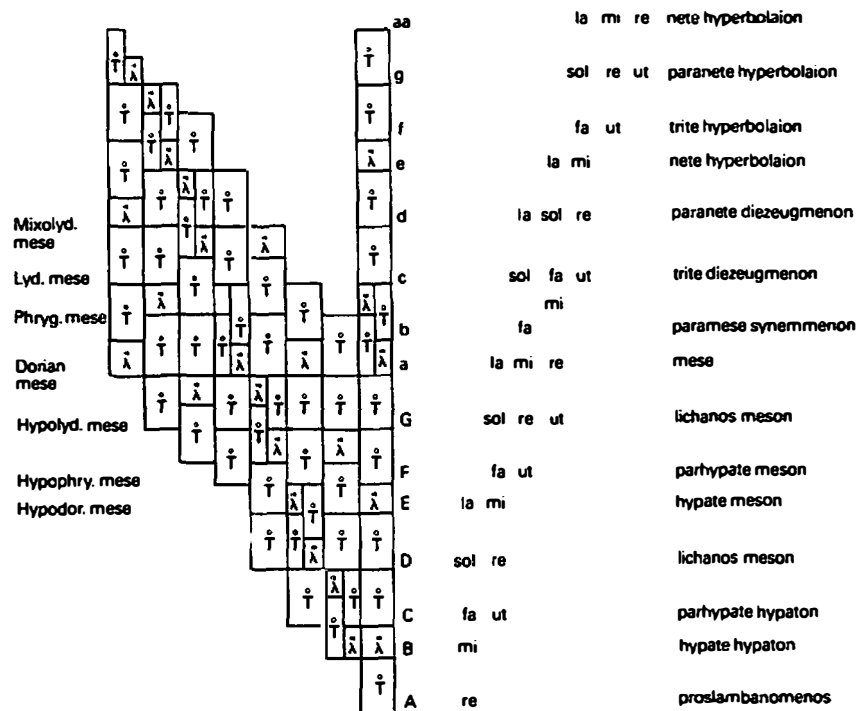


Figure 11.10.

The modal octave species of Ptolemy, from Mei, *De modis*, Biblioteca Apostolica Vaticana, MS Vat. lat 5323, p. 93

quasi sua e sede reliquis species sonitibus, quam illi iam ipse addixerat, conficeret.³⁸

attaches itself to the other sounds which have been, as it were, driven out from their seat.

This statement is far from lucid, but in the course of a wordy explanation and a much more communicative diagram—one that has no parallel in Ptolemy—Mei reveals his unique interpretation of the relation of the modes to the octave species (see Figure 11.10).

In Figure 11.10 the right-hand bar represents the greater perfect system, with the whole tones indicated by the abbreviation "To," the semitones by "lambda-a," for limma, and the tone of disjunction as a split key with fa

36. Mei, *De modis*, p. 84; Ptolemy *Harmonics* 2.8.

37. Mei *De modis*, p. 89.

38. *Ibid.*, p. 91.

mi in the middle. The steps are named both in terms of the medieval litterae-claves and the Greek string designations. To the left of the perfect-system bar are seven bars representing the seven octave species turned modes. The fourth line from the bottom in each bar represents the mese in that mode, which is labeled at the far left. The highest mode, Mixolydian, is constructed out of the ascending interval species limma, tone, tone, limma, tone, tone, tone, equivalent to the octave hypate hypaton to nete diezeugmenon, or B-b, with its median note, the fourth from the bottom, situated on paranete diezeugmenon, the step assigned to the Mixolydian as its mese. Similarly the Lydian is built from the second octave species, tone, tone, limma, tone, tone, tone, limma, around the mese on trite diezeugmenon, and so on for the rest. Since Mei recognizes that the tonoi are all formed from the same arrangement of pairs of conjunct tetrachords around a tone of disjunction, he marks this tone of disjunction in each bar as a split key, rising alternately tone limma at the left and limma tone at the right. The Mixolydian shows clearly the pattern of two conjunct tetrachords descending tone, tone, semitone, tone, tone, semitone, below the disjunction, while the Hypodorian exhibits the same conjunct pair above that the disjunction. In the other modes no more than one complete tetrachord falls within the octave span. The tones of disjunction—and, consequently, the tonoi—rise in thirds. Taking the note below the disjunction (mese) as a measure, the sequence of transposed “thetic mesai,” if we may call them that (Mei did not!), is B, d, f♯, a, c♯, e′, g′.

Mei seems to have been misled by the statement in Ptolemy that functional mese (the “dynamic mese” of modern commentators) of the Mixolydian coincides with the locus of the paranete diezeugmenon, and that other notes are similarly assigned the mese function in the other tonoi. If the entire greater perfect system is transposed to accompany the mese, the octave species will be projected on the central span, hypate meson to nete diezeugmenon, and in each octave species the thetic mese will naturally be the fourth note from the bottom.³⁹ This phenomenon, different from what Mei conceived, may be seen in Figure 2.6 of chapter 2.

In the course of his explanation Mei seizes the opportunity to berate Gaffurio and Glarean for blindly following Boethius in the pursuit of the eighth mode:

Qua in re nostrorum hominum
prudentiam saepe requiro, qui
octauum hunc a Ptolemaeo
modorum numero adiectum tradi-

In this matter I often wonder about
the sagacity of our men who
transmitted that this eighth was
added to the number of modes by

39. A more succinct discussion of the ancient modes is found in Mei's “Trattato di musica” in Paris, Bibliothèque Nationale, MS lat. 7209/2, pp. 53–56, trans. in Palisca, *Girolamo Mei*, pp. 50–53.

derunt, Franchini Gafurij
praesertim, uirj sane in hoc
studio exercitatissimj ac longe
doctissimi:

Nam de Glareano minus est meo
quidem iudicio mirandum; is enim
Gafurij autoritate qui se
Ptolemaej scripta legisse
testatus fuerat, facile, cum
ipse ea non legerit,
decipi potuit: Gafurius uero,
qui legit, et Ptolemaej sensum
non est assecutus, et Boethij
uerba, si modo ea legit non osci-
tanter, in suam sententiam inter-
praetatus detorsit: Boethius enim,
cum de Hypermixolydio uerba
faceret, ueritus nimirum, quando
septem tantum esse modos, qui
uidelicet ipsae diapason formae,
affirmasset, atque octauum hunc
postea eorum numero admiscuisset,
ne parum ipse sibi constare
uideretur, rationem se huius
adiectionis paulo posterius alla-
turum est pollicitus, quod uero
cum praestitisset, atque eam dili-
genter exposuisset, haec ille
statim subiecit: ATQUE
HIC EST OCTAVVS MODVS; QUEM
PTOLEMAEVS SUPERANNEXVIT.
Quae Gafurium in eam sententiam
accepisse uel facile credere
possumus, ut Hypermixolydij
authorem inuentoremque Ptolemaeum
existimasset. Quod non modo
falsum est, sed a Ptolemaei
quoque sententia penitus alienum.⁴⁰

Ptolemy, particularly that of
Franchinus Gafurius, a man certainly
very experienced and altogether
very learned in this discipline.
Less to be wondered at, in my
opinion, is Glareanus. Since he
did not himself read the writings
of Ptolemy, he could
easily be deceived by the authority
of Gafurius, who, it has been
witnessed, read
them, if only sleepily, and did not
pursue the sense of Ptolemy, but,
persuaded by the words of Boethius,
distorted the meaning. As for
Boethius, since he mentioned the
Hypermixolydian, when he affirmed
that there are seven modes, as many
evidently as the species of
diapason, and mixed in with
their number afterwards an eighth,
lest this seem to have been a
trivial thing to him, he promised
to bring forward a reason for this
addition a little later.
This, indeed, he both
fulfilled and
industriously explained.
He submitted it presently: “ATQUE
HIC EST OCTAVVS MODVS; QUEM
PTOLEMAEVS SUPERANNEXVIT.”
We can easily believe that
Glareanus accepted Gafurius’
judgment, so that he considered
Ptolemy to be the author and
inventor of the Hypermixolydian.
This is not only false but completely
alien to any opinion of Ptolemy.

Thus was the fiction of Ptolemy's addition of an eighth mode finally put to rest. Although Mei's work remained unpublished, his interpretations of the tonoi according to Aristoxenus, his followers, and Ptolemy were pub-

40. Mei, *De modis*, pp. 90–91. The references to Boethius are the following: *De institutione musica* 4.17; Friedlein ed., 343.16–18: “Septem quidem esse praediximus modos, sed nihil uideatur incongruum, quod octavus super adnexus est,” and 4.18, 348.2–3: “Atque hic est octavus modus, quem Ptolomaeus superadnexuit.”

lished by Vincenzo Galilei in his *Dialogo* of 1581. Mei had sent charts similar to those he included in his treatise to Giovanni Bardi and Galilei. According to Mei's description of this material, on one page were, to one side the thirteen modes according to Aristoxenus together with those added by his followers, below that the modes according to Boethius, and to the other side the modes according to Ptolemy. These must have been on a large folio and were probably separated from the letters by the time Giorgio Bartoli copied them, for this item is missing from the codex.⁴¹

Vincenzo Galilei

Galilei presents first the system of Aristoxenus. He took the octave in which the Dorian octave species lies, *e* to *e'*, and split it into twelve semitones, not by means of a monochord division but by ear, and assigned each half step to a different mode. The diagram (Figure 11.11) shows the double-octave system at the left, marked A to Aa, and to the right of that thirteen systems, each similarly marked A to Aa, and each a semitone higher than the previous one. The mese is indicated through Mei's device of a split key with b fa in the middle.

The interlocutor Bardi seizes the opportunity of defending the division of the octave into equal semitones. Admitting that in this system of tuning the fourth is too large and the fifth too small to be perfect, he says listeners have grown so accustomed to these tempered intervals that they actually prefer them. However he does not dispose of Ptolemy's arguments against the multiplicity of modes.

Galilei next shows the system of fifteen tonoi of the later Aristoxenians.⁴² He then goes on to the system of Boethius, because this is not as artful and as difficult to understand as Ptolemy's, and it fits the description of the eight-tonos system that Ptolemy rejected. Galilei perceptively noticed the discrepancy in the 1492 Venetian edition of Boethius between the intervals separating the tonoi as detailed in the text—tone, tone, semitone, tone, tone, semitone, tone—and their representation in the diagram—tone, semitone, tone, tone, semitone, tone, tone.⁴³ Galilei adds that he hunted for the editions of Basel and Paris but never found them. However he saw manuscript copies "in various famous libraries."⁴⁴ Galilei's own chart is based on the Boethius text and is misleading only in that it singles out in each vertical bar the octave (marked by an arch) that identifies the medieval mode known by the name rather than the octave species proper to the

41. See Palisca, *Girolamo Mei*, p. 154.

42. This chart is in *Dialogo*, p. 57, and is laid out in a format almost identical to that of the thirteen tonoi.

43. *Ibid.*, p. 59.

44. *Ibid.*, p. 60.

Dimostrazione de' tredici Tuoni, secondo la mente d'Aristoteleno.

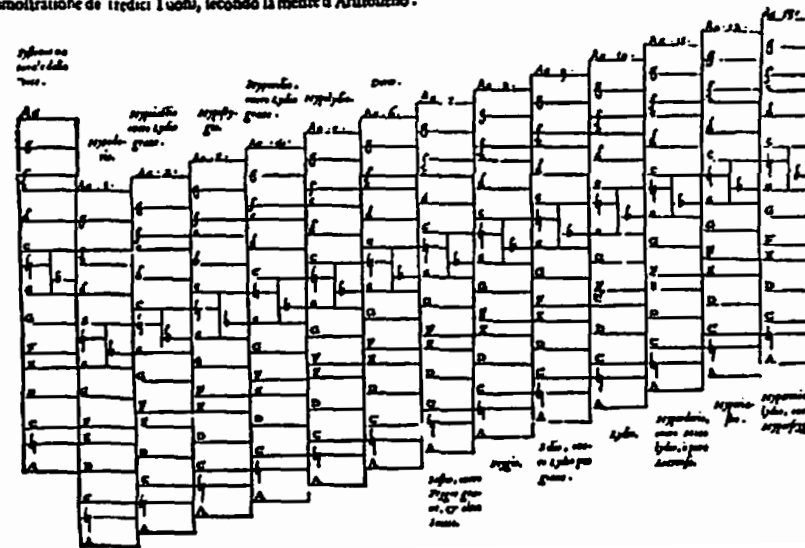


Figure 11.11.

Demonstration of the thirteen tonoi according to the opinion of Aristoxenus, from Galilei, *Dialogo*, p. 52

tonos. Galilei does not comment on this feature of the diagram (Figure 11.12).

Galilei's explanation and graphic representation of Ptolemy's seven tonoi follows Mei's thought faithfully up to a point, but the layout may be Galilei's own. It shows the complete greater perfect system at seven different levels. The mesai occupy the middle octave, *e* to *e'*, which coincides with the fourth species of diapason, belonging to the Dorian tonos. Each other octave species, whose interval arrangement follows Ptolemy correctly, occupies a similar place in the other double octave systems, which are built around the mese according to the normal tetrachordal coupling. The chart (Figure 11.13) shows the systems rising, but the alphabetical letters progress from D-Dd, C-Cc, etc. to E-Ee. The letters, however, indicate relative pitch—they are equivalent to the dynamic names—and simply extend the octave species of each tonos upward and downward. Whereas Mei stressed Ptolemy's confinement of all the transpositions within the thetic double octave, proslambanomenos to nete hyperbolaion, Galilei's diagram far exceeds this range both at the lower and higher extremes. The mesai are separated by tones and semitones, but since they are not Ptolemy's dynamic mesai but Mei's transposed thetic mesai, they actually progress by thirds. Strozzi in

Dimostrazione degli otto Tuoni, secondo la mente di Boethio.

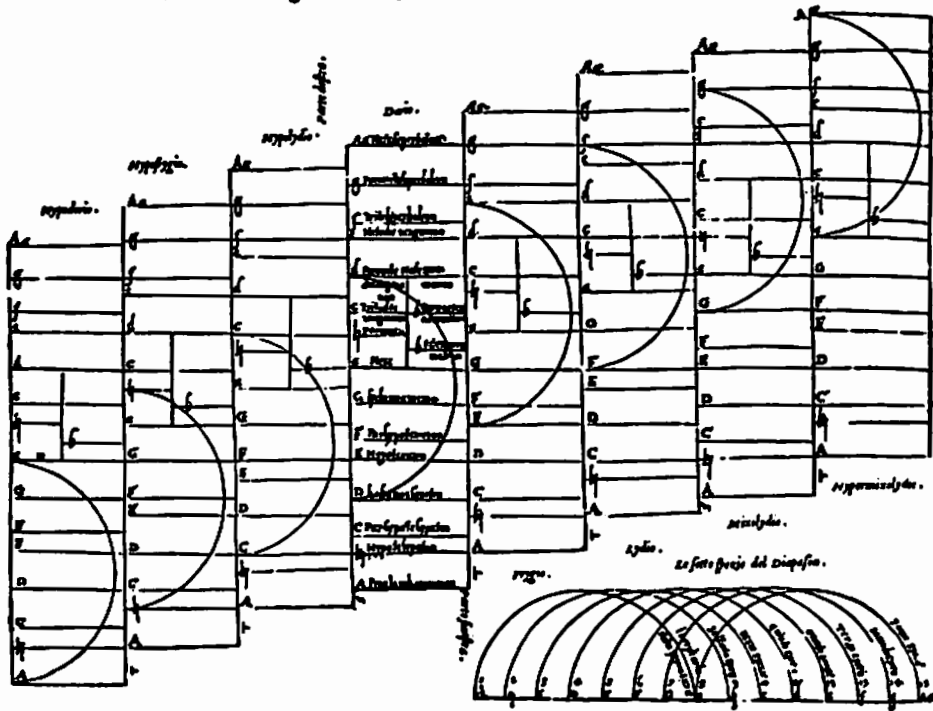


Figure 11.12.

Demonstration of the eight tonoi according to Boethius, from Galilei, *Dialogo*, p. 58 (the steps marked A indicate successively pitches analogous to A, B, C, D, E, F, G)

the dialogue notes this discrepancy, saying that "Ptolemy wishes, in addition, that the systems be distant from each other in a continuous order of ditones and semiditones, while you said instead tones and semitones."⁴⁵

The Tonoi and the Waning of Modality

If Glarean's campaign to provide the plainchant modes with a classical pedigree increased their prestige among polyphonic composers, Zarlino's repudiation of this association hastened their downfall. A more deliberate blow at the modal system was Galilei's mockery of it. Encouraged by Mei's views, Galilei in the *Dialogo* condemned modern musical practice for homogenizing modal and tonal differences:

45. Ibid., p. 66. Bardi's reply is translated in Palisca, *Girolamo Mei*, p. 57.

Dimostrazione de' sette Tuoni, secondo la mente di Tolomeo.



Figure 11.13.

Demonstration of the seven tonoi according to Ptolemy, from Galilei, *Dialogo*, p. 64

In singing according to this modern practice of figural music (so called from the diversity of notated figures) so many airs together at once, two modes are too many, let alone eight or more. Because any piece performed requires the same quantity and quality of steps with respect to high and low pitch, for all proceed in their parts with the same rhythm with regard to fast or slow movement, since the contrapuntist uses notes of any value and any interval indiscriminately according to his pleasure, giving not a thought in the world to the meaning of the words. In these characteristics reside, as will be proved in the proper place, the diversity and nature of the harmonies and melodies. Thus the modes and the compositions of today come to have the same quality, quantity, and form, and are, as it were, of the same color, flavor, and odor as every other.⁴⁶

46. Galilei, *Dialogo*, p. 78.

In his unpublished counterpoint treatise Galilei was even more vociferous in his repudiation of the modern modes. Here he contended that the modality of a modern piece could only be distinguished through the last note in the bass. Composers were now accustomed to making cadences on any note of a mode. Every little section of a mass, vesper service, or sonnet was in a different mode. Moreover the modes did not influence the pitch of a composition when performed, because "the bass singer has his eye for what tones the piece reaches, and he intones it according to the disposition of his voice, without respecting whether the piece ends on F or on C."⁴⁷

The modern modes had none of the affective qualities of the ancient, so it made no difference what mode a composer chose when setting a text. The practice of making cadences on any degree, the confusion of parts—each moving independently—and the free use of accidentals obliterated any distinct quality of a mode or any modal unity. The force of modern composition resided in the part-writing and harmony, not in modal differences. This disillusionment with the modes was to lead to a number of deliberate experiments in the restoration of the ancient tonoi by Bardi and later by Giovanni Battista Doni and his followers.

Giovanni Bardi

Galilei's *Dialogo* came out in 1582, four years after the letter from Mei bearing the information about the modes. In the meantime Giovanni Bardi (1534–1612) had developed his own interpretation of the system of Ptolemy and had communicated it in a *Discorso* addressed to Giulio Caccini but probably read to an academy, perhaps the informal one that met at his house. Bardi is remembered in the annals of music history chiefly for his leadership of the group that several of his associates referred to as the Camerata, where leaders in science, literature, and the arts gathered to talk and to listen to music. Although the earliest record of a musical gathering at Bardi's is dated 14 January 1573, the sessions must have started earlier.⁴⁸ Vincenzo Galilei, who had been Bardi's protégé since the early 1560's, apparently was the musical preceptor of this academy. The circle was deeply affected by the letters Girolamo Mei wrote to Galilei and Bardi between

47. *Il primo libro della prattica del contrapunto intorno all'uso delle consonanze*, in *Die Kontrapunkttraktate Vincenzo Galileis*, ed. Frieder Rempp, p. 72.

48. On 14 January 1573 it was recorded in the *Diario* of the Accademia degli Alterati that the regent of the academy, Cosimo Rucellai "sent word through one of his servants that he could not come because he was at the house of Monsignor de' Bardi to make music." See Palisca, "The Alterati of Florence," in *New Looks at Italian Opera*, ed. William W. Austin (Ithaca, 1968), p. 15, and "The 'Camerata Fiorentina': A Reappraisal," *Studi musicali* 1 (1972):205.

1572 and 1578 in response to their questions about ancient Greek music.⁴⁹ A document recently discovered by John W. Hill shows that Mei's letters must have figured prominently on the group's agenda during the year 1577. Giovanni Bardi writes on 2 November of that year to Giovanfrancesco di Lodovico Ridolfi:

Most magnificent Messer Giovanfrancesco, the desire I have of serving you and your amiability give me the courage to ask you to take on a chore. It is this: I would like you to accept the charge to see that the letters which Messer Girolamo Mei (who lives there with you) writes come into the hands of Vincenzo Galilei every week. This should be easy for you, because you can have them come weekly with Messer Giovanfrancesco Strozzi, your and my friend, with whom I shall have an understanding, and thus my desire will be fulfilled. I give you this chore, because for two months we have not had the letters promptly as we desire.⁵⁰

Only one letter from 1577 is extant, but many of the thirty "very long" letters that Mei exchanged with Galilei between 1577 and 1582, according to Mei's own count, must have been written that year.⁵¹ One of Mei's letters, of 17 January 1578—this one addressed to Giovanni Bardi directly—in reply to Bardi's of 9 December 1577, bears upon the question of the tonoi of Ptolemy. With it Mei sent charts of the tonoi according to Boethius, Ptolemy, Aristoxenus, and the followers of Aristoxenus.⁵²

Although Bardi depended upon both Mei and Galilei for information and interpretations concerning Greek music, he demonstrated in his discourse that he had studied the sources independently and come to his own conclusions. Bardi may have struggled with Ptolemy's text himself. He had a good literary education and read Latin and Greek. He wrote plays, poetry, and music, conceived and directed performances of intermedi and other entertainments, participated in the quarrel between the defenders of Ariosto and Tasso (siding with Ariosto), and kept up with current scientific developments—truly a Renaissance man.

Bardi must have been at work on his *Discorso* in 1577 when he elicited

49. The letters that survive are published in Palisca, *Girolamo Mei*, pp. 87–179.

50. Italian text in John Walter Hill, "Oratory Music in Florence, I: *Recitar Cantando*, 1583–1655," *Acta Musicologica* 51 (1979):111, n. 13. Mei lived at the house of Giovanni Francesco Ridolfi from 1574 until he died in 1594.

51. Mei spoke of the thirty letters in writing to Giovan Vincenzo Pinelli on 19 May 1582. The letter is printed in Palisca, *Girolamo Mei*, pp. 183–85.

52. *Ibid.*, pp. 148–54: "As you see, on one side [of the page] are the modes according to Aristoxenus; to his thirteen are added two put into use after him by his followers. There follow below the modes according to Boethius, and on the other side are the modes according to Ptolemy." The folio containing the diagrams was evidently not copied into the Vatican manuscript of the letters by Giorgio Bartoli, perhaps because it was removed by Bardi before the original letter went to Bartoli for copying.

Figure 11.14.

The Ptolemaic tonoi according to Bardi, from *Discorso*, Florence, Biblioteca Marucelliana, MS A287, I, fol. 6r, above, and transposed to their proper pitch level, below

Mei's views on the modes. That he did not depend entirely on Mei's charts and descriptions is attested to by the modifications he made in Mei's interpretation of Ptolemy's theory. Bardi restored the intervallic distances between the tonoi established by Ptolemy. Whereas Mei's and Galilei's mesai rise semitone, tone, tone, tone, semitone, tone, Bardi's rise tone, tone, semitone, tone, tone, semitone, in accordance with Ptolemy's text. However Bardi preserved Mei's idea of building the double octaves around each tonos's octave species according to the standard tetrachord arrangement.⁵³ If Bardi's chart is translated into modern pitch notation, as in the lower scheme of Figure 11.14, the necessary accidentals indicate from Hypodorian to Mixolydian our keys D, G \flat , A, C, E, A \flat , B \flat .

Bardi sets off the octave species by filling in the note heads. In his chart (upper staves), the tonoi are expressed in natural notes, as if on the white keys of the keyboard. The scheme gives the appearance of a descending

53. The text and diagrams used here are based on the manuscript copy of the essay in Biblioteca Apostolica Vaticana, MS Barb. lat. 3990, fols. 3v-13v. Where noted I have adopted the reading in another copy, Florence, Biblioteca Marucelliana, MS A287, which has corrections by Giovanni Battista Doni and was apparently prepared by him for publication. The latter was the basis for the edition by Antonio Francesco Gori and Giovanni Battista Passeri in G. B. Doni, *Lyra Barberina*, II, *De' trattati di musica di Gio. Batista Doni* (Florence, 1763), pp. 233-48. This edition is full of errors, particularly in the charts. The translation in Strunk, *Source Readings*, pp. 290-301 is based on the Gori-Passeri edition but omits pp. 234-40 and 245-46. My critical edition of this essay, with an English translation, is projected for a volume of the Yale Music Theory Translation Series entitled *Documents in the Florentine Camerata*.

series of scales, but in actuality it is an ascending series. Bardi shows this by changing the clef before each scale; I have rendered it by T or S and an upward arrow. The lower staves of Figure 11.14 give the actual pitches that result, if the appropriate octave species is disposed around each of the "medie" from e for Hypodorian to d' for Mixolydian.

Ptolemy's system was of more than purely theoretical interest to Bardi. He saw in it a model for a modern tonal system. In his *Discorso* Bardi identified the choice of tonality for a composition as one of the critical decisions a composer must make in setting out duly to express the affections of a text. There he stated:

conuene quando altri
uol metter in musica madrigale,
o, canzone, o, altra poesia
primieramente ben ricordarsi e
considerare se 'l concetto magnifico
o, lamenteuole sia, se magnifico
il tuono dorio prenderete
che in e la mi⁵⁴ comincia, et
ha la sua corda mezana in A la
mi re; dando tutta l'aria al
tenore, raggirandoui intorno alla
corda di mezo quanto più potrete,
perche come habbiamo detto
altroue le cose grandi,
e magnifiche in uoce grata
et mezana si parlano. Ma se 'l
concetto sarà lamenteuole il
tuono mixolydio prenderete
che in B. mi comincia, ed haue
in E la mi⁵⁵ la sua corda mezana
alla quale intorno più che
potrete u'andrete raggirando,
dando alla parte del soprano
l'aria più principale; e così
secondo gli altri concetti
delle parole u'andrete regolando.
Non ui scordando della natura
del tardo, uelocce, e mezano,

It is good when someone
wishes to set to music a madrigal,
canzone, or other poem
first of all to recall and consider
whether the subject is magnificent
or plaintive. If it is magnificent,
you will take the Dorian tonos,
which begins on e la mi and
has its median note on A la
mi re, giving the whole air to
the tenor, turning around the
middle note as much as you can,
because, as we said
elsewhere, grand and magnificent
matters are spoken of in a pleasant
and median voice. But if the subject
should be plaintive, you
will choose the Mixolydian tonos,
which begins on B mi and has
E la mi as its median note,
around which you will turn as much
as you can, giving
the principal air to the
soprano part. And so
you will be guided by
the other ideas of the words.
You will not forget the nature
of the slow, fast, and intermediate.

54. The Barberini manuscript, fol. 10r, has "A la mi re," whereas Doni's copy of the discourse, Florence, Biblioteca Marucelliana, MS A287 T. I, fol. 163r, reads "e la mi," which is correct and has been adopted here.

55. All the sources have "A la mi," which does not exist in the hexachord system, and I have emended it to "E la mi," which is the mese of the Mixolydian octave species in Bardi's chart.

come per essemplio douendosi mettere in musica quella canzone che comincia Italia mia bench' il parlar sia 'ndarno, prenderete il tuono dorio mentouato di sopra dando l'aria principale al tenor raggirandoui intorno alla mezana, addottando il ritmo cioè la lunga, e la breue che non sia ne troppo tardo, nè troppo ueloce, ma che imiti il parlar d'huomo magnifico e graue.⁵⁶

For example, having to set to music the song that begins "Italia mia bench' il parlar sia 'ndarno," you would choose the Dorian tonos mentioned above, giving the principal air to the tenor, turning around the median, adopting a rhythm, that is, the long and short [notes] that are not too slow nor too fast but imitate the speaking of a stately and solemn man.

Clearly, Bardi is not speaking of the church modes, but neither is he speaking of tonoi. His "tuono" could be a translation of *tonos* or the assumption of the most common term in Italian for mode. The ambiguity is not resolved even in the more technical part of the essay. When Bardi describes the tonoi of Ptolemy, the term he uses for them is "tuoni," and for the octave species it is "spetie d'ottaua." The boundary notes and mesai that he names in the above passage belong to the octave species associated with the Dorian and Mixolydian tonoi. Elsewhere in the essay he notes that these species were called "Armonic" (*harmoniai*) by the ancients⁵⁷ and he adds in another place that "each species of octave, which we call *tuono*, and the ancients *harmonia*," was assigned to appropriate verses and instruments. The confusion is compounded when he enumerates the modes by their ethnic names. Then he says that the lowest "species of octave" or "harmonia" was the Hypodorian, a whole tone above that the Hypophrygian, a whole tone higher than that the Hypolydian, a semitone above that the Dorian. Three *harmoniai*, thus, were sung lower and three higher than the Dorian. The confusion is only partly dispelled when Bardi explains that the Mixolydian was the highest tonos but that to this "harmonia" was assigned the lowest octave species, starting on B mi. If Bardi had been consistent in his terminology, he could have made evident that the tonoi were a means for assigning a pitch level to the octave species, or *harmoniai*, whose interval structure could best be recognized when placed on the steps of the fifteen-note system. But perhaps he did not realize that the conventional location of the octave species, such as B-b for the Mixolydian, was a virtual, not actual, location.

To return now to the quotation, what Bardi refers to as "the octave that begins on E la mi," called Dorian, is that set of intervals that Cleonides and other ancient writers recognized as one of the seven distinctive octave scales, found in the standard fifteen-note system between hypate meson and

nete diezeugmenon, our e and e', and by them called Dorian.⁵⁸ Bardi locates the median note of this octave species on A la mi re. In so doing he adopts the interpretation of Mei. Ptolemy does assign a functional, or dynamic, mese to each tonos within the e to e' octave, but only the Dorian's is the fourth note from the bottom. The note which is a fourth from the bottom when the Mixolydian octave species is placed in this same central octave is the thetic mese. If then this octave species is transposed to its conventional location, between hypate hypaton and paramese (Bardi's B mi octave), this thetic mese will be the fourth note from the bottom, or E la mi. Actually Bardi regards the B-mi version as the original, and, with Mei, conceives of it as being transposed upward in such a way that the mese assigned to the Mixolydian, d" (D la sol re), is the fourth from the bottom. However Ptolemy had assigned this note to the dynamic, not the thetic, mese. Bardi glosses over the fact that in the B octave the Mixolydian octave species is expressed in natural notes, whereas in the A octave—where it must be placed to make d' the fourth from the bottom—it must be sung with flatted B and E. Bardi shows elsewhere that he understands this need of *musica ficta*, when he points out that a given instrument could play in only one tonos (he assumes ancient instruments that were not chromatically and enharmonically tuned).

Bardi viewed the octave species as modes, each having a median tone that was a focus for the melody, around which the melody revolved, and each endowed with a moral character. However he was acutely aware of the difference between these ancient modes and the modern plainchant modes, as he shows in this passage:

Diciamo adunque che in tutta la quintadecima sette sono le spetie dell'ottaua, à ciascuna delli quali gl'antichi un tuono assegnarono da loro armonia nominato i quali tuoni faceuano le uariatione loro, e per la diuersità della spetie dell'ottaua, e per cantarsi ne luoghi loro, cioè nel graue, o nel mezzano, o nell'acuto; onde altre ueniuno cantate, e sonate nelle corde basse della quintadecima, altre nelle mezzane, altre

We are saying, then, that in the entire fifteen-note system there are seven species of octave, to each of which the ancients assigned a tonos, by them called harmonia. These tonoi achieved their variety both through the difference in the species of octave and the pitch at which they were sung, that is low, intermediate, or high. For some were sung and played in the low notes of the fifteen-note system, others in the middle, others in the

56. Barberini MS, fol. 10r-v; Gori-Passeri ed., p. 243.

57. Barberini MS, fol. 6v; Gori-Passeri ed., p. 237.

58. Cf. Cleonides *Harmonic Introduction* 9; von Jan ed., 197.4-7; 197.14-198.2 trans. in Strunk, *Sources Readings*, pp. 41-42.

nell'acute di essa, come si uedrà nella dimostratione che faremo di sette tuoni alla nostra usanza appropriata. Auuertendo che non si cantauano i tuoni come facciamo noi, che sempre il basso intonando sia Re, o, ut, o, altra corda, facciamo sempre la loro intonatione quanto più possiamo bassa, e così l'armonia non uaria se non quanto all'ottaua che nel rimanente sempre i bassi, e tenori, e l'altre parti cantano ne medesimi luoghi: i primi toccando le corde graui, i secondi le mezzane, ei terzi l'acute. Ma gl'antichi se intonauano una corda, pogniamo quella del [D] sol re, che fosse d'un tuono, ricercauano quell'ottaua secondo quella intonatione ma se cantauano poi l'ottaua che fosse la quinta più alta in A la mi re, andauan cantando per quella ottaua tutta una quinta più alta della ragionata.⁵⁹

Bardi's explanation is opaque, but he understands the difference between the modern modes and the ancient tonoi coupled with octave species. The modern modes have no pitch identity; they are located by singers to suit their voice ranges. The bass singer pitches his part as low as possible within his range, and the other singers follow suit according to their written parts. A tonos, on the other hand, has a specific pitch location, at which the octave species assigned to it is sung. However, the octave species could be shifted by a specific interval, such as a fifth higher, and sung at that level. Bardi does not say if this would be regarded as a change of tonos. The *Discorso*, regrettably, is not a formal treatise, and one cannot expect ironclad definitions or systematic expositions.

Bardi goes on to consider two other features that individualize the ancient modes—to each species of octave or harmonia was assigned its own proper “verse” (*verso*.) that is, a meter or verse type, such as the heroic, and modes were associated with specific instruments. For example, the Dorian harmonia, because it had a severe and magnificent character, was employed to

59. Barberini MS, fols. 6v–7r; Gori-Passeri ed., p. 237.

high notes, as will be seen in the demonstration that we shall make of the seven tonoi adapted to our usage. It should be noted that the tonoi were not sung the way we sing the modes, which, when the bass intones re, ut, or another note, pitch the mode as low as possible, and thus the harmony does not vary except with respect to the octave; in the rest of the piece the basses, tenors, and the other parts sing in their same locations. The first hugs to the low notes, the second to the middle, the third to the high. But if the ancients intoned a note, let us say d, which belonged to a tonos, they sought out the octave [species] belonging to that pitch, but if they sang that octave [species] as if it were a fifth higher at a, then they went on singing in that octave, all a fifth higher than established.

sing heroic verse and was given the lyre as an instrument. The Phrygian, which was exciting and furious, received dithyrambic verse and the aulos (*tibia*) as its instrument.⁶⁰ Bardi proposed a similar link between ancient modes and modern instruments, since it was customary “besides voices to concert with a large variety of instruments.”⁶¹ Of the winds, trombones are best suited to “low and somnolent music,” that is, the lower tonoi, whereas cornetti are most apt for high and fast music; and for median and ordinary music, flutes and recorders (*pifferi alemanni*) are most fitting. Viols, harps, and lutes, because they were most like the human voice—being strung with gut strings—are appropriate for the median tonoi, such as the Dorian. This is particularly true of viols, because they have a severe and magnificent quality, whereas harpsichords and citterns—made with metal strings—are more active and more suited to high tonoi.

Within an instrumental family, a large number of differently tuned instruments were needed in ancient times to play the seven modes in the various genera and shades (*spartimenti*). As there were nine diatonics, ten chromatics, and eight enharmonics, the total number of shades was twenty-seven. Each of these could be played in any of seven modes, giving a total of one hundred and eighty-nine possibilities.⁶² In modern times, when various types of instruments are mixed in ensembles there is the further problem of the different tuning systems. The viol and the lute, for example, “are tempered” (*temperati sieno*) according to the system of Aristoxenus, whereas harps and the harpsichord (*grauicembalo*) use other systems.

Of the four compositions by Bardi that survive complete or incomplete, one in particular seems to reflect the theories expounded in the *Discorso*, the madrigal “Miseri habitator del cie’auerno” in the fourth of the intermedi for the wedding of Grand Duke Ferdinand of Tuscany and Christine of Lorraine in 1589. The music is set for five voices, and, according to a note in the published partbook for the ninth voice (*nono*), it was accompanied by four trombones, four viols, and one lira.⁶³ According to the official description of the event by Bastiano de’ Rossi, however, the madrigal was sung by a troupe of devils who issued from a trap door below the stage into the set of rocks and caves engulfed by flames. With “a melancholic and plaintive music (the work of our poet) they began, singing over harps, viols, and citterns, to lament” (e con una musica malinconica, e lamentevole [opera del nostro poeta] cominciarono, cantando, sopra arpi, viole, e cetere,

60. Barberini MS, fol. 7r; Gori-Passeri ed., p. 238.

61. Barberini MS, fol. 10v; Gori-Passeri ed., p. 243: “hoggi s’usa oltr’alle uoci concertare le musiche con uaria sorte di strumenti.”

62. Barberini MS, fol. 6v, has “cento sessanta nove,” whereas Gori-Passeri ed., p. 236, has “cento settantanove,” here corrected to 189.

63. Quoted in D. P. Walker, *Musique des intermèdes de “La Pellegrina”* (Paris, 1963), p. xlvi.

à lamentarsi).⁶⁴ The instrumentation described by Malvezzi, of four trombones, four viols, and one lira is probably correct.⁶⁵

The poem, by Giovanni Battista Strozzi, addresses the wretched inhabitants of the "blind world of darkness, the kingdom of pain," warning them that nothing more will descend into the underworld but envy and disdain, no more human souls will join the damned already there, for the gates of the cruel prison will close forever—a kind of reverse amnesty or assured absolution in honor of the new duchess. The text is set to music line by line in a manner that contrasts with the method of contemporary madrigalists and that Bardi later described in a letter to the Duke of Ferrara as "according to my usual method, keeping the line intact, and with the expression of the words and the thought" (second'il mio solito col verso intero e con la spressione delle parole e concetto).⁶⁶ Each verse, in fact, is given an unbroken line in the canto, while the other four voices follow along homophonically, all coming together at the cadences. In an effort to preserve the longs and shorts of the poetic meter, Bardi freely mixed sets of two and three minims and of two and three semibreves, as reflected in the grouping into four and six quarter notes in my transcription (Figure 11.15).

Analyzed from the point of view of the Gregorian modes, this piece displays some baffling characteristics. The final note in the soprano and bass parts, G, suggests Mode 1 transposed down a fifth. The lines of poetry end harmonically (Basso) and melodically (Canto) on the following degrees of the mode:

line	basso	canto
1	fifth (D)	raised seventh (F \sharp)
2	fifth (D)	second (A)
3	second (A)	second (A)
4	fourth (C)	first (G)
5	fifth (D)	second (A)
6	second (A)	second (A)
7	first (G)	first (G)

The cadence notes of the bass voice are not incompatible with Mode 1, although there is disproportionate emphasis on the fifth degree, and the

64. Bastiano de' Rossi, *Descrizione dell'apparato e degl'Intermedi fatti per la commedia rappresentata in Firenze nelle nozze de' serenissimi Don Ferdinando Medici e Madama Cristina di Loreno, Gran Duchi di Toscana* (Florence, 1589), pp. 51–52, quoted in Walker, *Musique des intermèdes*, p. xlvii.

65. For a consideration of the instruments called for in the original performance of 1589 and their technical characteristics, see Howard M. Brown, *Sixteenth-Century Instrumentation: The Music for the Florentine Intermedii* (American Institute of Musicology, 1973), especially Appendix VII. D4.

66. Letter to Alfonso II d'Este, 3 October 1595, quoted in Angelo Solerti, *Gli Albori del melodramma* (Milan, 1904; repr. Hildesheim, 1969), I, 47, n. 4.

second degree is somewhat out of character. But more anomalous are the cadences of the top voice, in which the second degree ends four of seven phrases. Moreover, the species of fifth, G–A–B \flat –C–D, and species of fourth, D–E–F–G, expected in Modes 1 or 2, are entirely missing in the soprano melody and the other parts as well.

If modal analysis of this madrigal thus proves unsatisfactory, an explanation in terms of Bardi's advice to composers in the *Discorso* is remarkably apropos. From the standpoint of ethos, two possibilities present themselves. Bastiano de' Rossi heard the madrigal as a lament. If this is how the poem is interpreted, the proper tonos, according to Bardi, is the ancient Mixolydian, and the principal part should be given to the soprano. Harpsichord and cornetti would be appropriate instruments. The melody is, indeed, given to the soprano, and it is possible to view the pitch organization as Mixolydian diatonic, to which is added a mixture of the chromatic. Bardi's Mixolydian would have to be transposed a fifth upward, as Bardi indicated was done,⁶⁷ to put it in a range suitable for the soprano. Figure 11.16 shows that if the tetrachords are laid out according to the greater perfect system, the segment of it used in this composition falls in the middle of the soprano range, within the two conjunct tetrachords rising e'–a', and a'–d' through b \flat '. The chromatic version of these tetrachords would add f \sharp ' and b' to this gamut. However c \sharp ', used in two places (mm. 5, 17) in the harmony, and g \sharp , used once (m. 10), are not accounted for. As these are, technically, ficta notes, introduced to provide smoother cadential progression, this is not a serious drawback to the interpretation of the piece as in antique Mixolydian.

The note to which the soprano melody returns most often is a', the mese of this transposed Mixolydian, which appears at the end of four of the seven lines. It is also the central note of the melody, which has the narrow compass of a fifth, in keeping with Bardi's belief that melodies should be focused and limited to the range of the speaking voice.

The analysis in Mixolydian runs into difficulties, though, with Bardi's prescription for instrumentation. The viols employed in the performance are suited, according to Bardi, to magnificent and grave subjects and to the Dorian, while trombones are fitting to sluggish affections and the lower tonoi. Moreover the text is not really a plaintive one, despite de' Rossi's impression of it; in it a higher authority pronounces a sentence. Its tone is similar to that of Petrarch's canzona "Italia mia," which Bardi would have put in the Dorian. The music is magnificent, if diabolically so, rather than complaining. On these grounds the ancient Dorian is a better candidate than the Mixolydian.

Although the principal part is not given to the tenor, as Bardi advised for the Dorian, it is within a contratenor's range. Interpreting the piece in

67. See the quotation above from Barberini MS. fol. 6v, Gori-Passeri, ed., p. 237.

CANTO
ALTO TENORE
SETTIMO BASSO

5

10

15

Figure 11.15.
G. Bardi: "Miseri habitator del cicc'averno"

20

(Original note-values have been cut in half. Original unbarred in C . Punctuation is the editor's.)

Figure 11.15. Continued

Bardi's Dorian requires no transposition, but it is necessary to assume the synemmenon, or lesser perfect, system, in which the two central tetrachords are joined through a common note, mese (Figure 11.17).

Whether one prefers the ancient Dorian or the ancient Mixolydian interpretations, Bardi's madrigal lends itself to these better than it does to a conventional modal explanation. Bardi seems deliberately to have reached for an antique effect, to have aspired, indeed, to the fabled marvelous emotional effects of the ancient modes. The route he took was mapped by the theory of the Greek tonoi and octave species that he learned from Ptolemy

Figure 11.16.
Bardi's Mixolydian tonos, with transposition up a fifth

Figure 11.17.
Dorian tonos in the synemmenon system

and Cleonides, both directly and through Valla's translation and Mei's communications.⁶⁸

Giovanni Battista Doni

There was little significant speculation about the Greek tonal system after Bardi and Galilei until the work of Giovanni Battista Doni (1594–1647). Doni credited a letter by Mei that was in circulation with inspiring his studies of Greek music.⁶⁹ Doni read the Greek writings in the original language from manuscripts that he found in Rome or that were supplied by his many correspondents. Like Mei and Bardi, Doni was most attracted to Ptolemy among the authors who theorized about the tonoi. Doni knew Mei's treatise *De modis musicis*. Indeed, he had a copy made for him, which is now in Florence.⁷⁰ Doni also knew Bardi's discourse addressed to Caccini; a copy of it, partly in Doni's hand, is among his papers at the Biblioteca Marucelliana in Florence.⁷¹ He once planned to publish both these works.

Doni's interpretation of Ptolemy grew out of Mei's and Bardi's. Although Doni studied Ptolemy carefully, he apparently could not dismiss Mei's idea that the octave species constituted seven modes that were transposable to various levels by the tonoi. Doni's tonoi were seven, and they transposed the natural scale successively a tone, tone, semitone, tone, tone, semitone higher. The resulting keys are the same as those of modern interpretations of Ptolemy. But, whereas in the thinking prevailing today only the Dorian octave species was transposed into the other keys, Doni held that the octave species were modes and thus could all be transposed. In his *Compendio del Trattato de' generi e de' modi della musica* (Rome, 1635), he showed by means of a chart how modulation of key and mode would affect two of the modes and tonoi, the Dorian and Phrygian (Figure 11.18).

The Dorian mode has the rising melodic form mi, fa, sol, la, mi, fa sol, la (example 1a). In the second staff (example 2b) Doni shows how it may be transposed to the Phrygian tonos, which is a whole tone higher. The melody has remained the same, the pitch has been elevated by a whole tone,

68. Ercole Bottrigari also based a madrigal on the Greek chromatic genus "Il cantar novo," published in his *Il Melone, discorso armonico* (Ferrara, 1602), pp. 39–46. See the transcription in Ugo Sesini, "Studi sull'umanesimo musicale: Ercole Bottrigari," *Convivium, Rivista di lettere, filosofia e storia* 13 (1941):17–24. It uses the notes of the ancient Dorian chromatic and probably preceded Bardi's experiments by some years.

69. Doni, "Trattato secondo sopra gl'instrumenti di tasti," in *Lyra Barberina*, I, 324.

70. Biblioteca Riccardiana, MS 815.

71. Florence, Biblioteca Marucelliana, MS A287, I, fols. 154r–168v. This copy was the basis of the edition of Bardi's essay in *Lyra Barberina*, II, 233–48, which, however, is full of errors not the fault of Doni.

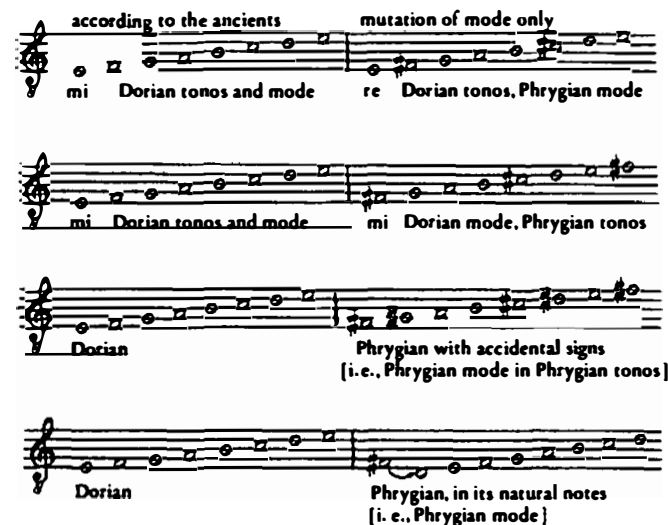


Figure 11.18.

The Ptolemaic modes according to Doni. *Compendio*, 1635, pp. 33–34

or, as we would say, it has been transposed from its natural key to the higher key of two sharps.

On the other hand, if one wished to sing a Phrygian mode in the Dorian tonos, one would remain in the e-e' octave but use the necessary accidentals to produce the succession characteristic of the Phrygian mode: re, mi, fa, sol, la, mi, fa, sol (example 1b). In going from example 1a to 1b there is a mutation of mode, but the pitch level of the Dorian tonos is maintained. (As we understand Ptolemy today, example 1b represents the octave species produced by the Phrygian tonos in the central octave hypate meson to nete diezeugmenon.) If one wished to sing the Phrygian mode in the Phrygian tonos, one would then sing the same syllables—re, mi, fa, sol, re, mi, fa, sol—starting on F# (example 3b), because the Phrygian tonos is a tone higher than the Dorian. The Phrygian melody would not be at its normal Phrygian pitch level.

To bring these ancient tonoi to life, Doni had to surmount two obstacles. One was notational—some of the transpositions required the use of many sharps and double sharps. Doni devised a notation in which all of the music appeared to be in familiar keys, but in fact it was meant to be played on a transposing instrument. The other problem was that of tuning. Doni believed that ancient music employed a system of just intonation. No modern instrument could play all of the keys with equally just tuning. Some keys

would be truer than others. To make it possible to play uniformly in all the keys, Doni developed several new instruments, such as the panharmonic lyre (the *lyra Barberina*), the triharmonic viol, and the triharmonic harpsichord. Examples 4a and b show how the modulation from Dorian tonos and mode to Phrygian tonos and mode would be notated. The initial $\text{F}\sharp$ would indicate the modulation to the Phrygian tonos; then the Phrygian mode would be written with its natural notes.

Doni sought to interest composers in applying the ancient tonoi, because he felt that the tonal system of his day was lacking in expressive variety. Some of those who experimented with his system were Girolamo Frescobaldi, Ottaviano Castelli, Pietro della Valle, Domenico Mazzocchi, Pietro Heredia, and Gino Capponi. Doni himself wrote some experimental pieces. The most extensive score that survives is by Pietro della Valle, who around 1640 wrote the dialogo (or oratorio) "per la festa della Santissima Purificazione a cinque voci con varietà di cinque tuoni diversi, cioè Dorio, Frigio, Eolio, Lidio et Hipolidio."⁷²

72. See Agostino Ziino, "Pietro della Valle e la 'Musica crudita,' nuovi documenti," *Analecta musicologica* 4 (1967):97-111.

TWELVE

A Natural New Alliance of the Arts



To link music with the verbal arts, with rhetoric as well as poetry, was as characteristic of the Renaissance as it was typical of the Middle Ages to ally music with the mathematical sciences. Although music was a component of the medieval quadrivium, in which it was a companion to arithmetic, geometry, and astronomy, neither poetry nor music had a place in the trivium, which consisted of grammar, rhetoric, and dialectic. The seven liberal arts had to be expanded and redefined to admit either poetry or music as communicative arts. But, then, history and philosophy, it should be recalled, also had no place in the system.

At the threshold of the Renaissance Coluccio Salutati proposed a redefinition of the liberal arts. He distinguished the various verbal arts according to function: philosophy defines, dialectic demonstrates, rhetoric persuades, and grammar narrates and relates. Because simple exposition, the object of grammar, did not fully satisfy the ancients, they conceived of an exquisite kind of narration that went beyond simple and raw grammatical expression. To the coordinated discourse of grammar, therefore, they joined the precision of logic and the ornament of rhetoric. From arithmetic they drew rhythm, from geometry quantity, from music melody, and from astrology proportion, and these they added as ornaments to the arts of the trivium. Out of the amalgam came the art of poetry, the only art worthy of praising the beauty and excellence of the human or of the divine being. Poetry is thus the union of the quadrivium and trivium, a virtual octessential art.

Et quoniam versus est poete
proprium instrumentum, quem
suis partibus, hoc est
pedibus, mensuramus atque compo-
nimus et non omnibus sed certis
numeris alligamus, ex quibus
resultat et queritur musica

Since the proper instrument
of the poet is verse, which
we measure with and compose out
of its parts, that is feet, and
we knit these together not with
any rhythms but with established
ones from which results and is sought