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TOWARDS A HISTORY OF *TONOI*

JON SOLOMON

The *tonos* element of ancient Greek music and ancient Greek music theory and the scholarship treating *tonos* in the modern era—"modern" meaning the era beginning with Boethius—have offered us a variety of difficulties and contradictory solutions. At the outset, let me assure you that I have no intentions of doing or contributing anything to this tonic can of worms other than discussing and relating several of these difficulties, thereby adding a worm or two. I will focus briefly on one particular aspect of the problem—the discussions of *tonos* and species in Cleonides' *Eisagoge harmonike*. In doing so, I intend to touch briefly on the *tonos* theories of Aristoxenus and his predecessors, Eratocles and the Harmonists, as well as on the shifting thetic system of Ptolemy. Hopefully I can assist any ensuing discussion of these matters by highlighting the diversity of our evidence and proposing a chronological framework for its development. I expect that the learned members of this panel can individually or collectively do more with this material than I have. At best I have tried to make some chronological sense out of a chronically chaotic situation.

At the outset let me attempt to clarify why we do not have and could never have a completely unified, consistent, coherent accounting of ancient Greek music and music theory. Ancient Greek music included the Ionian (that is, Asian) epic chants of Homer and the rhapsodes, the Aeolic (Greek islander) songs of Sappho and Alcaeus, the Dorian (Southern Greek) lyrics of Pindar (the epinician poet), Aeschylus, Sophocles, Euripides (the tragic poets), and Aristophanes (the comic poet), the Hellenistic Delphic (Northern Greek) paeans to Apollo, the funerary, pagan, Seikilos inscription from the first century, a "Christian hymn" from the fourth,¹ and the rest of an entire corpus, almost all of it lost, of Greek music composed without, and then with, the aid of notation and technical schooling throughout the period of some 1200 years from Homer to Boethius. Finding a consistent strain of any significant sort in such a collection of regional dialects, ethnic tra-

¹All of the music of Homer, Sappho, Alcaeus, Pindar, Aeschylus, and Sophocles is, so far as we know, lost. I do not admit the reconstruction of Homer's music as proposed by M. L. West, "The Singing of Homer and the Modes of Early Greek Music," *The Journal of Hellenic Studies* 101 (1981) 113-29, nor does the modern consensus consider Athanasius Kircher's music to Pindar *Pythian* 1 genuine. It could be that a musically notated tragic fragment such as *P.Berol.* 6870, lines 16-23, could be Aeschylean, but this has not yet been proven. The paeans, Seikilos inscription, and "Christian Hymn" (*P.Oxy.* 1786) as well as the Euripidean *Orestes* fragment are to be found in Egert Pöhlmann, *Denkmäler altgriechischer Musik* (Nürnberg 1970) #20, 18, 19, 21, and 34, respectively. For the Euripidean *Iphigeneia* fragment, see most recently Thomas J. Mathiesen, "New Fragments of Ancient Greek Music," *Acta musicologica* LIII (1981), 14-32.

ditions, polytheistic and monotheistic religions, and various artistic purposes and technical trainings would be even harder than finding a consistent strain of any significant technical/theoretical sort in the last 1200 years of “modern” Western music, the prospects of which, one must agree, are not encouraging.² The same will need to be said for the theoretical studies which have survived from antiquity. We cannot realistically expect theoreticians trained in two diametrically opposed philosophical schools—the Pythagorean and Aristoxenian—who could not agree whether the study of music was a mathematical science or an aural experience, and who wrote over the course of seven centuries—to concur on every major theorem, methodology, or even terminology, no matter how conservative their trainings were. “Ancient Greek music” encompasses over 1200 years or more of different musics and 700 years or more of different musical theories.³

Complicating the matter further is what has been traditionally understood to be a lack of interchange between those who made ancient music and those who wrote about it. In the past, late-nineteenth- and twentieth-century scholarship found little connection between the fragments of ancient Greek music and the extant treatises of the music theorists, but contemporary scholarship is in the process of remedying this blanket misconception.⁴ I have elsewhere bored people to the point of tears by inspecting *ad nauseam* the elements of one of the surviving pieces of Greek music, the Seikilos inscription, through an Aristoxenian music theoretical analysis;⁵ and Professor Mathiesen elsewhere and here shows that ancient theories of ethos and musical rhythm and meter as found in Aristides Quintilianus apply very neatly to several extant pieces of Greek music, including the new Euripides IA fragment.⁶ Even so, the correspondence between ancient Greek music and ancient Greek theory seems to be far from total, and this must be attributed for the most part to the first two factors described above, namely, that we are dealing with theoreticians and musicians who geo-

²Modern scholarship recognizes these difficulties in the metrical, linguistic, contextual, and organological aspects of the poetry and iconography. See, for instance, W. Sidney Allen, *Vox Graeca*² (Cambridge, 1974) and M. L. West, *Greek Metre* (Oxford, 1982) *passim*. There is as yet no current work on the organological differences between musical genres, but a large volume on chordophones and their usages by Professor Jane Snyder of the Ohio State University is in the final stages of preparation.

³The 1200 years encompass the period from Homer (c. 700 B.C.) to Boethius (d. 524 A.D.), but it is known that Homer had Mycenaean and Minoan musical predecessors antedating him by as much as a millenium. The ancient theorists begin with Aristoxenus (c. 300 B.C.), but one could easily include Damon of the fifth century B.C.

The terminology varies between authors; *tonos*, *harmonia*, *tropos*, and *modus* are terms used often indistinguishably to describe the same phenomenon. It can vary even within one treatise; Cleonides, for instance, uses *skēma* and *eidos* (“figure,” “species”) interchangeably.

⁴The traditional consensus is still found in Annemarie Neubecker, *Altgriechische Musik; eine Einführung* (Darmstadt, 1977) 93, “Ob die musikalische Praxis gegen Ende dieser langen Zeitspanne der dargestellten Theorie noch entsprach, ist mehr als zweifelhaft.”

⁵This was a paper, “The Seikilos Inscription: An Aristoxenian Analysis,” delivered for a panel on ancient Greek music and music theory at the annual meeting of the American Philological Association in San Francisco in 1981. A written version of that paper, “The Seikilos Inscription: A Theoretical Analysis,” has been submitted for publication.

⁶See Thomas J. Mathiesen, “New Fragments” (*supra*, n. 1), his *Aristides Quintilianus On Music* (New Haven and London, 1983), 94-113, and his paper in the present volume, pp. 264-86.

graphically span the entire Mediterranean basin from Ptolemy's Alexandria to Aristoxenus' Italy to Nicomachus' Gerasa and who temporally span a period from the time of Homer's predecessors to the time of Boethius—more than one millenium.

It would therefore seem to be almost dangerous to propose any unifying theory separate from a carefully analyzed chronological development through this millenium. Unfortunately, the space allotted here forbids such a carefully analyzed chronological development; a full chronological history of *tonos* alone would burst the seams of one volume. So what I present here is rather sketchy and newborn. I will try out these ideas here in the hope that they may be nurtured or mercifully put out of their misery before they grow into a scholarly nuisance.

Covered by all these disclaimers and caveats, I can now move on to Cleonides' seemingly isolated discussions of *tonos* and species. I say "seemingly isolated" since these discussions in particular, representative of Aristoxenian theory, seem not to concern themselves with musical practice but with only neatly packaged and progressively built theoretical definitions. This is only partly true, as I hope to demonstrate.⁷

Cleonides (202.6ff) tells us that the word "*tonos*" refers to a variety of things. Most important for our purposes is his third definition of the term.⁸ Actually, it is not a definition at all; he says merely, and I translate literally,

‘ο δὲ ὡς τόπος φωνῆς, ὅταν λέγωμεν δώριον ἢ φρύγιον ἢ λύδιον ἢ τῶν ἄλλων τινά. εἰοὶ δὲ κατὰ Ἀριστόξενον εἰς τόνου.

[*Tonos* is described] as the locus of the voice whenever we speak of the Dorian, Phrygian, Lydian, or one of the other [*tonoi*]. There are, according to Aristoxenus, thirteen.

Cleonides then lists the *tonoi*. He lists thirteen which is, incidentally, not the number given by Aristoxenus who does not actually list them at all in the extant works. Cleonides lists the *tonoi* in descending order and by geographical appellation from the Hypermixolydian (Hyperphrygian) to the Hypodorian.⁹ In a brief, concluding paragraph battered in the manuscript tradition, he tells us that each *tonos* stands one half-tone apart from its

⁷Cleonides is absolutely unknown to us except for Aristoxenus as a *terminus post quem*. The second-century A.D. date found in the handbooks and encyclopedias has no basis. The text of Cleonides has been reedited and will appear in a forthcoming volume of the *Musici scriptores graeci* I am preparing for B. G. Teubner Verlag (Leipzig). For a translation, see Jon Solomon, *Cleonides Eisagoge harmonike; a critical edition, translation, and commentary* (Ph.d. diss., Chapel Hill, 1980) 145-61, or Oliver Strunk, "Harmonic Introduction," in *Source Readings in Music History* (New York, 1950), 34-46. The textual references used in this paper are to Carl von Jan, *Musici scriptores graeci* (Leipzig, 1895).

⁸Cleonides (202.6 - 202.8) defines *tonos* as 1) a note, 2) an interval (= one whole-tone), 3) a region of the voice, and 4) a tuning. The third definition is the one in question.

⁹Cleonides (203.7 - 204.8): "Hypermixolydian, also called Hyperphrygian; two Mixolydians, a higher and a lower, of which the higher is also called 'Hyperionian,' and the lower 'Hyperdorian'; two Lydians, a higher and a lower, of which the lower is also called 'Aeolian'; two Phrygians, a higher and a lower, of which the lower is also called 'Ionian'; one Dorian; two Hypolydians, a higher and a lower, of which the lower is also called 'Hypoeolian'; two Hypophrygians, of which the lower is also called 'Hypoionian'; Hypodorian."

neighboring *tonoi*.¹⁰ Never does he tell us the intervals or the internal structure used in each *tonos*. Never does he tell us how they derived their geographical appellations; never does he tell us how they compare with the octave species (let alone with the *harmoniai*, which he never even mentions).

When he discusses the octave species (197.4ff), on the other hand, he does describe the intervallic structure within each species, which suggests that he recognized some difference between the octave species and the *tonoi*. However, at the end of each description he associates the octave species with some of the same geographical appellations he had used for the *tonoi* (this time, of course, in ascending order). To describe the intervallic structure he uses the position of the disjunctive wholetone; each enharmonic and chromatic *dia pason*, according to the Aristoxenian Cleonides, includes only the one disjunctive wholetone and two pairs each of ditone plus two quartertone dieses or trihemitone plus two halftones. Cleonides traces the extraneous, disjunctive wholetone as it progresses in a descending direction while its surrounding intervals correspondingly progress upwards. Cleonides describes this opposite ascending movement by the names of the notes, not by the location of the intervals. So while the bottommost notes ascend from *hypate hypaton* to *mese* and the uppermost from *paramese* to *nete hyperbolaion*, the wholetone interval descends from the uppermost locus to the bottommost. Interestingly, Cleonides describes the descending locus of the wholetone as moving from highest, to second highest, third highest, fourth highest, fifth highest, sixth highest, and lowest. The movement is described throughout in relation to the highest locus.

This contrasts slightly with his analysis of the diatonic *dia pason* species, for there he describes the position of the two halftones. Again he describes the intervals as descending and the notes as ascending, but the positionings of the half-tone intervals he describes in a more complex manner: In the first species of the the diatonic *dia pason*, the halftones are first from the bottom and fourth from the top; in the second species, third from the bottom and first from the top; in the third, second from the bottom and top; in the fourth, first from the bottom and third from the top; in the fifth, fourth again from the bottom and first from the top; in the sixth, third from the bottom and second from the top; and in the seventh, second from the bottom and third from the top.¹¹

It is only at the very end that Cleonides adds that these diatonic species “are called by the same names” as the species of the enharmonic and chromatic. This suggests that the enharmonic and chromatic genera were of primary importance to him. At least he approaches the species of the *dia tessaron* and *dia pente* in the same order, enharmonic and chromatic first, diatonic last, and this in turn suggests that the concept of the octave species goes back chronologically at the latest to the pre-Aristoxenian theorists,

¹⁰The text here as reported in Jan (*supra*, n. 7) 204.9 - 204.12, is corrupt in describing the intervals between each *tonos*, but it seems clear that no additional information about the structure of a *tonos* has been lost.

¹¹See the diagrams in Jan (*supra*, n. 7) 195 (*dia tessaron*), 196 (*dia pente*), and 197 (*dia pason*).

most likely to Eratocles, in the fifth or fourth century B.C. Such a dating accords with our meager knowledge of the so-called Platonic (fourth-century) scales reported by Aristides Quintilianus, which are not basically diatonic in nature but enharmonic.¹² It may be, then, that the octave species as an entity of music theory dates back to the pre-Aristoxenian period, the late-fifth or early-fourth century B.C.

Textual evidence for this can be found where Aristoxenus criticizes the Harmonists for omitting any analysis of the octave species.¹³ They did omit it, but Eratocles alone, Aristoxenus tells us, did “attempt without proof to enumerate the figures [i.e. species] of the *dia pason* in one genus; he demonstrated it *via* the περιφορὰ of the intervals.” This περιφορὰ (“carrying around”) of the intervals no doubt refers to the seemingly revolving ascending and descending scales one sees in diagramming the movement of the species¹⁴—where the half-tone or whole-tone moves in the octave species in order from highest to lowest, in the *dia tessaron* and *dia pente* species from first to third and around again cyclically. The actual analysis of the *dia pason* species is not found in the extant works of Aristoxenus, but it seems clear from this passage that the concept of the *dia pason* species predates Aristoxenus and was perhaps invented by Eratocles (in the enharmonic species alone).

Aristoxenus in the same passage is critical of Eratocles and the Harmonists for not analyzing the species of the *dia tessaron* and *dia pente*, but in the extant works of Aristoxenus there is no such analysis to be found. Cleonides, for whose date we have only the aforementioned *terminus post quem* of Aristoxenus (and the Byzantine Bryennius as a *terminus ante quem*), is perhaps our earliest source for an analysis of the species of the *dia tessaron* and *dia pente*, and he again begins with an analysis of the enharmonic and chromatic. He, or perhaps his source Aristoxenus, described the enharmonic and chromatic *dia tessaron* and *dia pente* species first because Eratocles had described the enharmonic *dia pason* species first. In fact, Cleonides describes the three figures of the enharmonic and chromatic *dia tessaron* not by the names of the notes or the numerical relationships of the intervals but as being bounded by the barypykna, mesopykna, and oxy-pykna, respectively. Without precisely defining the word “*pyknon*,” I will remind the reader here that the *pyknon* is found only in the enharmonic and chromatic genera (which is why these might be labeled the “*pyknic* genera”).¹⁵ Since the diatonic genus has no *pyknon*, he analyzes the diatonic *dia tessaron* last, and he does so according to the placement of the lone half-tone. Similarly, he analyzes the enharmonic and chromatic species of the *dia pente* by the placement of both the barypykna, mesopykna, and

¹²Aristides Quintilianus *De musica* 19.2 - 19.10 (Winnington-Ingram) and Mathiesen (*supra*, n. 6) 20 and 86.

¹³Aristoxenus #2 (166[Macran]; 6.14 - 7.8 and 11.2 - 11.12 [da Rios]).

¹⁴See the diagrams cited *supra*, n. 11.

¹⁵The *pyknon* is, according to Aristides Quintilianus 9.15 - 9.16 (Winnington-Ingram), an arrangement of three notes, but the term is used only with the lower three notes of a distinct enharmonic or chromatic tetrachord.

oxyphykna and the disjunctive whole-tone, and he analyzes them before the species of the diatonic *dia pente*. In all likelihood, Cleonides, following Aristoxenus, bases his analyses of the *dia tessaron* and *dia pente* species on the traditional, pre-Aristoxenian species of the *dia pason*.

What, then, might be the relationship between Cleonides' octave species and his *tonoi*, the former elaborately analyzed and geographically labeled, the latter simply listed and geographically labeled without elaboration? It seems to me that the octave species (and with them of course the *dia tessaron* and *dia pente* species) are analytical, the *tonoi* practical in conception. The very concept of the "species" (*eidos*, *skēma*) is not developed until late in the fifth century or early in the fourth century in Academic (Platonic) terminology. In the late-fifth century, for example, for the comic playwright Aristophanes the word *skēma* is a "figure" of a dance; for the historian Thucydides it is a "figure" or "characteristic" of a city-state. For the late-fifth-century Hippocratic medical corpus, *skēma* is a "position" of the body. Within one generation, however, in the early-fourth century, Plato is using both *eidos* and *skēma* to refer to figures, types, Forms; with Aristotle in the next generation the words are canonized as peripatetic categories.¹⁶ Eratocles probably used the words in the same sense as Aristophanes, Thucydides, and [Hippocrates], that is, in a proto-technical application of a common word, whence the peripatetic Aristoxenus easily adopted it into his analyses of the "figures," i.e. species, of the *dia tessaron*, *dia pente*, and *dia pason*. For Aristoxenus, the terms are purely analytical and not at all native to actual music.

Informing us of this relatively recent and continuing development in music theory and terminology, Aristoxenus (#6 = 11.2-11.12 [da Rios]) tells us that Eratocles alone investigated the figures (species) of the octave, that "none of his [Aristoxenus'] predecessors" did so [169 Macran]; 10.18-10.19 [da Rios]: τῶν δ' ἄλλων καθόλου μὲν καθάπερ ἔμπροσθεν ἐῖπομεν οὐδεὶς ἥπται), and that he, Aristoxenus, was first to analyze the species of the *dia tessaron* and *dia pente*, which he emphasizes should be done first. Aristoxenus' *dia tessaron* and *dia pente* divisions have not survived. Cleonides', of course, have, and following Aristoxenus' guidelines he begins with the species of the *dia tessaron* and proceeds to the *dia pente* and then the *dia pason*.

It is no accident that Cleonides, following the tradition, in this instance Aristoxenus, analyzes the species of the enharmonic and chromatic first, the diatonic last. This preserves the order of things passed down from Eratocles, with his lost analysis of the enharmonic octave species, to Aristoxenus, with his lost analyses of the enharmonic, chromatic, and diatonic *dia tessaron* and *dia pente* species, to Cleonides, about whom everything but his name and treatise is lost. (One sees here from the gaps in our evidence another reason that a complete and coherent analysis of ancient Greek music tonal theory is so elusive.)

¹⁶These and other examples can be found in *L.S.J.*, *q.v.* σχῆμα.

Surely something is different and irregular about Cleonides' direct or indirect source here, for elsewhere Cleonides normally begins with the diatonic and then proceeds to the chromatic and then last to the enharmonic. He introduces the three genera in this order (181.12). He analyzes the three genera in this order (181.13).¹⁷ He lists the names of the notes (182.4 - 184.10) in the same order, and he reintroduces the three genera (189.10) in the same order—diatonic, chromatic, enharmonic.

The species he treats differently, as we have seen—enharmonic, chromatic, diatonic. So far as we can tell, the octave species is an analytical device developed by Eratocles who, according to Aristoxenus, with or without the Harmonists divided the entire *dia pason* system of notes into twenty-eight quartertone dieses.¹⁸ It looks as if the octave species is an analytical contrivance devised by Eratocles to assist him in maneuvering his music up and down his impossibly close-packed quartertone system and that the species of the *dia tessaron* and *dia pente* are then additional species devised and developed by Aristoxenus to conform to his notion that all Greek music consists of regularized conjunct and disjunct tetrachords.¹⁹

The *tonoi*, on the other hand, represent real music for these earlier theorists. When Aristoxenus discusses them, he compares (#37) the confusion about the number, make-up, and relationship of the *tonoi* with the confusion about the ancient Greek calendar. The tenth day of the month at Corinth falls on the same day as the fifth day of a different month at Athens and this same day is the eighth day of some other month somewhere else.²⁰ Indeed, this example offered by Aristoxenus illustrates further some of the problems I outlined at the beginning of this paper, and it should be considered not at all unique to ancient Greek music. Be it in the distribution of the 365¼ days of the year, the *tonoi* of ancient Greek music, ancient Greek political systems, ancient Greek philosophical schools, or ancient Greek genres of poetry, ancient Greece is almost never a unified entity but a collection of city-states each steeped in its own habits, culture, traditions, and music.

In the archaic period—the seventh and sixth centuries B.C.—these differences surely provided the climate for the creation of the different *harmoniai*—the Dorian from the austere tribe of southern Greece, the Lyd-

¹⁷He does so (181.13 - 181.16) in the same, colorless, detailed, peripatetic fashion as the rest: "The diatonic consists of a wholetone plus wholetone plus halftone descending, ascending, the opposite, halftone plus wholetone plus wholetone. The chromatic consists of a trihemitone plus halftone plus halftone descending," etc.

¹⁸This could well be an *argumentum ex silentio*, but Aristoxenus for one says that "none of the others" describe or analyze the octave species. Aristoxenus could be misrepresenting the truth, of course. Ancient authors often misrepresent another's theories, particularly in that age in which legal recourse for such misrepresentation was unavailable.

¹⁹Aristoxenus, Book III (*passim*), discusses this. See 209 - 222 (Macran) or 73 - 92 (da Rios).

²⁰Aristoxenus #37 (46.20 - 47.1 [da Rios]):

ἀλλὰ παντελῶς ἔοικε τῇ τῶν ἡμερῶν ἀγωγῇ τῶν ἁρμονικῶν ἢ περὶ τῶν τόνων ἀπόδοσις, οἷον ὅταν κορίνθιοι μὲν δεκάτῃ ἄγωσιν Ἀθηναῖοι δὲ πέμπτῳ ἕτεροι δὲ τινας ὀγδόῃν.

"But the situation with the *tonoi* is very much like the arrangement of days, whereby the tenth day for the Corinthians is the fifth for the Athenians and the eighth for others."

ian from the affluent, haughty, oriental society of the Asian coast, and the Phrygian from the unbounded, ecstatic peoples of the wild, mountainous regions of the Anatolian highlands. By “different” I do not mean just different *tonoi*, i.e. “scales,” but entirely different ethnomusical systems—scales, instruments, subject matter, dance, poetry, and ethos.

Of course we have no external examples of analytical music theory from the seventh, sixth, or fifth centuries B.C., and it is only in the fourth century that Plato and Aristotle give us their brief, descriptive, that is, ethical, musical philosophies.²¹ By this time the national *harmoniai* seem to have become rather standardized. This probably begins to happen as early as the time of Damon, and it continued surely in fifth-century Athenian tragedy. It is not entirely a “national” matter when Plato and Aristotle admit and reject certain “*harmoniai*” in establishing their ideal states. They reject not Lydian music but Lydian-style music. Roughly contemporary with Plato and Aristotle, however, are Eratocles’ regularizing theories and those of the Harmonists. They continue to break down the old *harmoniai* which are now rapidly becoming *tonoi* with more regularized constituent parts and more compatible interrelationships. Finally with Aristoxenus one or two generations later we get our first complete, unified, and all-encompassing analytical theory.

We have two musical examples from fifth-century Greek lyric music, and the music of the *Orestes* papyrus at least can be shown to belong to the Phrygian (or Dorian) *harmonia* (as described in Aristides Quintilianus).²² This Euripidean tragedy of the very late fifth century, the *Orestes*, predates Aristoxenus by nearly a century, so I would not be surprised to find it not completely analyzable by Aristoxenian analysis. After all, Euripides wrote his music within the systems of the nearly standardized *harmoniai* of the fifth century; Aristoxenus analyzed in a peripatetic fashion the music theory of the fourth. Aristoxenus’ *tonoi* do not necessarily therefore belong to the practical music of a century before his day (in a city not native to him; he was not an Athenian). The *tonoi* he discusses are instead the variegated and separate but slightly modified musical systems of his own era. He recognized the irregular national systems. He was disturbed by the previous attempts by Eratocles and the Harmonists at regularizing them, so his solution was to contrive the Greater Perfect System to admit all the notes in the various *tonoi*. This Greater Perfect System was somewhat like Eratocles’ shifting enharmonic system, but it accommodated the diatonic and chromatic as well as the enharmonic genera. Aristoxenus no doubt had to squeeze some of the intervallic leaps used originally in the native, tribal *harmoniai* and then in the *tonoi* into or out of the great system, but such is the universally compromising force of standardization. The difference between our own tempered and non-tempered systems provides somewhat of a parallel.

²¹Plato *Rep.* 398 C - 399 E; Arist. *Pol.* 1340^a38 - 1340^b10.

²²*Supra*, n. 12. The intervals would be (in the enharmonic): 1 + ¼ + ¼ + 2 + 1 + ¼ + ¼ + 2 in the Dorian. Only the final interval would be different in the Phrygian (+ 1). It is not impossible that the music modulates in line 5 (δεῦνών πόνων) from one to the other.

The end result of Aristoxenus' efforts at standardization was apparently the list of *tonoi* found now in Cleonides. Aristoxenus never lists the *tonoi* in the extant works. He does in section 37 mention several of them, but this is to illustrate the confusion.²³ It must have been elsewhere that he or Cleonides or an intermediate theorist standardized these *tonoi* completely to fit into the Greater Perfect System with each of the thirteen *tonoi* standing one half-tone above the preceding, e.g. beginning on A, A#, B, c, c#, d, d#, e, f, f#, g, g#, and a again in the next octave.

Someone finding hypocrisy in my stating that the species of the *dia tesseracton*, *dia pente*, and *dia pason* were merely analytical contrivances could easily jump in here to claim that "you yourself in your tedious analysis of the Seikilos inscription try to prove that the piece is built upon the modulation of various species of the *dia tesseracton* and *dia pente*." Indeed I did try to prove that the species of the *dia tesseracton* and *dia pente* were integral parts of the composition of the Seikilos inscription, and I still believe that to be the case. But I now clarify this: Some of the music, including the Seikilos inscription, written well after the promulgation of Aristoxenus' theories—and his work was well-known all over the Greco-Roman world²⁴—was written in compliance with Aristoxenian guidelines. That so many of our fragments of ancient Greek music are analyzable (with the Alypian tables) as belonging to a certain pitch-standardized *tonos* (*tropos*) while at the same time being analyzable through a thetic shift as belonging to a certain octave species, I attribute in part to this fact. Aristoxenus not only fit the music, the variegated *tonoi* (once *harmoniai*) as well as the Eratoclean octave species into one musical system of standardized notes and intervals, but he also created the standardized system upon which almost all subsequent music in ancient Greece and Rome is based. Parallels for one man's theoretical analyses of music and theoretical constructs setting the standard for the composed music of subsequent generations are apparent from the past few centuries, so it is highly possible that Aristoxenus, who we know was regarded as a giant in the field in antiquity, had as much an effect on ancient music theory and practice as did his contemporary Theophrastus on ancient botany or his teacher Aristotle on ancient, medieval, and Renaissance poetic theory.

I mentioned earlier the phenomenon which appears in most of our forty-two Greek musical fragments, that the *tonos* (*tropos*) as analyzed *via* the notation used in the Alypian tables is at the same time describable as an octave species analyzable *via* the Aristoxenian system. This same phenomenon was recognized in the early second century A.D. by Claudius Ptolemy. Never one to be stumped by theoretical divergence or contradictory data, Ptolemy (*Harmonics* 2.5) described a mechanism for shifting a piece of music from its notational *tonos* (*tropos*) to its thetic, or practical,

²³He says that some Harmonists list the *tonoi* (ascending) as Hypodorian, Mixolydian, Dorian, Phrygian, Lydian, others as Hypophrygian, Hypodorian, Mixolydian, Dorian, Phrygian, Lydian, and others with different intervals between these five or six *tonoi*.

²⁴There is ample evidence for this in the testimonia found in Rosetta da Rios, *Aristoxeni Elementa harmonica* (Rome, 1954) 95-136.

octave species. The Mesomedes Hymns to the Muse and to Calliope (II A.D.) are in the Lydian *tonos* (by notation) but in the Dorian octave species by thetic shift. The Seikilos inscription of the first century A.D. is in the Ionian *tonos* (by notation) but in the Phrygian octave species by thetic shift. The Berlin paean is in the Hyperionian *tonos* by notation but in the Hypodorian octave species by thetic shift. Since Aristoxenus refused to employ the notational system(s) developed most probably as early as the fifth century B.C.—he despised the use of notation as a pedagogical device—his theoretical, perfect systems were developed apart from the notational, and the two needed at some point to be reconciled in the theoretical treatises. This was part of Ptolemy's contribution.

What I have done here amounts probably to an inferior Chailleyesque stab at establishing a chronological development for various systems of musical theory possibly so complex that any ancient theorist or musician would simply dismiss my summary of their developmental history as typical neo-neo-Aristoxenian nonsense. But my belief that the world of ancient Greek music is, characteristically for all of ancient Greek culture, a confusing, inconsistent, contradictory one, especially in the sixth, fifth, and fourth centuries, B.C., is strong. It is so strong that I am able to reconcile all the *harmoniai*, *tonoi*, and octave species only so far as I can reconcile the calendars of Athens and Corinth or the republican democracy of Athens and the dual monarchy of Sparta. There is no doubt that ancient theorists of government recognized such differences and tried to reconcile them as part of a great cycle of government revolving through democracy, tyranny, and oligarchy.²⁵ I therefore assume that ancient theorists of music recognized a similar difference between the various musics of Greece—Aristoxenus (#37) says as much in introducing the varieties of *tonoi*—and that they then tried to reconcile these differences. Their solutions differ greatly, and most of the music and theoretical evidence is lost. We do the best we can with a fraction of the total music that was actually written down in antiquity. But to judge from what evidence we do have, I would hazard a guess that the *tonos* and the octave species in Cleonides (*ex Aristoxeno*) were two very different entities, one an attempted standardization of actual national musics, the other an analytical device developed from Eratocles but which became part of the standardized music for subsequent generations.

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²⁵As described, for example, in Book 8 of Plato's *Republic*.