XX. The Hendecachord of Ion of Chios

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Ἑνδεκάχορδε λύρα, δεκαβάμονα τάξιν ἔχουσα
τὰς συμφωνούσας ἁρμονίας τριόδους·
πρὶν μέν σ' ἑπτάτονον ψάλλον δὶς τέσσαρα πάντες
Ἕλληνες σπανίαν μοῦσαν ἀειράμενοι.

This fragment,[1] one of our few direct references to the art of lyre playing in Greece of the fifth century, is preserved in the treatise, *Isagôgê harmonikê*, written by Cleonides, an otherwise unknown author of the Aristoxenian school of theorists.[2] Cleonides, enumerating the four significations of the word *tonos* (sound, interval, region of the voice, tension), takes up first its sense as *phthongos* or "sound." According to Cleonides, it is in this sense that Terpander and Ion have called the phorminx *heptatonos*. After citing Terpander (Jan 202; Fr. 4, 3s D), Cleonides then quotes the above fragment of Ion, in which *heptatonon* in line three also, according to Cleonides, illustrates the sense of "sound." Beyond this, Cleonides gives no other information which might assist in the interpretation of these lines. Although the text has reached us in a corrupt form, the successive emendations of such scholars as Meibom, Bergk and Hermann have succeeded in ameliorating it to the extent that much of the original has been restored.[3] Nevertheless, there has been much

[1] I am indebted to Professor Michael H. Jameson of the University of Pennsylvania, who read an earlier draft of this paper and made a number of helpful suggestions.

Ion's dates are usually given as *ca.* 490 B.C.—before 421 B.C. His fame as a tragedian and poet is well attested (cf. Ath. 1.3F; 14.645; 10.436; Arg. Eur. *Hipp.*), as is his acquaintance with various illustrious men of his time, such as Cimon, Themistocles, Pericles (Plut. *Per.* 5; *Cim.* 9.16), Sophocles (Ath. 13.603E), Aeschylus (Plut. *De prof. virt.* 8). For details see, T. B. L. Webster, "Sophocles and Ion of Chios," *Hermes* 71 (1936) 263–74; F. Jacoby, "Some Remarks on Ion of Chios," *CQ* 41 (1947) 1–17.

The following abbreviations are used: Jan = C. von Jan, *Musici scriptores Graeci* (Leipzig 1895); M = M. Meibom, *Antiquae musicae auctores septem* (Amsterdam 1652).

[2] The fragment is reproduced here from the text of Jan 202.

[3] 1. *ἑνδεκ.* Bergk *Fr. Lyr.* (page 579³, page 253⁴). *τὴν* (ante *δεκαβ.*) *del.* Hermann. *ἔχουσα* Meibom. *ἔχοισα εἰς* [*τὰς*] *del.* Wilamowitz, for which cf. E. Diehl, *Anth. lyr. Gr.* 1.6³ (Leipzig 1949). 2. *τριόδους* Meibom for the ametrical *τριώδους*. 3. *διὰ* Bergk and Hiller; but there are two tetrachords on a seven stringed lyre. Cf. Jan 202.

disagreement among scholars about its meaning. Consequently, its evidential value for music of classical Greece, a field of study which suffers from a paucity of records, has never been fully assessed. The poem is addressed to a lyre of eleven strings:

1 O eleven stringed lyre with your ten step arrangement,

2 .....

3 Formerly comprising seven strings in two tetrachords

4 All the Greeks played you, when they raised a meager music.

The second line is the focal point of the scholarly controversy, its contextual meaning never having been satisfactorily explained; it is therefore omitted from the above translation. In this paper we shall attempt to make this line intelligible in the light of information which the rest of the poem contains.

Theodore Reinach, in a study of the epigram,[4] has described the various interpretations proposed by scholars and has demonstrated at the same time the numerous problems it raises. His discussion has shown that attempts to render the Greek intelligibly are difficult to understand musically, while interpretations making musical sense have depended on violent emendations of the words. F. Gevaert, for example,[5] translated the line (without indicating the text he was using): "toi qui . . . possèdes un triple chemin pour les harmonies consonantes," which Reinach understood to suggest the following:[6]

ταῖς συμφωνούσαις ἁρμονίαις τρίοδον.

Reinach's observation that this translation, although satisfactory on the surface, is musically inadmissible, is justified. He argued that, if Gevaert meant by "triple way for concordant harmonies" three scales of transposition permitting the execution on one lyre of various alterations of key without retunings, then his explanation could not be supported by the testimony of any ancient harmonician.[7] That is, the tonal scales conjectured by

[4] Th. Reinach, "Un Fragment d'Ion de Chios," *REG* 14 (1901) 8–19.

[5] F. Gevaert, *Histoire et théorie de la musique dans l'antiquité* 2 (Gand 1881) 261.

[6] Reinach (above, note 4) 9.

[7] To find these three scales on a lyre of eleven strings, Gevaert proposed the following intonation: G A B♭ B♮ C D E♭ E♮ F G A. The three scales would then be: G A B C D E F G; G A B♭ C D E F G; G A B♭ C D E♭ F G. These would correspond to the octave species of Aristoxenus: Hypophrygian; Phrygian; Hypodorian.

Gevaert correspond in no way to the system of modes as they existed before Aristoxenus,[8] nor can his proposed system of composite tuning in which chromatic notes are intercalated among diatonic (i.e. B♭ and E♭; cf. note 7), be substantiated by ancient evidence.

H. Weil and Th. Reinach[9] suggested that the eleven strings of Ion's lyre comprised a disjunctive system permitting the execution of four octave scales—Mixolydian, Lydian, Phrygian and Dorian—this interpretation requiring the change from *triodous* to *tetoras* in the second line. Reinach, later noting numerous difficulties in this reading, retracted the idea himself.[10]

In his translation of Cleonides' *Isagôgê*, Ch.-Em. Ruelle observed[11] that *triodous*, construed by Meibom as an adjective—*triplices*[12]—is more probably the accusative plural of the noun *triodos* meaning "cross-road," his definition being: "carrefour, rencontre de trois chemins." He then translated the line: "concours consonant de l'harmonie," apparently relating *tas symphônousas* to *triodous* (accusative plural) and construing *harmonias* as genitive singular. Ruelle's identification of the noun, "cross-road," offers no help, however, in determining the meaning of the line. The meeting point of three roads is a cross-road (*trivium*) but each of the roads is not a cross-road.[13] Thus, it is impossible

[8] Aristoxenus has given us a brief account of the scales used by the early harmonicians, in *Harm.* 37 M. Our most important evidence for the early scales is that offered by Aristides Quintilianus, *De musica* 21–22 M. This evidence is considered below, page 305. In her exhaustive work *The Greek Aulos* (London 1939) Kathleen Schlesinger has demonstrated that the formative principle in the generation of the ancient *harmoniai* (modes) on the *aulos* was the arithmetic progression in the harmonic series. This progression, through the equal measure or aliquot division of the air column (or string), was responsible for the generation of the *harmoniai* and of the whole modal system. The modal determinant for each *harmonia* is selected from the harmonic series; from this determinant a reversed harmonic series is constructed which embodies, through the equal division of the air column into aliquot parts, the mode generated from this determinant or harmonic. Thus the fourteenth harmonic, for example, the modal determinant for the Mixolydian mode, would determine the aliquot division of the pipe necessary to generate the material of this mode. In her words (page 12): "The modes are the sole and original creation of the descending or reversed series, due to equal measure by a specified Determinant, dividing string or pipe into aliquot parts."

[9] H. Weil and Th. Reinach, *Plutarque de la musique* (Paris 1900) 123, note.

[10] Reinach (above, note 4) 13–14.

[11] Ch.-Em. Ruelle, *L'Introduction harmonique de Cléonide* (Paris 1884) 36–37, note 6.

[12] Meibom (above, note 1) *Notae* 63.

[13] Cf. Reinach (above, note 4) 9.

to determine what the words "concordant cross-road of harmony" mean in terms of music.

Finally, Reinach, unsatisfied with these explanations, proposed a new solution based on the understanding of *triodous* as a singular noun, a synonym of *triaina* or trident.[14] He then emended the line: *τῶν συμφωνουσῶν ἁρμονιῶν τριόδους*. Although he gave no clear reasons, he understood *harmoniôn* to signify tetrachords. His translation, "trident de tetracordes consonants entre eux," was then related to a bizarre device invented by a certain Pythagoras of Zacynthus (described by Athen. 14. 637B–F). This contrivance, called a *tripous* or tripod, accommodated in the three spaces between its legs a set of strings in each space. One set was tuned to the Dorian mode, one to the Phrygian, and one to the Lydian. This arrangement enabled a player to shift to a different mode by rotating the tripod to a new set of strings, thus avoiding the nuisance of retuning. According to Reinach, therefore, Ion has described in the second line, a trident contrivance similar to Pythagoras' tripod.

This ingenious interpretation is liable to several objections. First, Reinach's suggestion that such a trident, if it ever existed at all, could function as did Pythagoras' tripod, seems unjustified. That is, where would the three sets of strings be accommodated between the bars of a trident? Secondly, if they could be so arranged, why would these strings be restricted to the limitations of a tetrachord? A final damaging factor is that there is no ancient report which gives any testimony for the existence of such a trident.[15] The Pythagoras whose device is noted by no one but Athenaeus cannot be dated with any certainty (he is mentioned briefly by Aristoxenus, *Harm.* 36 M), so that it is impossible to determine whether Ion could have been acquainted with him or his tripod. Although Reinach's proposal has a certain linguistic attraction, his shift from tripod to trident cannot be realistically understood. Finally, even if these serious difficulties could be somehow removed, this interpretation is weakened through its dependence on the emendation of no less than three words in the line.

[14] Reinach (above, note 4) 17–18. The examples of *trident* which he offers are: Pindar, *Ol.* 9.30; *Isth.* 8.38; Plato, *Soph.* 220c; Agathon, Fr. 4 (Nauck), who in his tragedy *Telephus* compared the letter *E* to a *triodous plagios*.

[15] It is surprising that Reinach did not avail himself of evidence concerning the *trigônos*, a stringed instrument of triangular form, which has the more reliable authority of Plato, *Rep.* 399c, for its existence.

A chief obstacle to the correct understanding of the line is the seemingly deliberate ambiguity in the inflectional endings of the words. The ending *-as* could in the case of *symphônousas* and *harmonias* be construed either as genitive singular or accusative plural. Thus, *symphônousas* could modify *harmonias* with either construction or the accusative plural *triodous*.

A further difficulty concerns the meanings of the words themselves, each of them having a wide semantic range, as evinced in the ancients' use of them. *Triodous* in particular is hard to understand in terms of lyre music. Some scholars have seen in the term a reference to tetrachords. D. B. Monro, for example, related it to the three conjunct tetrachords of the Lesser Perfect System (*hypatôn*, *mesôn*, *synemmênôn*) of Aristoxenus.[16] C. von Jan concluded that it referred to the three tetrachords of Aristoxenus' Greater Perfect System (*hypatôn*, *mesôn*, *diezeugmenôn*).[17] Gevaert, however, related it to three scales of transposition;[18] and Reinach, as we have seen, attempted to introduce a new interpretation based on the meaning "trident." None of these views suggest in any way the meaning "cross-road" but (except for Reinach's trident) imply *treis hodous*.

Symphônousas signifies among the ancient theorists an agreement or blending of musical sounds.[19] Several combinations of sounds are regarded as fulfilling the requirements of concordancy (*symphônia*), such as the fourth, fifth, octave, octave and a fourth, octave and a fifth, etc.[20] Thus, if we understand Ion's words in the second line to signify "concordant cross-roads" or "concordant harmony," we must in either case determine the particular respect in which these elements are concordant.

Harmonia is even more diffuse in meaning. It was used in the Pythagorean sense of octave in the fifth and fourth centuries.[21]

[16] D. B. Monro, *The Modes of Ancient Greek Music* (Oxford 1894) 37–38.

[17] Jan 202: "de Ionis tribus tetrachordis . . . sunt autem toni: Si do re mi fa sol La si do re mi."

[18] See above, note 7.

[19] Cf. Bacchius, *Isagôgê* (Jan 293): Concordancy (*symphônia*) is "the blending of two sounds dissimilar in highness and lowness, in which the pitch of the lower sound is not more evident than that of the higher, nor is the pitch of the higher more evident than that of the lower." Practically the same definitions are given by Aristides Quintilianus, *De mus.* 12 M and Gaudentius (Jan 337).

[20] Cf. H. S. Macran, *The Harmonics of Aristoxenus* (Oxford 1902) 235.

[21] Nicomachus, *Ench.* (Jan 252) quoting Philolaus: "The size of an octave (*harmonia*) is a fifth and a fourth." See also Aristides Quintilianus, *De mus.* 18 M.

Aristoxenus (*Harm.* 36 M) says that his predecessors used it to denote the seven octave scales. Thrasyllus (*ap.* Theon of Smyrna; Hiller 48) used it to mean "organisation of systems." Aristoxenus (*Harm.* 48 M) used it in the sense of "enharmonic genus." Plato used the term with various significations. For example, in *Philebus* 17D it refers to "systems." The purest and most elevated of musical forms is to Plato the Dorian *harmonia* or mode (*Laws* 670B; *Laches* 188D). Elsewhere he regarded *harmonia* as the fundamental character underlying all music and drew the human soul to its likeness (*Phaedo* 86A). In *Symp.* 187B, *harmonia* signifies an accord, which supposes the existence of a principle through which is effected the relationship of opposites.[22] In *Phaedo* 86C, in Socrates' analogy between the attunement of the lyre and that of the soul, the term denotes the tuning of lyre strings. Aristophanes also used it in the sense of the tuning of lyre strings in *Clouds* 968. The meanings of *harmonia* thus range in these few examples from the most general, "an accord or attunement," to the most particular, "enharmonic genus and octave."

In order to determine what Ion meant in his use of these three words, it is necessary to examine the lyre itself which he described. The arrangement (*taxin*) of its strings and the scale principle to which these strings were tuned must then be ascertained.

The poem describes in reverse order the historical development of the lyre, skipping from the earliest type to the latest. Thus, the first two lines tell us what the contemporary lyre was like, the last two lines what sort of lyre the Greeks of former times (*prin*) played. The old lyre according to the poem had only seven strings, the music it was capable of producing being meager (*spanian*) in Ion's opinion. Further, these seven strings were arranged to comprise two tetrachords (*dis tessara*). Ancient evidence supports Ion's description of this early lyre,[23] so that it is possible to reconstruct it as follows:

E F G A B♭ C D

The seven strings represented here in alphabetical notation comprise two conjunct tetrachords, the note *A* (*mesê*) being the point

[22] Cf. E. Moutsopoulos, *La musique dans l'oeuvre de Platon* (Paris 1959) 321–47.

[23] Nicomachus, *Excerpta* 1 (Jan 266); Plutarch, *De mus.* 30. Cf. J. Curtis, "Greek Music," *JHS* 33 (1913) 35–36. See also J. Chailley, "L'hexatonique grec d'après Nicomaque," *REG* (1956) 82.

of conjunction. The seven stringed lyre, associated with Terpander,[24] was not augmented by any string addition until about 530 or 520 B.C., when Pythagoras was said to have added an eighth string.[25] Thereafter the evolution of stringed instruments followed a regular course until, within a hundred years after the addition of the eighth string, instruments had increased to twelve strings. Phrynis is credited with the addition of the ninth string,[26] Histiaeus of Colophon with the tenth, Timotheus with the eleventh[27] and Melanippides with the twelfth.[28]

The whole question of the identification of the various string additions has resulted in a basic disagreement among scholars. It is believed here that an analysis of Ion's eleven stringed lyre may yield some interesting information in this connection. The disagreement involves two distinct theories: (1) the traditional view that a separate string was required for each note of the scale; (2) the principle of pentatonic tuning first proposed by Curt Sachs,[29] according to which a technique of "stopping"[30] required that the lyre comprise a fewer number of strings than there were notes in the scale to be played. R. P. Winnington-Ingram has subjected the pentatonic theory to a searching critical analysis, in the course of which he has advanced a number of cogent arguments against the hypothesis.[31] The evidence from ancient sources which he has adduced shows that, although the technique of stopping may have been used in some instances, the use of a

[24] Terpander (*Fr.* 4. 3s D) in Cleonides, *Isagôgê* (Jan 202); Plutarch *Inst. Lac.* 17.

[25] Nicomachus, *Ench.* 5 (Jan 244).

[26] Plutarch, *De prof. in virt.* 13. However, Nicomachus, *Excerpta* 4 (Jan 274), attributes this addition to Prophrastus the Pierion.

[27] Nicomachus, *Excerpta* 4 (Jan 274). Suidas 4.556 (Adler) attributed to Timotheus not only the eleventh string but also the tenth.

[28] Plutarch, *De mus.* 30. Cf. E. Moutsopoulos (above, note 22) 88–92 on the evolution of stringed instruments.

[29] C. Sachs, "Die griechische Instrumentalnotenschrift," *Zeitschrift für Musikwissenschaft* 6 (1924) 289–301. Sachs describes this theory in his two books: *History of Musical Instruments* (New York 1940) 131–35; *The Rise of Music in the Ancient World* (New York 1943) 203–5. See also the explanation offered by G. Reese, *Music in the Middle Ages* (New York 1940) 25.

[30] Stopping, or the shortening of a string by finger pressure, produces a note of higher pitch than the string tone. Evidence on the technique of stopping derives from various sources. For example, Aristotle, *Prob.* 19.12, demonstrates the production of a tone an octave higher than the string tone by means of finger pressure (*dialêpsis*). Plato, *Philebus* 56A, implies that intervals other than the octave were thus produced.

[31] R. P. Winnington-Ingram, "The Pentatonic Tuning of the Greek Lyre: A Theory Examined," *CQ* 50 (1956) 169–86.

standardized pentatonic accordature was not prevalent. In criticizing the pentatonic tuning hypothesis, he has demonstrated the various technical difficulties involved in stopping, the technique on which the entire pentatonic theory depends. Although the pentatonic theory itself rests on very slim foundations, he does concede that stopping may have been used. He says accordingly: "It may be that the Greek virtuosi, especially from the late fifth century onwards, succeeded in overcoming the difficulties to the extent of occasionally supplementing the open strings with a note of thinner tone obtained by stopping."[32]

I think that an examination of the tuning principle of Ion's lyre will demonstrate the validity of Winnington-Ingram's conclusions. In my attempt to show that Ion's lyre was not tuned according to a pentatonic accordature, I hope further to prove that stopping was used in this case and to show what the results of this technique were.

The main feature of the pentatonic theory is a gapped accordature; that is, six strings tuned to a pentatonic scale would produce, by means of stopping, a diatonic octave. A lyre tuned, for example, to the sequence *E G A B D E* could, by means of stopping or shortening the *E* string and the *B* string, play the scale *E f G A B c D E* (lower case letters indicating the notes produced by stopping). If we apply this theory to Ion's lyre, we find that the eleven strings could accommodate a two octave compass.[33] This is represented as follows (the numbers beneath the letters indicating the strings of the lyre):

A B c D E f G A B c D E f G A
1 2 3 4 5 6 7 8 9 10 11

Thus an eleven stringed lyre tuned in this way could encompass two octaves by means of stopping the second, fourth, seventh, and ninth strings. But the word *decabamona* in the first line of the poem precludes this possibility, for eleven strings comprising ten steps or intervals can mean nothing else than that a separate string was used for each degree of an eleven note series. Thus:

B C D E F G A B C D E
1 2 3 4 5 6 7 8 9 10 11

[32] R. P. Winnington-Ingram (above, note 31) 186.

[33] G. Reese (above, note 29) 37 states that by *ca.* 400 B.C. "the standard number of strings on the kithara had been increased from seven to eleven which, in pentatonic tuning, would be sufficient to span two octaves."

An eleven stringed lyre, if tuned pentatonically, would accommodate a two octave scale of fourteen intervals. But an eleven stringed lyre comprising ten intervals would span an eleventh and would require that each note of the series have a separate string. Therefore, Ion's lyre was tuned according to the latter principle and not according to a pentatonic principle.

The arrangement of this lyre consists of cross-roads if we take *taxin* and *triodous* as in apposition.[34] *Triodous* in this context signifies, then, two or more points at each of which three musical forms meet, these points being, conceivably, single notes or certain intervals which are concords. Construing *harmonias* as genitive singular, we could translate:

> Eleven stringed lyre, having as your ten step arrangement
> the concordant cross-roads of harmony.

Harmony in this frame could reasonably signify the tuning arrangement[35] of the eleven strings so as to produce a setting wherein several modes might meet at certain junctures.

If Ion is referring to the fact that this lyre could play a multiplicity of modes without retuning, we must next determine whether there is any ancient evidence which could support this supposition. Unfortunately, musical records are almost nonexistent for this early period. Of the sixteen bits of actual music which remain, only the mutilated fragment from the score of Euripides' *Orestes* can be dated with certainty as being from the fifth century.[36] The only other musical document of comparable antiquity is the melody set to the opening of Pindar's

[34] The apparent awkwardness of these appositional accusatives gave rise to the emendation in the second line εἰς [τὰς], for which cf. Diehl (above, note 3). J. M. Edmunds, *Elegy and Iambus* 1 (London 1931) 433, thus translated it: "Eleven stringed lyre with thy flight of ten steps | into the place where the three concordant roads of Harmonia meet. . . ."

[35] Cf. R. P. Winnington-Ingram, "Greek Music," *Grove's Dictionary of Music and Musicians* 3 (London 1954) 777: "The word 'harmonia' means, among other things, a 'tuning'."

[36] For complete information about this and the other fragments see, J. F. Mountford, "Greek Music in the Papyri and Inscriptions," *New Chapters in the History of Greek Literature,* ed. J. U. Powell and E. A. Barber, 2nd ser. (Oxford 1929) 146–83 and 169 in particular. The fragment is reproduced with numerous restorations by E. Martin, *Trois documents de musique grecque* (Paris 1953) 14. See also D. D. Feaver, "The Musical Setting of Euripides' *Orestes*," *AJP* 81 (1960) 1–15.

first *Pythian Ode*. This has generally been regarded as a forgery, however.[37] No theoretical works of the fifth century are comparable in completeness to the treatises of Aristoxenus and his followers, whose writings constitute substantial evidence for later stages in Greek musical development. Some theoretical evidence for the fifth century has come down to us, however, in the form of fragments scattered through Greek literature,[38] and from this scant body of information, it is possible to discover references to musicians' use of such a multiplicity of modes as Ion's poem implies. This implication has been seen, for example, by F. Lasserre who says: "À qui objecterait toutefois que cette interprétation par polytonalité présuppose un système harmonique non attesté . . . on peut répondre par le témoignage formel de Platon et par l'example du Lydien dont les trois tonalités sont connues déjà de Damon."[39] Plato is also known to have deplored the introduction of many-stringed instruments, believing that such innovations gave rise to certain undesirable elements in music.[40]

The most specific information regarding the modes used by musicians at this time is contained in the well known passage *Rep.* 398E in which Glaucon enumerates for Socrates at least six modes and their relative ethical values. If we add to this information the facts in *Rep.* 443D, some highly significant details emerge. Here, Plato likens the parts of the soul to the three limits of harmony: ὥσπερ ὅρους τρεῖς ἁρμονίας ἀτεχνῶς, νεάτης τε καὶ ὑπάτης καὶ μέσης. These words, reminiscent of Ion's *harmonias triodous*, allude to a musical reality: the *nêtê*, *hypatê*, and *mesê*, defining the strings of the lyre and corresponding to the fixed sounds of a harmony—that is, the attunement of all the strings. Furthermore, they doubtless pertain to the set of modes which Aristides Quintilianus (*De mus.* 21–22 M) attributed to the *pany palaiotatoi*,[41] and which he further identified as the six

[37] Cf. R. P. Winnington-Ingram, *Mode in Ancient Greek Music* (Cambridge 1936) 32, note 1. K. Schlesinger is convinced of its authenticity, however (above, note 8) 358–59.

[38] Cf. F. Lasserre, *Plutarque de la musique* (Olten and Lausanne 1954) 74–79 and the introduction (13–95) entitled "L'éducation musicale dans la Grèce antique."

[39] Lasserre (above, note 38) 173–74.

[40] *Rep.* 399C; 398D; 410A; *Laws* 812D–E. Cf. Plutarch, *De mus.* 15 and 22.

[41] Cf. E. Moutsopoulos (above, note 22) 338–39.

modes to which Plato referred in *Rep.* 398E.[42] They are given as follows (quarter-tones indicated by +):[43]

Lydian	E+ F A B′ B+′ C′ E′ E+′
Dorian	D E E+ F A B′ B+′ C′ E′
Phrygian	D E E+ F A B′ B+′ C′ D′
Iastian	B B+ C E G A
Mixolydian	B B+ C D E E+ F B′
Syntonolydian	B B+ C E G

The entire series spans an interval of an eleventh from *B* to *E′*[44] which, as we have seen, is the range of Ion's lyre. One type of tetrachordal sequence is dominant in all six modes—the enharmonic, consisting of quarter-tone, quarter-tone, ditone. This pattern is indicated by brackets above the letters. The limit of each tetrachord is, of course, a concord, the fourth.

If now we construct a series of notes representing the tuning of Ion's lyre, we shall see that four notes in Aristides' set of modes are in excess of this tuning (*B*+, *E*+, *B*+′, *E*+′):

hypatôn				*mesôn*				*diezeugmenôn*		
B	C	D	E	F	G	A	B′	C′	D′	E′
hypatê						*mesê*				*nêtê*

The strings *B*, *A*, and *E′* may be identified as the three limits mentioned by Plato (*Rep.* 443D)—*hypatê hypatôn*, *mesê* and *nêtê diezeugmenôn* respectively.[45] The enharmonic tetrachords in Aristides' modes thus evidently correspond to the three tetrachords in Aristoxenus' Greater Perfect System. That is, the tetrachord comprising the interval *B–E* in Aristides' modes

[42] The authenticity of this evidence has been demonstrated by J. F. Mountford, "Greek Music and its Relation to Modern Times," *JHS* 40 (1920) 25–28. See also J. F. Mountford, "The Musical Scales of Plato's Republic," *CQ* 17 (1923) 125–36; M. I. Henderson, "The Growth of the Greek Harmoniai," *CQ* 36 (1942) 94–103; R. P. Winnington-Ingram (above, note 37) 22–30.

[43] Aristides' Lydian is noted in the Hypolydian key (enharmonic); the remainder are noted in the Lydian (diatonic and enharmonic); the Iastian and Syntonolydian may be regarded as noted in the Hypolydian with the *synêmmenôn* tetrachord. Cf. Winnington-Ingram (above, note 37) 22, note 2. For the sake of clarity, we have transposed these to a fourth below.

[44] Cf. Winnington-Ingram (above, note 37) 23, note 1.

[45] For these identifications see Cleonides, *Isagôgê* (Jan 1822).

corresponds to the tetrachord *hypatôn*; the tetrachord comprising the interval *E–A* corresponds to the tetrachord *mesôn*; the tetrachord comprising the interval *B′–E′* corresponds to the tetrachord *diezeugmenôn.*[46] The tetrachord *hypatôn* (*B–E*) is a concord in which the three modes participate—Iastian, Mixolydian, Syntonolydian—and for this reason could be termed a *triodos*. The tetrachord *diezeugmenôn* (*B′–E′*) is a concordant juncture for the three modes: Lydian, Dorian, Phrygian. The tetrachord *mesôn* (*E–A*) is a concordant juncture shared by the two modes: Dorian and Phrygian. The Lydian may very likely have some affinity with these modes through its truncated formation of the tetrachord *mesôn.*[47]

There are, then, according to this explanation, three junctures in the form of tetrachords, through which three modes cross paths. These junctures or cross-roads are not only concords themselves but are also concordant between themselves (the *mesôn* is a fourth above the *hypatôn*; the *diezeugmenôn* is a fifth above the *mesôn* and an octave above the *hypatôn*). The word *symphônousas* would therefore describe them most accurately. Through these tetrachordal cross-roads, each shared by three modes, modulation from one mode to another could easily be effected without retuning. Such modulational possibilities thus seem to justify the concept of "concordant cross-roads."

The strings of Ion's lyre, tuned to the sequence described above (305), could produce all six modes of Aristides without retuning, the four notes in excess of the eleven strings being produced by stopping.[48] This may be diagrammed as follows (lower case letters indicate the notes produced by stopping):

B	b+	C	D	E	e+	F	G	A	B′	b+′	C′	D′	E′	e+′
1		2	3	4		5	6	7	8		9	10	11	

[46] These names, used to denote the notes of the scale and the various tetrachords to which these notes belonged, identified the positions of the lyre strings. Thus *hypatôn*, "of the highest sounds," refers to the highest or top strings, which produce, however, the lowest pitched notes of the scale. *Mesôn* is the tetrachord "of the middle," and *diezeugmenôn* the tetrachord "of the disjunctive." *Hypatê*, literally translated, means "highest note," indicating the position of this string on the lyre. In reality it denotes the note of the lowest pitch. Hence *nêtê*, the lowest string, produces the highest pitch. For further explanation, see H. S. Macran (above, note 20) 41–43.

[47] Cf. Lasserre (above, note 38) 39.

[48] Lasserre (above, note 38) 40, note 1: "Les notes en surnombre, en revanche, seraient celles qu'on obtenait à partir de l'accord initial par une pression du doigt ou du plectre sur la corde."

The quarter-tone intervals, characteristic of the enharmonic tetrachords in Aristides' modes, are thus produced by stopping the first, fourth, eighth and eleventh strings.

The *Orestes* fragment (above, 303), the earliest piece of Greek music we have, could have been played on a lyre tuned in the way described above. This fragment employs the diatonic *lichanus hypatôn*—*G* (=*D* in our transcription)—alongside the notes of the enharmonic *pyknon* (of the Lydian key).[49] This interesting feature occurs also in the early modes preserved by Aristides (above, 305). In the proposed tuning of Ion's lyre these diatonic notes in Aristides' modes would be produced by the open strings 3(*D*), 6(*G*) and 10(*D'*). The melody of the *Orestes* fragment is noted in the Phrygian mode of Aristides, the two highest notes of this mode being absent from the melody, however. The enharmonic notes in the *Orestes* melody could be produced by stopping the fourth and eighth strings of Ion's lyre.

The second line of this poem, then, considered in terms of this evidence from Plato and Aristides Quintilianus, becomes meaningful now: "the concordant cross-roads of harmony" are the three enharmonic tetrachords shared by the six modes of Aristides. The "harmony" of the lyre is a tuning of its strings which, by means of stopping, will accommodate all six modes without the need for retuning. Further, the *Orestes* fragment accords well with this view. An advantage of this interpretation is that it does not require emendation of any word in the line.

The information which has emerged from the foregoing examination is important as evidence for Greek music of the fifth century for the following reasons:

1. The poem shows clearly that a fifth century lyre did not necessarily depend on a pentatonic accordature for its performance.

2. The accordature of this lyre, in its ability to accommodate on its eleven strings the six modes mentioned by Plato and documented by Aristides Quintilianus, emphasizes an early tetrachordal system within the six modes. This system has evident correspondences to the later Greater Perfect System of Aristoxenus.

3. The melody of the *Orestes* fragment agrees throughout with this interpretation.

[49] Cf. J. F. Mountford (above, note 36) 169. Also, R. P. Winnington-Ingram (above, note 37) 32.