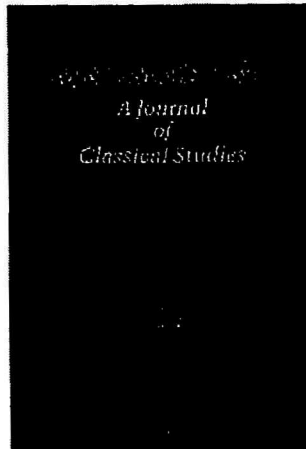


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John Curtis Franklin

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DIATONIC MUSIC IN GREECE: A REASSESSMENT OF ITS ANTIQUITY

BY

JOHN CURTIS FRANKLIN

ABSTRACT

This paper argues that diatonic music and the theory of its tunings were an important precursor to the musical developments of the fifth and fourth centuries. The cyclical principles of diatony were imported to Greece in the early Archaic period as a musical aspect of the Orientalizing movement, an event which is encrypted in the tradition that Terpander invented the seven-stringed lyre. The Terpandrian style of music persisted until the time of Phrynis in the mid-fifth century, after whom constant harmonic innovation began to obscure its important diatonic foundation. This phase of Greek musical history has left only oblique traces in the corpus of technical literature, since the earliest (mostly) extant treatise, the *Elementa Harmonica* of Aristoxenus, presents rather an account of the Perfect System, which was designed to accommodate the innovations of the later Classical period.

1. *Introduction*

The diatonic or ‘Pythagorean’ tuning process, one of Aristoxenus’ three types or *genera* of tuning, is now known to have been cultivated in the Ancient Near East from the Old Babylonian period (c. 1800 BC) or earlier down through the last generations of the cuneiform scribal tradition.¹⁾ It doubtless persisted beyond as the basis for the various forms of modal heptatonic music found throughout later Near Eastern history (see e.g. Farmer [1962], 373 f.).

I have recently argued (Franklin [2002] and forthcoming) that the traditional ascription to Terpander of a newly-(re)invented seven-stringed lyre—the ἐπτάτονος φόρμιγξ of fragment 4 (Gostoli)—epitomizes the Greek exposure, at the height of Neo-Assyrian expansionism (c. 750-650 BC), to this Mesopotamian tradition of classical music. The Mycenaean seven-stringed lyre, which has always been the chief

1) The Mesopotamian musical system cannot be reviewed here: the best introductions (with bibliography) are Kilmer (1971) and (1997).

obstacle to crediting Terpander or his age with the invention of a *ἐπτάτονος φόρμιγξ*—see e.g. Maas and Snyder (1989), 203—may be readily explained as a trapping of high culture that disappeared, like literacy, with the collapse of the palaces. The non-diatonic *genera*—the enharmonic and chromatic which were popular in the later Classical period—represent the overlay of native musical inflections (derived from an unknown variety of sources, including probably the inherited art of epic song, and perhaps the intonation of the *αὐλός*: *v. infra*) on the borrowed diatonic musical art, and hence the creation of a distinctly Hellenic form of the heptatonic *koinê* of the Near East. For though these *genera* could not be tuned solely through the consonant intervals of the diatonic method, they were nevertheless consistently seen as modifications of the diatonic, and were required to conform to minimum conditions of diatony according to Aristoxenus' cardinal rule of *συνέχεια* ('continuity').

This hypothesis calls for a reassessment of the early history of Greek tonality. It is generally assumed that the Perfect System (*σύστημα τέλειον*)—documented, and largely devised, in the late fourth century by Aristoxenus—was the Greeks' first coherent theoretical structure, the culmination of fifth-century efforts to find some common structural ground between various heterogeneous tuning conventions—the *ἁρμονίαι*. This evolutionary view of the Perfect System, most firmly established by Winnington-Ingram (1936), has since crystallized into the not quite identical belief that the earliest tunings of which we hear were actually 'defective', the Greeks not yet achieving the complete diatonic conception that underlies the Perfect System with its cyclical species (*εἴδη* or *τόνοι*) and pitch keys (*τόνοι*).² Aristides Quintilianus, for instance, a neo-Platonizing musicologist of perhaps the late third century AD (Mathiesen [1999], 521-4), preserves a collection of *ἁρμονίαι*, allegedly those known to Plato himself, which show sometimes more, sometimes fewer than seven pitches.³ There is also the *σπονδειαῖζων τρόπος* ('Libation Style')

2) For the two senses of *τόνοι*, *v. infra* and Winnington-Ingram (1936), 82 f. Henderson (1957), 347 offered a valuable refinement to our interpretation of the *τόνοι*, seeing them not as absolute pitch-keys but "theoretical concepts employed to define and name the relative *loci* of the topography of harmonic space".

3) Aristid. Quint. 1.9. On these scales generally see Winnington-Ingram (1936), 55 ff.; West (1992), 174 f. and n. 47, with further bibliography.

studied by Aristoxenus, a melody of the Archaic period attributed to the great aulete Olympus which, unlike the contiguous scales of the Perfect System, had an intervallic or 'gapped' structure, as it is commonly described.⁴⁾ Finally, a handful of sources, beginning in the later fifth century with Philolaus—the earliest extant Pythagorean—have been read as attesting 'defective' scales, covering an octave in seven strings and so 'omitting' one pitch which was later 'filled in'.⁵⁾ Thus, while admitting that it was "attractive" to equate the octave species of the Perfect System with the ancient ἁρμονίαι—for "it is clear that they were to some degree the heirs of the ἁρμονίαι, for both the term ἁρμονίαι and the modal names were applied to them"—nevertheless Winnington-Ingram thought it better to see them as "systematized surrogates of less uniform scales."⁶⁾

Yet Winnington-Ingram himself suspected that the knowledge of diatonic scales was probably coexistent with, and perhaps even preceded, these so-called defective structures ([1928], 84 f.). Indeed, the discovery that a cyclical diatonic tone-system was widely known in the Near East for probably two millennia before Aristoxenus now deprives this simple evolutionary view of whatever foundation it might claim, namely the paucity of pre-Aristoxenian source material. This is not to deny the existence of pentatonic and other 'gapped' systems, nor to reject the historicity of the ἁρμονίαι in Aristides Quintilianus and the Libation Style of Olympus, nor to make a simple equation of the fifth-century ἁρμονίαι with the octave species, nor to turn a blind eye to the systematization which the σύστημα τέλειον clearly represents. But equally, these facts are no longer sufficient to exclude the synchronous or earlier existence of heptatonic music in a well-developed, 'undefective' form. If an historical connection is established between the diatonic methods of Greece and Mesopotamia, our explanation of the non-diatonic Greek structures will need to be renovated.

This paper assembles evidence for the early history of diatonic music in Greece. I distinguish this from the narrower term 'diatonic

4) Aristox. fr. 83 = ps.-Plut. *de Mus.* 1135a; see Winnington-Ingram (1928); Barker (1984-9), 1.255 ff.

5) Philol. fr. 44B6a D-K; ps.-Arist. *Pr.* 19.7, 19.25, 19.32, 19.44, 19.47; Nicom. *Ench.* 5 (244.22-245.11), etc.

6) Winnington-Ingram (1936), 10 f.; cf. 69, 82; cf. Anderson (1994), 139 f.

genus’, since the *genera* as we know them bear the Peripatetic stamp of Aristoxenus (Rocconi [1998]) and the term ‘diatonic’ itself may have been a relatively late coinage (*v. infra*). Yet obviously the *genera* must have codified existing tuning methods. It is on this living music, and on its theoretical treatment before Aristoxenus, that we must focus.

2. *The Chronology of Aristoxenus*

Other types of tuning were more popular in the late fifth and fourth centuries, namely those classified within the enharmonic and chromatic *genera*.⁷⁾ But according to Aristoxenus, who devised the system as we know it, the diatonic was older than either:

πρῶτον μὲν οὖν καὶ πρεσβύτατον αὐτῶν θετέον τὸ διάτονον, πρῶτον γὰρ αὐτοῦ ἢ τοῦ ἀνθρώπου φύσις προστυγχάνει, δεύτερον δὲ τὸ χρωματικόν, τρίτον δὲ καὶ ἀνώτατον τὸ ἐναρμόνιον, τελευταίῳ γὰρ αὐτῷ καὶ μόλις μετὰ πολλοῦ πόνου συνεθίζεται ἡ αἴσθησις.⁸⁾

‘Now, the diatonic must be put down as the first and oldest of them [*sc.* the *genera*], for the natural state [φύσις] of man comes across it first, and afterwards the chromatic, and third and finally the enharmonic, for it is the last to which the perception grows accustomed—and with difficulty at that, after much labor.’

A persistent tradition, not limited to the Aristoxenian school, agrees in regarding the diatonic as somehow more natural than the other *genera*, and given its systematic dependence on the primary resonant intervals 3:2 and 4:3, this is a crucial point.⁹⁾ The diatonic

7) Without going into detail, the various *genera* and their shades (χρόαι) were catalogued by the position of pitches which were ‘movable’ between the ‘bounding’ tones of the consonant fourth (οἱ περιέχοντες φθόγγοι): see first Aristox. *Harm.* 21-27.

8) Aristox. *Harm.* 19; the formal sequence is followed, without chronological context, by e.g. *Anth. Pal.* 16.220.5 f. (Antipater); Cleonid. 3 (181.12 ff.); ps.-Plut. *de Mus.* 1142d; Adrastus ap. Theo Sm. 53.17-56.5; Gaud. 5 (331.8 f.); Boeth. *De inst. mus.* 1.15 (200.25 f.), 1.21 (212.25). The sequence is reversed by Bacch. 21 (298.6), Vitruv. *de Arch.* 5.4.3, as it is (more or less) in Aristoxenus’ presentation of the χρόαι (*Harm.* 21-7).

9) This may be inferred from Philolaus’ and Plato’s preference for the diatonic, but is made explicit by Vitruv. *de Arch.* 5.4.3: *diatoni vero, quod naturalis est, facilius est intervallorum distantia* (‘indeed, because it is natural, the distance of intervals of the diatonic is easier’); Aristid. *Quint.* 1.9 (16.10 ff.): τούτων δὲ φυσικώτερον μὲν ἐστὶ

basis of the other *genera*, seen in the precepts of συνέχεια, is corroborated by Aristoxenus' appeal elsewhere to 'the nature of melody' (τὴν τῆς μελωδίας φύσιν) as the foundation of the proper heptatonic tone structures governed by this rule (*Harm.* 28). Thus he states that there is 'a certain nature of the cohesive/continuous in melody' (τις φύσις . . . τοῦ συνεχοῦς ἐν τῇ μελωδίᾳ, *Harm.* 27). Likewise, he criticized his predecessors for not showing which sequences would be 'contrary to nature' (παρὰ φύσιν), in other words, for not formulating the rule of συνέχεια (*v. supra*). Nicomachus too described the diatonic progression as dictated by 'a certain natural necessity' (ἀνάγκη τινὶ φυσικῇ).¹⁰

There is good reason to accept the Aristoxenian chronology as historical. Obviously we cannot expect Aristoxenus to have had a perfectly accurate picture of the state of Greek music from three centuries earlier. Nevertheless, if the diatonic was in fact of great antiquity, one may at least credit the musicians of the fourth century with a general awareness of the fact. A number of arguments confirm this view.

3. *The Seven-Stringed Lyre*

Terpander's ἐπτάτονος φόρμιγξ tells an important tale of its own, since the term τόνος, with eight distinct layers of meaning, has clear diatonic overtones.¹¹) At its most basic, τόνος designated merely a

τὸ διάτονον κ.τ.λ. ('Of these, the diatonic is more natural' etc.); Boeth. *De inst. mus.* 1.21 (212.26): *diatonum quidem aliquanto durius et naturalius*. Plato *Lg.* 657a4-c4 calls for music which follows the laws of nature (μέλη τὰ τὴν ὀρθότητα φύσει παρεχόμενα), and this can be loosely connected with the diatonic given his preference for it in the *Republic* and *Timaeus*; cf. Adrastus ap. Theo Sm. 56.3-5: τὸ δὲ διάτονον γένος ἀπλοῦν τι καὶ γενναῖον μᾶλλον κατὰ φύσιν· διὸ μᾶλλον τοῦτο παραλαμβάνει Πλάτων ('The diatonic *genus* is somewhat simple and more noble by nature; for this reason Plato embraced it the more'); cf. Macr. *Somn. Scip.* 2.4.13 *diatonum mundanae musicae doctrina Platonis adscribitur*.

10) Nicom. *Ench.* 7 (249.1-3): τὴν δὲ πρόβασιν ἀνάγκη τινὶ φυσικῇ . . . κατὰ τοῦτο τὸ διατονικὸν γένος ('the progression by some physical necessity . . . along this diatonic *genus*').

11) The musical writers vary in the number of meanings they report: see for example Cleonid. 12 (202.6 ff.); Aristid. *Quint.* 1.10 (20.1 ff.); Porph. *in Harm.* 4 (82.1 ff.); Theo Sm. 70.7 ff. From these and other sources I have compiled the following: 1. τάσις; 2. φθόγος; 3. διάστημα generally; 4. the διάστημα of a whole tone specifically; 5. τόνος as a whole tuning; 6. the specific tuning of the diatonic

stretched string of any pitch, and was synonymous with *τάσις*; to this category belong its various uses in rhetorical contexts, of the voice's 'pitch'. But naturally the Greeks tuned their instruments to purposeful *τόνοι*, and not randomly, whence the secondary equation of the term with *φθόγγος*, the musical 'note'. Cleonides cites *ἐπτάτονος* in the Terpander fragment and Ion of Chios (*v. infra*) as an illustration of this sense, asserting that this was the normal force of the word, which thus comes close to being a technical term;¹²) we also find the form *ἐπτάφθογγος* (Nicom. *Ench.* 6 [277.9-10]). If this is right, *ἐπτάτονος* should imply a specific set or means of relating seven *φθόγγοι*.

Where there are purposeful pitches, there are also purposeful intervals; accordingly, some sources record a tertiary meaning of *τόνος* as the interval or 'stretch' between two tuned strings.¹³) Cleonides, whose third semantic level is merely *ὡς διάστημα* ('as an interval'), may also be taken to mean this, but as the sequel shows, it was usual to understand *τόνος* as the specific interval of a whole-tone—in the words of Aristoxenus, 'that by which a perfect fifth is greater than a perfect fourth'.¹⁴) This fourth layer of meaning must point to a time when the whole-tone was the interval which typically occurred between two strings; and this clearly requires the diatonic method. It is true that a diatonic scale also contains one or

(for 5 and 6 *v. infra*); 7. *τόνος* as octave species (deriving perhaps from 5 and 6); 8. *τόνος* as pitch key, to which we may refer Cleonid. 1 (180.4 f.): *τόνος δέ ἐστι τόπος τις τῆς φωνῆς δεκτικὸς συστήματος ἀπλατῆς* ('and *τόνος* is some place in pitch, without width, which can receive a system'; cf. Aristox. *Harm.* 37: *πέμπτον δ' ἐστὶ τῶν μερῶν τὸ περὶ τοὺς τόνους ἐφ' ὧν τιθέμενα τὰ συστήματα μελωδεῖται* ('The fifth subtopic [of ἀρμονική] is that which concerns the *τόνοι*, upon which the systems which are sung are placed'); cf. Porph. *in Harm.* 4 (82.3 ff.)). For meanings 7 and 8, *v. infra*.

12) Cleonid. 12 (202.8 ff.): *ἐπὶ μὲν οὖν τοῦ φθόγγου χρώνται τῷ ὀνόματι οἱ λέγοντες ἐπτάτονον τὴν φόρμιγγα καθάπερ Τέρπανδρος καὶ Ἴων*. For Ion of Chios fr. 32 (West), *v. infra*.

13) Aristid. Quint. 1.10 (20.1-4): *τόνον . . . καλοῦμεν . . . μέγεθος ποιὸν φωνῆς, οἷον ᾧ τὸ διὰ πέντε τοῦ διὰ τεσσάρων ὑπερέχει* ('We call a *τόνος* a certain interval [lit. 'size'] of the voice, as for example that by which the fifth is greater than the fourth'); schol. *ad Ptol. Harm.* 1.4 (10.3): *τόνος λέγεται καὶ τὸ ἀπὸ τόνου εἰς τόνον διάστημα*; Porph. *in Harm.* 82: *τόνος γὰρ λέγεται καὶ τὸ διάστημα, οἷον μέτρον τι τοῦ τῆς φωνῆς τόπου, καθ' ὃ λέγεται μείζον εἶναι τὸ διὰ πέντε τοῦ διὰ τεσσάρων (τόνου) λόγῳ*.

14) Aristox. *Harm.* 46: *τόνος δ' ἐστὶν ᾧ τὸ διὰ πέντε τοῦ διὰ τεσσάρων μείζον, et alibi*.

two semitones,¹⁵⁾ so that not every interval can be a *τόνος* in this sense. But since wholetones far outnumber semitones, it was possible to understand these tone structures as proceeding ‘through tones’ (dia-ton-ically), and the *genus* is in fact so defined in a persistent tradition of non- and probably pre-Aristoxenian pedigree.¹⁶⁾ Thus Plato uses *τόνος* to describe each and every ‘tone’ in the cosmic, Siren-sung diatonic scale in the Myth of Er.¹⁷⁾

A ‘heptatonic’ lyre should therefore mean precisely a ‘diatonic’ lyre; for the history of the term *τόνος*, with all its layers, points unambiguously to the word’s deep involvement with the diatonic tuning method. Terpander’s *ἐπτάτονος* is meaning-laden, i.e. significant, and consequently implies a particular style of music. In fact, the Lesbian poet was not merely an organological innovator. He was remembered for *καινοτομία* generally—his radical, trail-blazing changes to musical idiom.¹⁸⁾ If it is right to associate these changes with diatony, it need not be literally true that Terpander’s *φόρμιγξ* had seven strings, although this *is* the standard representation during the Archaic period. The actual tunings used in the new music would *always* be *ἐπτάτονος*, regardless of the instrument used to render them—though a minimum of seven strings would be needed. In Mesopotamia, the ‘heptatonic’ system was expressed in terms of the nine-stringed *sammû*. Thus, according to one tradition, the salient

15) Depending on its species, and whether the structure is repeated at the octave.

16) Adrastus ap. Theo Sm. 54.12-15: *καλεῖται δὲ τὸ τοιοῦτον γένος τῆς μελωδίας διάτονον . . . ὅτι διὰ τῶν τόνων τὸ πλείστον διοδεύει* (‘This type of melody is called diatonic . . . because it progresses for the most part through tones’); Nicom. *Ench.* 12 (262.14 ff.): *καὶ ἐκ τούτου γε διατονικὸν καλεῖται, ἐκ τοῦ προχωρεῖν διὰ τῶν τόνων κ.τ.λ.*; [Aristid. Quint.] 2.19 (92.22 f.): *διάτονον δὲ καλεῖται διότι πεπύκνωται τοῖς τόνοις κατὰ τὰ διαστήματα* (‘It is called ‘diatonic’ because it is packed with tones in its intervals’)—Meibom recognized this passage as an interpolation; it is closely followed in this and other details by Anon. Bell., here 2.26 (7.14-16): *διάτονον μὲν οὖν λέγεται, ἐπειδὴ κατὰ τὸ πλεῖον διὰ τῶν τόνων θεωρεῖται τὸ διάστημα* (‘it is called diatonic since for the most part the interval is observed through tones’); Mart. Cap. 9.956: *diatono vero [sc. dicitur], quod tonis copiosum*; Boeth. *De inst. mus.* 1.21 (213.7): *ideoque vocatur diatonum, quasi quod per tonum ac per tonum progrediat*. On the probable pre-Aristoxenian antiquity of this tradition, see Franklin (forthcoming).

17) Pl. *Resp.* 617b5 f.: *Σειρήνα συμπεριφερομένην, φωνὴν μίαν ἰείσαν, ἓνα τόνον*; cf. Philostr. *Im.* 1.10.15.

18) Ps.-Plut. *de Mus.* 1135c: *ἡ Τερπάνδρου καινοτομία*; cf. Jacoby’s restoration to *Mam. Par. FGrH* 239A34: *Τέρπανδρος . . . τοὺς νόμους τοῦ[ς] κιθ[α]ρ[ω]ιδ[ι]κ[ο]ῦς . . . [ἐκαινοτόμησε καὶ τὴν ἔμπροσθε μουσικὴν μετέστησεν.*

fact is that Terpander ‘invented the heptatonic *tuning*’ (τὴν ἐπτάτονον ἁρμονίαν εὐρεῖν).¹⁹⁾

This subtle distinction, between the seven-stringed lyre and ἡ ἐπτάτονος ἁρμονία, is effectively glossed in the *Hymn to Hermes*, the standard mythological account of the instrument’s invention, dating to the sixth century or earlier—though naturally the myth itself may well be older than our text.²⁰⁾ The concluding lines of a technical set-piece read:

καὶ πήχεις ἐνέθηκ’, ἐπὶ δὲ ζυγὸν ἥραρεν ἄμφοϊν,
ἐπτά δὲ συμφώνους οἴων ἐτανύσσατο χορδὰς.²¹⁾

‘And he put in the arms, and joined a yoke upon them both, / And stretched seven consonant strings of sheepgut.’

This is the first appearance of σύμφωνος (‘consonant’) in Greek literature. So much earlier is it than the next attestations that some scholars are reluctant to see here any of the word’s later technical sense (Barker [1984-9], 1.43 n. 18, cf. 1.295 n. 177). To be sure, this is not a passage of music theory. And yet Apollo, hearing the new sound, explicitly inquires of his brother ‘What is this τέχνη?’ (*H. Merc.* 447, cf. 482 sqq.). We must not fail to give the word its due weight. In Stravinsky’s definition, τέχνη is ‘the knowledge and study of the certain and inevitable rules of the craft’ ([1942], Lesson 1). This is what Alcman described concisely as τὸ καλῶς κιθαρίσδην (‘to play the κιθάρα beautifully’, Alcman. 41 *PMGF*), while Terpander was

19) Georg. Syncell. *Chronog.* 403 (253.21 Mosshammer). Note that ἁρμονία may be anachronistic here, not being certainly attested in the sense ‘tuning, scale’ before Lasus of Hermione (fr. 1 *PMG* 702) in the late sixth century (but see Sapph. fr. 70.9-11 [Voigt], often overlooked).

20) The *Hymn to Hermes* has been variously dated, to as late as the end of the sixth century: see Janko (1982), 143; he is, however, receptive to a date as early as the second half of the seventh century, but not earlier because there is false archaism (communication).

21) *H. Merc.* 50 f. The key defense of the reading συμφώνους over the variant θηλυτέρων is that Sophocles *Ichn.* 326 (Maltese) used σύμφωνον in his adaptation of the myth, which is in fact one of the next attestations of the word (preceded by Pi. *P.* 1.70, followed by Ion of Chios fr. 32 [West] and Ar. *Av.* 221, 659). It is true that θηλυτέρων is the *difficilior lectio*. But either Sophocles adopted σύμφωνον from the *Hymn*, or συμφώνους was later introduced into the *Hymn* under the influence of Sophocles. The former is the more economical solution, and the alternation of συμφώνους with θηλυτέρων might be accounted for by the complex ‘textual’ transmission of the Archaic oral repertoire.

remembered as ἐντέχνως κιθαρίσας ('playing the κιθάρα in accord with the τέχνη', Diod. Sic. 8.28 ap. Tz. H. 1.389). Far from being untechnical, this early passage is of chief importance, attesting that consonance was the key feature of the new seven-stringed instrument. 'Beautiful musicianship', τὸ καλῶς κιθαρίσδην, required each string 'to be well and knowledgeably tuned' (τὸ "εὖ καὶ ἐπισταμένως" εἶναι τὴν νευράν), the most basic musical definition of ἁρμονία.²²⁾ According to the Hippocratic *de Victu*, the 'beautifully tuned voice' comes through the use of consonance (καλῶς δὲ ἡρμοσμένης γλώσσης τῇ συμφωνίᾳ)—and here the diatonic is assumed.²³⁾ Indeed, with every string described as σύμφωνος in the *Hymn to Hermes*—σύμφωνοι χορδαί—it is natural to understand consonance as operating mutually throughout. The tuning is consonant *as a whole*, with the seven resonating strings which are the prerequisite of diatony. Thus συμφωνία or συμφωνεῖν could be used collectively to describe a tuning, where the diatonic is often assumed.²⁴⁾ For the enharmonic and chromatic *genera* used a number of relations which could *not* be established by the process of consonant tuning, ἡ λήψις διὰ συμφωνίας.²⁵⁾

Diatony was thus the heptatony *par excellence*. For Terpander, ἐπτάτονος may well have been synonymous with the later διάτονος. First attested only in Aristoxenus, this term must have owed its existence to the need for distinguishing between several types of scales—heptatonic scales—some of which did not proceed 'through tones', were not 'tuned throughout' or 'cross-supported', or whatever διάτονος originally meant in this context—for τόνοϛ and διάτονος, like ἁρμονία and Akkadian *pīnu*, may all have belonged to an ancient metaphor of tonal 'construction'.²⁶⁾ Likewise the term σύντονον, which in and

22) Schol. *ad Ar. Eq.* 994 = *Suda* s.v. ἁρμονίαν; note the dactylic quotation, which suggests that the definition derives substantially from the Archaic period, a sort of technical fragment in oral diction.

23) Hp. *Vict.* 1.18. On the assumption of diatony here and in 1.8, *v. infra*.

24) Pl. *Resp.* 617b6 f.: ἐκ πασῶν δὲ ὀκτώ οὐσῶν μίαν ἁρμονίαν συμφωνεῖν; Nicom. *Exc.* 3 (242.15 f.): τῆς κοσμικῆς συμφωνίας; 6 (277.9-10): ἐπαφθόγγῳ . . . συμφωνία.

25) Ps.-Plut. *de Mus.* 1145b-c, esp. τὸ μὴ δύνασθαι ληφθῆναι διὰ συμφωνίας τὸ μέγεθος, καθάπερ τὸ τε ἡμιτόνιον καὶ τὸν τόνον καὶ τὰ λοιπὰ δὲ τῶν τοιούτων διαστημάτων ('the magnitude [*sc.* of a quarter-tone] cannot be taken through consonance, as can the semitone and tone and the other such intervals').

26) For *pīnu*, see Kilmer (1965), 262-265; (1971), 132.

after Aristoxenus referred to the Pythagorean tuning, presupposes a different type of diatonic, the *μαλακόν* or 'soft'. Taken together, the two terms suggest the 'tense' diatonic as a norm, and *σύντονον* describes this tuning quite well since each *τόνος*—whether we understand the word as an individual pitch, or the interval between two such pitches—is 'together' with its neighbors in the correct resonant—i.e. diatonic—place. Indeed, in less technical passages which use *τόνος* to mean 'tuning', the diatonic can be implicit or explicit.²⁷⁾ This peculiar usage, which had disappeared from the language of the theorists by the fourth century, continuing only in the sub-technical vernacular, suggests that the 'normal' tuning designated by *τόνος* was diatonic for non-professionals of basic musical education, even as professional musicians were expanding their horizons. Hence, according to Aristides Quintilianus, '[*sc.* the diatonic] can be sung by everyone, even those who are altogether untrained' (*πᾶσι γὰρ καὶ τοῖς ἀπαιδεύτοις παντάπασι μελωδητόν ἐστι*, Aristid. Quint. 1.9 [16.11-15]). This is important for understanding the Archaic background of the Classical *θεωρία*, for it lets us assume, in the absence of qualifiers, that the seven-stringed lyres which are ubiquitous in vase paintings of the seventh and sixth centuries were for the most part, like Terpander's *ἐπίτατος φόρμιγξ*, tuned 'normally', i.e. diatonically. Compare the Akkadian tuning *išartu* ('upright, normal'), found at one end of the diatonic cycle, with *ἀρμονίης ὀρθῆς* in the *de Victu*; Apollo's *μουσικὰν ὀρθάν* at the wedding of Cadmus and Harmonia; and Plato's insistence on 'melodies which evince the correctness (*ὀρθότητα*) of nature'.²⁸⁾ To Terpander was attributed 'the orthian style of melody' (*τὸν τῆς ὀρθίου μελωδίας τρόπον*, ps.-Plut. *de Mus.*

27) Ar. *Eq.* 532: τοῦ τόνου οὐκέτ' ἐνόντος shows *τόνος* as a 'tuning' generally; Hp. *Vict.* 1.8 also refers to a whole tuning as *τόνος*, and states that without *ἀρμονία* it cannot exhibit the consonances of fourth, fifth and octave; based on the linguistic parallels to Philol. fr. 44B6a D-K, this passage must assume the diatonic—which most consistently employs these intervals; *τόνος* is expressly equated with 'diatonic tuning' at *Anth. Pal.* 16.220.5 f. (Antipater), where it is contrasted with the other *genera*: ἄλλ' ἃ μὲν κράντειρα τόνου πέλει, ἃ δὲ μελωδός / χρώματος, ἃ δὲ σοφᾶς εὐρέτις ἀρμονίας ('But the one [*sc.* Muse] is master of the diatonic, the next is a singer of the chromatic, and the last is inventor of the clever enharmonic'); three Muses, one per *γένος*, are likewise attested at Plut. *Quaest. conviv.* 744c: τρεῖς ἦδεσαν οἱ παλαιοὶ Μούσας . . . αἰτία δ' οὐχ ὥς ἔνιοι λέγουσι τὰ μελωδοῦμενα γένη, τὸ διάτονον καὶ τὸ χρωματικὸν καὶ τὸ ἐναρμόνιον.

28) Pi. fr. 32 (S-M), *v. supra*; Hp. *Vict.* 1.8, *v. supra*; Pl. *Lg.* 657a7 f.

1140 f.). High-pitched music is described as 'orthian' elsewhere,²⁹⁾ but here the word, which has both meanings of *išartu*, seems to designate something more general. We do indeed find early hints of enharmonic and chromatic music, but these exceptions mark the rule (Franklin [forthcoming]). Terpander's ἐπτάτονος φόρμιγξ is therefore of much greater significance than at first meets the eye. Appearing in the right place at the right time, and with the needed technology of seven resonating strings, it was the instrument by which the Archaic melic was achieved.

4. *The Tonoι and the Perfect System*

While the diatonic tuning method may have shared the Classical stage with the chromatic and enharmonic *genera*, it must have provided the foundation of the later σύστημα τέλειον. The τόνοι or 'pitch keys'—by which Aristoxenus organized and interrelated the various octave species (σχήματα) of each *genus* and the smaller fragments (συστήματα) thereof for the purposes of modulation and interconnection (μεταβολή)—were essentially diatonic in nature. This follows from the fact that the term τόνος in this usage must derive from its more basic meaning (*v. supra*), 'the difference between a perfect fourth and a perfect fifth'. As may be seen in the Mesopotamian system, it is through the continuous alternation of these two intervals that the diatonic scale is generated, and consequently a series of τόνοι in the earlier sense of the word. Since these pitches were the same τόνοι 'upon which systems are placed and sung',³⁰⁾ we may exclude a direct etymology from τόνος as τάσις ('pitch'). Ptolemy considered this a likely explanation of the ancients' coinage, though the exact derivation of this layer of meaning had been forgotten by his time.³¹⁾ There were in fact thirteen τόνοι (and later

29) References to 'orthian' of high-pitched music, including the so-called ὀρθιος νόμος, as well as 'orthian' rhythm, are collected by Barker (1984-9), 1.251 ff.

30) Cf. Aristox. *Harm.* 37: πέμπτον δ' ἐστὶ τῶν μερῶν τὸ περὶ τοὺς τόνους ἐφ' ᾧν τιθέμενα τὰ συστήματα μελωδεῖται ('The fifth subtopic [*sc.* of ἀρμονική] is that which concerns the τόνοι, upon which the systems which are sung are placed').

31) Ptol. *Harm.* 2.10 (62.21 f.): τόνῳ διαφέροντας ἀλλήλων ὑποθέμενοι, καὶ διὰ τοῦτο ἴσως τόνους αὐτοὺς ὀνομάσαντες ('assuming these to differ from each other by a τόνος, and perhaps for this reason naming them τόνοι').

fifteen), rather than seven or eight, in the σύστημα τέλειον.³²⁾ But this came about merely as an extension of the diatonic process through two cycles of alternating fifths and fourths, rather than one, so that all possible modulations could be accommodated by an underlying grid of semitones (hence the temptation to draw comparisons with equal temperament: see Laloy [1904], 251-5). Thus τόνος in this sense derives from the whole-tone's function as a useful unit of sonic measurement.³³⁾ Ptolemy himself, of course, recognized only seven τόνοι, which were not pitch-keys but octave species, and this shows him a more faithful heir to the Archaic heptachordal music than fifth-century modernists like Phrynis and Timotheus, or their successors who used the pitch-keys of Aristoxenus (Laloy [1904], 252; Winnington-Ingram [1936], 82 f.).

5. Interval Rotation and the Predecessors of Aristoxenus

That the σύστημα τέλειον had a theoretical precursor in the diatonic has been further obscured by a passage of the *Elementa Harmonica* in which Aristoxenus, in criticizing the diagrams of his predecessors, says that they concerned themselves only with octachords in the enharmonic *genus*.³⁴⁾ This allusive and punning account was

32) Aristoxenus' theory of the τόνοι is alluded to by Cleonid. 12 (203.4-204.15); Aristid. Quint. 1.10 (20.5 ff.); cf. ps.-Censor. *de Mus.* 6.609.17 ff.; Isid. *Ethym.* 3.20.7; see also the criticisms of Ptol. *Harm.* 2.9-11.

33) Aristox. *Rhythm.* 2.21 γνώριμον κατὰ μέγεθος, ἥτοι ὡς τὰ τε σύμφωνα καὶ ὁ τόνος ἢ ὡς τὰ τούτοις σύμμετρα ('... intelligible in magnitude, either like the consonant intervals and the τόνος, or like those intervals commensurate with these'); Adrastus ap. Theo Sm. 53.3 ff.: καθάπερ ὁ πήχυς τοῦ κυρίως τοπικοῦ διαστήματος ... ἔστι δὲ γνωριμώτατον τὸ τονιαῖον διάστημα, ἐπειδὴ τῶν πρώτων καὶ γνωριμωτάτων συμφωνιῶν ἔστι διαφορά ('just like the cubit for literally spatial intervals ... the τόνος is the most intelligible interval, because it is the difference between the first and most intelligible consonances'); cf. 66.19-67.3: οἱ δὲ παλαιοὶ πρῶτον διάστημα τῆς φωνῆς ἔλαβον τὸν τόνον ... ὅτι μέχρι τούτου καταβαίνουσα ἡ φωνὴ τοῦ διαστήματος ἀπλανῆ τὴν ἀκοὴν φυλάσσει. τὸ δὲ μετὰ τοῦτο οὐκέτι οἷα τε ἡ ἀκοὴ πρὸς ἀκρίβειαν λαβεῖν τὸ διάστημα ('and the ancients took the tone as the first interval of the voice ... because, as the voice proceeds, it safeguards the hearing as far as this interval, but after this [i.e. with smaller intervals] the hearing is no longer able to take the interval with precision').

34) Aristox. *Harm.* 2-3: τοὺς μὲν οὖν ἔμπροσθεν (ἡμμένους τῆς ἀρμονικῆς πραγματείας συμβέβηκεν ὡς ἀληθῶς, *restituit Marquard ex Procl. in Ti.*) ἀρμονικοὺς εἶναι βούλεσθαι μόνον, αὐτῆς γὰρ τῆς ἀρμονίας ἥπτοντο μόνον, τῶν δ' ἄλλων γενῶν οὐδεμίαν πάποτ' ἔννοιαν εἶχον ('Now it happens that those who previously set

already confusing in antiquity. As Proclus commented, 'Aristoxenus is saying something incredible here, that the ancients did not know the diatonic diagram,'³⁵⁾ reporting also the older gibe of Adrastus, elicited by this same problem, that Aristoxenus was generally 'concerned to seem to say something brand new' (ὅπως ἂν δόξη τι καινὸν λέγειν πεφροντικώς).³⁶⁾ For the diatonic had been the subject of close scrutiny by Philolaus, Plato, and—in his wish to make it conform more closely to the higher superparticular (i.e. resonant) ratios—Archytas.³⁷⁾ Indeed, the statement, according to the usual interpretation, would scarcely accord with Aristoxenus' own chronology of the *genera*.

The solution to the riddle must be that Aristoxenus, in focusing on the new system he was forging, neglected an older, established θεωρία as not needing any redress, and saved his criticism for the architects of its change. Aristoxenus brought to completion what had long been sought, a new system which could accommodate the innovations of the late fifth and fourth centuries. What he has taken for granted, then, is the phase of music and its theory preceding these trends, which, relative to the New Musicians, will have been classical forms. Thus, when he complains that 'Eratocles attempted to enumerate the octave-schemes of one genus [*sc.* the enharmonic], showing it, without formal demonstration, by the rotation of the intervals' (Ερατοκλῆς ἐπεχείρησε καθ' ἑν γένος ἐξαριθμῆσαι τὰ σχήματα τοῦ διὰ πασῶν ἀναποδείκτως τῇ περιφορᾷ τῶν διαστημάτων δεικνύς, Aristox. *Harm.* 6), we should not conclude that the enharmonic *genus* was the first melodic style *ever* subjected to theoretical scrutiny. It was rather the first to be analyzed with an eye towards comprehending in a single system the innovative practices that were

themselves to the endeavour of ἁρμονική truly wanted to be only 'ἁρμονικοί', for they grasped only the enharmonic [ἁρμονία] itself, but never yet had any thought for the other *genera*); cf. the summary, with some additions, in ps.-Plut. *de Mus.* 1143e-f.

35) Procl. in *Ti.* 3.192a (2.169.21-29 Diehl): ἐν οἷς καὶ λέγει τι θαυμαστὸν ὁ Ἀριστόξενος, ὅτι τὸ διατονικὸν διάγραμμα οὐκ ᾔδεσαν οἱ παλαιοί... πῶς οὖν ταῦτα λέγει καίτοι καὶ τοῦ Πλάτωνος κατὰ τὸ διατονικὸν γένος ἐκθεμένου τὸ διάγραμμα καὶ τῶν ἀμφὶ τὸν Τίμαιον, θαυμάσαι ἄξιον.

36) Aristox. fr. 8 = Adrastus ap. Procl. in *Ti.* 3.192a (2.169.29 ff. Diehl).

37) Philol. fr. 44B6a D-K; Archyt. fr. 47A16; Pl. *Ti.* 35b1-36b5. Cf. Winnington-Ingram (1932); Burkert (1972), ch. 5 sec. 2; Barker (1978), 3; (1984-9), 2.59 f.; West (1992), 165.

then (in the second half of the fifth century)³⁸) being developed, what would eventually culminate in the *σύστημα τέλειον*. Eratocles is criticized for not having done this well or completely enough, and for doing it *ἀναποδείκτως*, that is, without “the logical derivation of propositions from appropriate principles” (Barker [1984-9], 2.130 n. 25.).

The phrase *τῇ περιφορᾷ τῶν διαστημάτων* is crucial. This ‘interval rotation’ has always been seen as Eratocles’ great achievement, a breakthrough in the cyclical synthesis of disparate tunings. But given the opprobrious tone, it is equally possible to understand the phrase as belonging to the complaint of *ἀναποδείκτως*. Since Aristoxenus criticized his predecessors for not producing sufficient diagrams, *ἡ περιφορά* would then be a means of demonstrating the species without recourse to diagrams, and so presumably could be executed on the instrument itself, i.e. with one tuning succeeding another in a visibly and/or audibly coherent sequence (*δεικνύς*, ‘showing’). It was a processual cycle which ‘brought one back around’ to the starting point, exactly as *περιφορά* suggests; the similarity to the diatonic tuning cycle of UET 7/74 is striking (for which see Gurney [1968]; Wulstan [1968]; Gurney [1994]). Thus the rotation of intervals was a familiar technique that could be used without the more rigorous methods required by Aristoxenus—not needing, for example, the linear interval map of the *σύστημα τέλειον*. The underlying principle of scales related cyclically would have been the same in both systems, but the two forms of presentation were quite distinct. To take full account of complex musical developments, a more graph-like approach was needed to assist the ears in the analysis of music. This was the function of the musical diagram, as Bacchius explains:

Διάγραμμα δὲ τί ἐστι;—Συστήματος ὑπόδειγμα . . . διαγράμματι δὲ χρώμεθα, ἵνα τὰ τῇ ἀκοῇ δύσληπτα πρὸ ὀφθαλμῶν τοῖς μανθάνουσι φαίνηται. (Bacch. 62 [305.16-20]; cf. Rocconi [1999], 101)

‘And what is a diagram? A representation of a (*sc.* musical) system. And we use a diagram so that, for students of the subject, matters which are hard to grasp with the hearing may appear before their eyes.’

38) The resonance between his theory of road-junctions and Ion of Chios fr. 32 (West)—for which *v. infra* and cf. West (1992), 226—as well as his use of octachords, lets Eratocles be dated approximately to the second half of the fifth century.

Thus Eratocles did not produce a sufficient account by Aristoxenus' latter-day standards, but *merely* used a rotational process which did little to transform a no-longer-adequate method of musical analysis. Given that the σύστημα τέλειον reveals a diatonic substructure in the τόνοι, and that Aristoxenus accepted the diatonic as the oldest of the *genera*, the easiest solution is to suppose that ἡ περιφορὰ τῶν διαστημάτων reveals a thorough familiarity with the cyclical properties of the diatonic method as the basis of pre-Aristoxenian θεωρία—a long-familiar, not novel, approach. It is important, then, that Bacchius defines a diagram as 'a flat chart on which *all* the *genera* could be sung' (σχῆμα ἐπίπεδον, εἰς ὃ πᾶν γένος μελωδεῖται).³⁹)

Plato, who was only interested in the diatonic, serves to unite this tuning method with the cyclical in his elaborate Myth of Er, where the eight tones (τόνοι) all partake in a cyclical cosmos (Pl. *Resp.* 616b1-617d5). The old usage of τόνος as 'tuning' clarifies the word's later meaning of 'octave species': that is, these τόνοι were 'the tunings'—i.e. the standard tunings—and they were created by cyclical transformation; compare the synonymous term τρόποι, which may thus be rendered as 'turnings' of the musical circle.⁴⁰) The link between these cyclical τόνοι and the diatonic method is established by the intermediate application of τόνος, 'tuning', to mean 'diatonic tuning' specifically—an ancient and somewhat untechnical usage documented for the Classical period (*v. supra*). Eratocles therefore showed how the enharmonic could be schematized according to a classical, diatonic, and fundamentally circular approach.

In the light of the foregoing, one can see, in a criticism of his predecessors where Aristoxenus' new, unaddressed harmonic concerns dwarf those of an earlier period, the strata of the evolutionary process which led to the σύστημα τέλειον:

39) Bacch. 62 (305.16-20). A diagram with all the *genera* is found at e.g. Nicom. *Ench.* 12 (264.6 ff.).

40) For τρόπος as τόνος, see e.g. Plut. *An seni* 793a: τόνων καὶ τρόπων . . . οὐς ἁρμονίας οἱ μουσικοὶ καλοῦσι; *De E Delph.* 389e: εἴτε τόνους ἢ τρόπους εἴθ' ἁρμονίας χρὴ καλεῖν: cf. West (1992), 188 n. 103; ps.-Plut. *de Mus.* 18.1137b: πολυτρόπων; Bacch. 46-7 (303.3 ff.), etc.; Gaud. 20 (347.22): τρόπον ἢ τόνον; Aristid. *Quint.* 1.6 (8.20), 1.10 (20.1-4): τόνον . . . τρόπον συστηματικόν, οἷον λύδιον ἢ φρύγιον, etc.; Alyp. 3 (367.20): τρόπους τε καὶ τόνους.

τέταρτον δ' ἂν εἴη μέρος τὰ συστήματα θεωρῆσαι πόσα τ' ἐστὶ καὶ ποῖ' ἅττα καὶ πῶς ἔκ τε τῶν διαστημάτων καὶ φθόγγων συνεστηκότα. οὐδέτερον γὰρ τῶν τρόπων τεθεώρηται τὸ μέρος τοῦτο ὑπὸ τῶν ἔμπροσθεν· οὔτε γὰρ εἰ πάντα τρόπον ἐκ τῶν διαστημάτων συντίθεται τὰ συστήματα καὶ μηδεμία τῶν συνθέσεων παρὰ φύσιν ἐστὶν ἐπισκέψεως τετύχηκεν, οὔθ' αἱ διαφοραὶ πᾶσαι τῶν συστημάτων ὑπ' οὐδενὸς ἐξηρίθμηνται. περὶ μὲν γὰρ ἑμμελοῦς ἢ ἐκμελοῦς ἀπλῶς οὐδένα λόγον πεποιήνται οἱ πρὸ ἡμῶν, τῶν δὲ συστημάτων τὰς διαφορὰς οἱ μὲν ὅλως οὐκ ἐπεχείρουν ἐξαριθμεῖν—ἀλλὰ περὶ αὐτῶν μόνον τῶν ἑπταχόρδων ἃ ἐκάλουν ἁρμονίας τὴν ἐπίσκεπιν ἐποιοῦντο—οἱ δὲ ἐπιχειρήσαντες οὐδένα τρόπον ἐξηριθμοῦντο, καθάπερ οἱ περὶ Πυθαγόραν τὸν Ζακύνθιον καὶ Ἀγήνορα τὸν Μυτιληναῖον. (*Harm.* 36-7)

'The fourth topic would be to observe the systems: how many they are, what type, and how they are composed from intervals and musical tones. For in neither of these ways has this topic been observed by the earlier harmonists: for the question of whether systems are composed from intervals in every manner, and whether none of these composites run counter to nature, has not met with an examination; nor have all the differences of the systems been enumerated by anyone. For concerning what is properly melic and what is not (περὶ μὲν γὰρ ἑμμελοῦς ἢ ἐκμελοῦς), our predecessors have simply made no account. Some made no attempt at all to enumerate the differences between systems, but made examination only of the heptachords themselves, which they used to call ἁρμονίαι. Those who did try were in no way exhaustive, as for instance Pythagoras of Zacynthus and his school, and Agenor of Mytilene and his.'

The key phrase here is ἀλλὰ περὶ αὐτῶν μόνον τῶν ἑπταχόρδων ἃ ἐκάλουν ἁρμονίας τὴν ἐπίσκεπιν ἐποιοῦντο. The manuscript reading ἑπταχόρδων must be retained against the emendation ἐπτά ὀκταχόρδων, adopted by Westphal, Marquard, Macran and Da Rios. In M, ἐπτά χορδῶν had been corrected to ἑπταχόρδων; wishing to account for this, modern editors have seen a parallel in Aristoxenus' criticism (*v. supra*) of his predecessors who 'only spoke about enharmonic octachord systems' (περὶ συστημάτων ὀκταχόρδων ἑναρμονίων μόνον ἔλεγον, *Harm.* 2). It is generally held that the *Elementa Harmonica* is, as we have it, a later compilation of two independent drafts, for there are a number of parallel topics that are repeated between books 1 and 2.⁴¹) On the supposition that the two passages in question are essen-

41) See Da Rios (1954), CXII ff.; contrast Bélis (1986).

tially the same critique, it is suggested that ὀκτα- was omitted in a sort of numerical haplography, whereupon an editor of M closed the gap between ἐπτὰ and χορδῶν in a false emendation.

But this cannot be right. First, ἐπτὰ χορδῶν is more economically explained as an erroneous division of ΕΠΤΑΧΟΡΔΩΝ at the time when word breaks were first introduced to a text without accents, a very simple error for which there is an exact (but inverted) parallel in the tradition of Nicomachus (*Exc.* 1 [266.7]). Second, with ἃ ἐκάλουν ἁρμονίας ('which they used to call ἁρμονίαι'), Aristoxenus is evidently drawing a distinction between an older use of the term and that of his own day. Now, with the exception of this passage, Aristoxenus always uses ἁρμονία to mean a scale in the enharmonic *genus*; the enharmonic, so popular in the late fifth and early fourth centuries, had become the 'tuning' *par excellence*.⁴²⁾ Thus the predecessors criticized here cannot have been talking about the enharmonic. Consequently the first passage cannot be adduced as a parallel, and the supposed haplography vanishes.

With this reading, the passage lets us glimpse the earlier practical and theoretical norm of the seven-stringed lyre which had been current in the Archaic period and well into the Classical. It is clear from the phraseology that Aristoxenus saw these heptachords as a fixed, finite set, as shown both by the definite article and still more so by the intensive pronoun (περὶ αὐτῶν μόνον τῶν ἑπταχόρδων, 'only about the heptachords themselves'). This would naturally precede the work of Eratocles and others, whose octachord diagrams were the first steps towards the σύστημα τέλειον. Moreover, these ancient ἁρμονίαι must have been more orderly than the odd tunings, seemingly from the high enharmonic period, preserved by Aristides Quintilianus, which show sometimes more, sometimes fewer than seven pitches.⁴³⁾ For they did in fact have seven pitches—exactly as we

42) Adrastus ap. Theo Sm. 55.15-56.1: καλεῖσθαι δέ φησιν Ἀριστόξενος τοῦτο τὸ προειρημένον γένος ἁρμονίαν διὰ τὸ εἶναι ἄριστον, ἀπενεγκάμενον τοῦ παντὸς ἡρμοσμένου τὴν προσηγορίαν ('And Aristoxenus says that this, the aforementioned genus, is called ἁρμονία because it is best, taking this title away from τὸ ἡρμοσμένον as a whole'); ps.-Plut. *de Mus.* 1143e-f. See also Henderson (1957), 388 f.; West (1992), 164 f.

43) Aristid. *Quint.* 1.9. On these scales generally, see Winnington-Ingram (1936), 55 ff.; West (1992), 174 f. and n. 47 with literature cited there.

should expect from early literary evidence and the consistent representation of seven-stringed lyres throughout the Archaic period.⁴⁴⁾

This ancient heptachordy began to undergo a permanent change at the professional level in the first half of the fifth century (probably c. 480-460),⁴⁵⁾ an important landmark being Phrynis' victory at the Panathenaea in 446/5 with his modern πολυχорδία.⁴⁶⁾ Yet the heptachordal norm must have persisted at the popular level and in the music lesson, for non-professional lyres are still commonly so depicted throughout the period of the New Music and beyond, and the seven strings of the ancients are still clearly recalled in much later sources.⁴⁷⁾ Aristotle treats it as a matter of fact that there were seven strings in the old ἁρμονίαι, while the Aristotelian *Problems*,

44) Terp. fr. 4.2 (Gostoli); *h. Merc.* 51; *Pi. N.* 5.22: φόρμιγγ' . . . ἐπτάγλωσσαν; *P.* 2.70 f.; Ion of Chios fr. 32 (West), *v. infra*. For the ceramic evidence, Maas/Snyder (1989).

45) This crucial issue has not been adequately addressed; see first West (1992), 63 f. A thorough study of the ceramic evidence is needed; initial indications of my own ongoing survey are that eight-stringed instruments become a common configuration in professional contexts between 480-460; but note that an accurate typology, could it be established, might itself provide a dating criterion. Corroborative literary evidence is Pliny *Nat.* 7.204, who credits Simonides (traditionally c. 556-468; see West [1971]) with the eighth string—or τὸν τρίτον φθόγγον as the *Suda* puts it (*s.v.* Σιμωνίδης)—while ps.-Plutarch reports that Lamprocles added a disjunctive tone at the top of the conjunct heptachord (*de Mus.* 1136c-d). Nicomachus' attribution of the eighth string to Pythagoras in *Ench.* 5 (244.14 ff.) was in his time already an old tradition, which may be dismissed as having the ulterior motivation of glorifying the master. The tradition of Terpander's eighth string is equally false, as I will show in a future publication.

46) Ister *FGH* 334F56 = schol. a *ad Ar. Nub.* 971: ὁ Φρῦνις κιθαρωδός . . . δοκεῖ πρῶτος κιθαρίσαι παρ' Ἀθηναίοις καὶ νικῆσαι Παναθήναια ἐπὶ Καλλι(μάχ)ου ἄρχοντος (for the emendation, see West (1992), 360 n. 15).

47) *E. Alc.* 446 f.: ἐπτάτόνων τ' ὀρεῖαν / χέλυν; *Ion* 881; *Call. Del.* 253 ff.: ἔνθεν ὁ παῖς τοσσάσδε λύρῃ ἐνεδήσατο χορδὰς / ὕστερον, ὅσακι κύκνοι ἐπ' ὠδίνεσσιν ἄεισαν· ὄγδοον οὐκέτ' ἄεισαν ('Hence the child [*sc.* Apollo] later bound that number [*sc.* seven] of strings to the lyre, as often as the swans sang upon his birth; an eighth time they did not yet sing'); forged Laconian decree, Boeth. *De inst. mus.* 1.1 (182.7 ff.); Verg. *Aen.* 6.646; Thrasyllus wrote a work called Περὶ τοῦ ἐπταχόρδου probably in the early first century AD (Porph. *in Harm.* 5 [91.14]; for dates see Barker [1984-9], 2.209 f.); *Anth. Pal.* 9.250 (Onestes); Nicom. *Ench.* 3 (242.5): ἐν γε τῇ ἐπταχόρδῳ κατὰ τὸ παλαιὸν, cf. 5 (245.4), 7 (249.15), 9 (253.4), 11 (256.5 f.); τῇ τοίνυν ἀρχαιοτρόπῳ λύρα, τουτέστι τῇ ἐπταχόρδῳ; *Exc.* 1 (266.3), 6 (277.9-10); Paus. 3.12.10: χορδαῖς ἐπτά ταῖς ἀρχαίαις; *Lucian Astr.* 10; ps.-Plut. *de Mus.* 1141c: ἐπταφθόγγου τῆς λύρας ὑπαρχούσης ἕως εἰς Τέρπανδρον; *Exc. Neap.* 23 (418.10 ff.); Procl. *Chr. ap. Phot. Bibl.* 320a33-b11; Alex. Aphr. *In Metaph.* 1093a13; Clem. Al. *Strom.* 6.16.144; Isid. *Etym.* 3.22.4; *Suda s.v.* Τέρπανδρος; etc.

compiled well into the octachord period, nevertheless report heptachords as standard in an earlier *θεωρία*.⁴⁸⁾ Nicomachus clings stubbornly to the memory, loyally (if wrongly) attributing the eighth string to Pythagoras (*Ench.* 5 [244.22-245.11] *et passim*). We are thus justified in regarding 'the heptachords' of Aristoxenus as comprising a coherent collection of some sort associated with this ancient phase of Greek music, just as the Aristotelian problems cited refer in the plural to heptachordal *ἁρμονίαι*. Aristoxenus remembered that the term *ἁρμονία* was closely associated with the tunings of this heptachordal 'system', not used as 'attunement' in some more generic sense which might include a variety of other tunings with more or fewer than seven strings, such as those in Aristides Quintilianus. For Aristoxenus, these heptachordal tunings were *the* *ἁρμονίαι*.

Thus two broad groups of *ἁρμονικοί* may be detected in Aristoxenus' critique. Like Eratocles, the schools of Pythagoras of Zacynthus and Agenor of Mytilene, while aware of the subjects which needed discussion, addressed them inadequately. But the unnamed adherents of seven-stringed classical music never even attempted an investigation. It was not the concern of the earlier, codified heptachordy, which was widely taught in the *παιδεία*, to incorporate new features which would catalyze a breakdown of rules and conventions which had been handed down from the Archaic period.

6. *The Two Classical Styles*

This conservative force, and the coexistence in the fifth century of an old heptachordal discipline with its modification by avant-garde musicians, is well illustrated by Right Logic's resentful account of the 'contemporary' music lesson in *Clouds*. Scandalously, young students were introducing fashionable modulations—*καμπαί* or 'bends',⁴⁹⁾ a term which derives its meaning from the ancient image

48) Arist. *Metaph.* 1093a14: *ἐπὶ δὲ χορδαὶ ἡ ἁρμονία*; ps.-Arist. *Pr.* 19.7: *οἱ ἀρχαῖοι ἑπταχόρδους ποιοῦντες ἁρμονίας* ('the ancients, making their heptachordal *ἁρμονίαι*'); 19.47; 19.25: *ἐπτάχορδοι ἦσαν αἱ ἁρμονίαι τὸ παλαιόν*; 19.32: *ἐπὶ ἦσαν αἱ χορδαὶ τὸ ἀρχαῖον*; cf. 19.44.

49) For the term, cf. Ar. *Nub.* 333: fr. 753, 953 K-A; Pherec. fr. 155.15 K-A; Eup. fr. 366 K-A; Tim. fr. 26.3 (PMG 802) of Phrynis; Poll. *Onom.* 4.66.

of the melodic ‘road’⁵⁰)—into the older style on offer from the κιθαριστής:

εἶτα βαδίζειν ἐν ταῖσιν ὁδοῖς εὐτάκτως εἰς κιθαριστοῦ . . .
 εἶτ’ αὖ προμαθεῖν ῥῆσιν ἑδίδασκεν τῷ μῆρῳ μὴ ξυνέχοντας . . .
 ἐντειναμένους τὴν ἁρμονίαν ἣν οἱ πατέρες παρέδωκαν.
 εἰ δέ τις αὐτῶν βωμολοχεύσαιτ’ ἢ κάμψειεν τινα καμπήν
 οἷας οἱ νῦν, τὰς κατὰ Φρῦνιν ταύτας τὰς δυσκολοκάμπτους,
 ἐπετρίβeto τυπτόμενος πολλὰς ὥς τὰς Μούσας ἀφανίζων. (Ar. *Nub.* 964-72)

‘And then [*sc.* they had] to walk in good order in the streets to the citharist’s . . . / And then in turn he taught them to learn a song by heart, not holding their thighs together . . . / Tuning the ἁρμονία which our fathers handed down. / But if one of them played the fool or effected some modulation— / Like musicians nowadays do, those difficultly-bent modulations à la Phrynis— / He got a good long thrashing for doing away with the Muses.’

Actually, the humor of the passage lies in the anachronism of the complaint, for Phrynis was already old news in Aristophanes’ day, having been radical only when the men who fought at Marathon had reached middle or old age (Dover [1968], *ad* 971); only a few codgers could have lived to see *Clouds*. We are dealing then with a musical education that was traditional already in the early fifth century—in other words, an inheritance from the Archaic period. Note that here in the music lesson, where we must assume a seven-stringed lyre, the term for the tuning is again ἁρμονία, as in Aristoxenus. The conservative musical tastes underlying this passage—probably not entirely shared by Aristophanes, who indulged in New Music himself (and no doubt not always ironically)—is found again in *Frogs*. When Dionysus brings Aeschylus back to earth as the greatest tragedian, and not Euripides, it is the return of an old celebrity who had learned his craft in the classical seven-stringed phase of music. As another Aristophanic character complained elsewhere, ‘they sang everything all alike—on seven strings’ (ἦδον ἐπτάχορδα πάνθ’ ὁμοῖα, fr. 467 K-A). Thus, in *Frogs*, Euripides charges Aeschylus with ‘always composing the same things’ (ποιοῦντα ταῦτ’ ἀεί, *Ran.* 1250), while

50) For the road image, cf. West (1992), 227 and n. 25; Rocconi (1999), 99 f. The image survives into modern Greek, where δρόμος designates ‘mode’ (Beaton [1980], 9). It is also found in ancient Indian music theory, where *antaramarga* is ‘the path between the notes’: see e.g. Widdess (1995), 264-7.

Psellus attributes to Euripides the introduction of πολυχорδία in tragedy.⁵¹⁾ The well-known vase-painting by Duris, showing the music lesson in its classical form with boys studying the lyre and epic poetry at the house of the κιθαριστής—and no fewer than four carefully rendered seven-stringed instruments—is from this same Aeschylean period (Berlin F 2285: see West [1992], plate 11). One boy is shown with a tablet on which he has written a hexameter invoking the Muse; it belongs to the traditional prelude style attributed to Terpander—the Aeolic form Μοῖσα is therefore not accidental (West [1971], 308).

This 'ἁρμονία which our fathers handed down' does not suggest the usual picture of chaotic evolution used to explain the apparently aberrant evidence of Philolaus fr. 6a, the Libation Style of Olympus, and the ἁρμονίαι of Aristides Quintilianus. On the contrary, since ἁρμονία and ἐπτάχορδα in the Aristophanic passages clearly do not presuppose one tuning only, it indicates a well-defined convention of tuning which had been stable for generations.⁵²⁾ This is confirmed by another music lesson scene where Aristophanes recounts how the boorish Cleon made little progress because he would learn only the Dorian ἁρμονία (*Eq.* 985-96); the implication is that mastery of the Dorian led on to a more involved knowledge of tuning. Hence these passages, taken together, refer to a tradition of tuning which was formal, ancient, had several stages of which the Dorian had had some primacy for generations before Aristophanes, and was properly *heptachordal*.

What role did diatony play in this period of the classical—i.e. Archaic—heptachord? Was the diatonic, as in the later fifth century, largely overshadowed by what would become known as the enharmonic and chromatic *genera*, or by some other tunings of which we have no notice, like those of Aristides (though these themselves are predominantly enharmonic in character)? Or was the Terpandrian heptachord proper to a classical form of diatonic music which endured throughout the Archaic period? A scholiast, commenting on the 'ἁρμονία which our fathers handed down', asserts

51) Psell. *De trag.* 5: συστήμασι δὲ οἱ μὲν παλαιοὶ μικροῖς ἐχρῶντο, Εὐριπίδης πρῶτος πολυχорδία ἐχρήσατο.

52) Cf. Hp. *Vict.* 1.18: ἁρμονίης συντάξεις ('the arrangements of ἁρμονία').

that 'the ancient tuning was σύντονος⁵³⁾'—the very term used by Aristoxenus to describe the diatonic in its normal form.⁵⁴⁾ In the music lesson the diatonic was surely the first method to be learned, if it was regarded as the oldest and, as Aristoxenus held, most open to human discovery (*v. supra*). It would have been easiest to master, since, as Aristoxenus asserted elsewhere, the ear can readily trust the consonant intervals, and the diatonic was tuned by a very regular progression of these πρώται συμφωνίαι.⁵⁵⁾ The enharmonic, by contrast, could not be established solely through ἡ λήψις διὰ συμφωνίας (*v. supra*). Requiring years of practice, it belonged to the art of the professional musician.⁵⁶⁾ The citizen-choruses of the tragic stage, with twelve or more voices, would have needed much practice to make these quarter-tone discriminations nicely.⁵⁷⁾ Indeed, though the enharmonic was considered proper to tragedy in the

53) Schol. *ad Ar. Eq.* 968, glossing ἐντειναμένους τὴν ἁρμονίαν: ὡς συντόνου οὔσης τῆς παλαιᾶς ἁρμονίας.

54) Cf. Psell. *De trag.* 12 προσήλουν αὐταῖς οἱ κράτιστοι αὐληταί, ὁ μὲν τὴν χρωματικὴν περίοδον, ὁ δὲ τὴν ἑναρμόνιον, ὁ δὲ τὴν σύντονον; Winnington-Ingram, *ap. Browning* (1963), 71, wished to supplement this as σύντονον (διάτονον).

55) Cf. Aristox. *Harm.* 55: πολὺ μᾶλλον τοῖς τῶν συμφώνων μεγέθει πιστεύει ἡ αἴσθησις ἢ τοῖς τῶν διαφώνων· ἀκριβεστάτη δ' ἂν εἴη διαφώνου διαστήματος λήψις ἢ διὰ συμφωνίας ('our perception is much more trusting of the consonant interval sizes than the non-consonant, and the tuning of a nonconsonant interval would be most precise when it is taken through consonance'); cf. Vitruv. *de Arch.* 5.4.3, *v. supra*; Adrastus (*ap. Theo Sm.* 53.3 ff.), *v. supra*.

56) Aristox. *Harm.* 19: τρίτον δὲ καὶ ἀνώτατον τὸ ἑναρμόνιον, τελευταίῳ γὰρ αὐτῷ καὶ μόλις μετὰ πολλοῦ πόνου συνεθίζεται ἡ αἴσθησις ('Third and last comes the enharmonic, for the perception becomes accustomed to it last and with difficulty after much labor'); cf. Adrastus *ap. Theo Sm.* 56.1 ff.: ἔστι δὲ δυσμελωδητότατον καὶ, ὡς ἐκεῖνός φησι, φιλότεχνον καὶ πολλῆς δεόμενον συνηθείας, ὅθεν οὐδ' εἰς χρῆσιν ῥαδίως ἔρχεται ('it is very difficult to sing and, as he [*sc.* Aristoxenus] says, artistic and requiring much habituation, whence it does not come easily into use'). Consider Plato's portrait of musicologists straining to distinguish between such closely-packed intervals (*Resp.* 7.530e5-531b8); as Barker (1978), 8, points out, πικνώματ' ἅττα ὀνομάζοντες provides a verbal link to the καταπύκνωσις ('interval compression') mentioned by Aristoxenus (*Harm.* 7, 28, 38, 53), which relied on quarter-tone discriminations and seems to have acted as musical graph paper for measuring very fine intonational shades.

57) Cf. Aristid. *Quint.* 1.9 (16.11-5) φυσικώτερον μὲν ἐστὶ τὸ διάτονον (πᾶσι γὰρ καὶ τοῖς ἀπαιδεύτοις παντάπασι μελωδητόν ἐστι) . . . ἀκριβέστερον δὲ τὸ ἑναρμόνιον· παρὰ γὰρ τοῖς ἐπιφανεστάτοις ἐν μουσικῇ τετύχηκε παραδοχῆς, τοῖς δὲ πολλοῖς ἐστὶν ἀδύνατον ('The diatonic is more natural, for it can be sung by everyone, even those who are altogether untrained . . . But the enharmonic is more exacting; for it has won acceptance from the most illustrious men in music, and is impossible for most people'); cf. Vitruv. *de Arch.* 5.4.3.

Classical period (*PHib.* 13.20 sq., *v. infra*; cf. West [1992], 164), its original defining feature was not the difficult quarter-tone *πυκνόν*, but the consonance-derived ditone, which even a second-rate, under-rehearsed chorus could have sung with ease. Thrasyllus still treated this as the essential form of the enharmonic (ap. Theo Sm. 92.27-93.2). As Aristoxenus believed, it had been drawn by Olympus centuries earlier—in the Orientalizing period in fact—from the diatonic.⁵⁸⁾ There is no problem, then, in allowing the enharmonic its attested place in tragedy, while at the same time conceding that the further refinement of the quarter-tone discriminations was less essential to its popular character than the underlying diatonic substrate. In fact, this three-pitched version of the enharmonic is attested in the *Paean* of Athenaeus, one of the Delphic hymn inscriptions of the Hellenistic period,⁵⁹⁾ thus showing the enduring and popular appeal of this style over the centuries since its ‘invention’.

It is no accident, then, that Aristoxenus made the diatonic the oldest of the *genera*. It formed the core of an earlier system, before the modulating and chromatic New Music, before the challenging enharmonic in its heyday. This must be what lies behind his distinction of two ancient phases in Greek musical history:

ὅτι δ' ἔστι τις μελοποιία διτόνου λιχανοῦ δεομένη καὶ οὐχ ἡ φαυλοτάτη γε ἀλλὰ σχεδὸν ἡ καλλίστη, τοῖς μὲν πολλοῖς τῶν νῦν ἀπτομένων μουσικῆς οὐ πάνυ εὐδηλὸν ἔστι, γένοιτο μεντὰν ἐπαχθεῖσιν αὐτοῖς· τοῖς δὲ συνειθισμένοις τῶν ἀρχαίων τρόπων τοῖς τε πρώτοις καὶ τοῖς δευτέροις ἱκανῶς δῆλόν ἐστι τὸ λεγόμενον . . . μάλιστα μὲν γὰρ καὶ πλείστον χρόνον ἐν τῷ χρώματι διατρίβουσιν, ὅταν δ' ἀφίκωνται ποτε εἰς τὴν ἀρμονίαν, ἐγγὺς τοῦ χρώματος προσάγουσι συνεπισπωμένου τοῦ μέλους. (*Harm.* 23)

‘But that there is a certain style of melic composition [μελοποιία] which needs a ditonic λιχανός, and that it is not the worst μελοποιία but quite the best, is entirely unclear to the many who undertake music these days, but would be if they applied themselves. But what I am saying is clear to those who are accustomed to the first and second ancient styles . . . For they [*sc.* musicians today] spend most of their time in the chromatic, and if at some point they end up in the

58) Aristox. fr. 83 = ps.-Plut. *de Mus.* 1134f-1135b: ἀναστρεφόμενον τὸν Ὀλυμπον ἐν τῷ διατόνῳ κ.τ.λ. (‘Olympus was roaming about in the diatonic,’ etc.); cf. Franklin (forthcoming).

59) *DAGM* 20; see also Hagel (2000), 38-89; cf. West (1992), 288 ff.

enharmonic, they lead it near to the chromatic, the melody being drawn along.'

Of the two archaic styles, one is associated with the enharmonic *genus*, thought to be the most lofty and beautiful by those who were familiar with both and with contemporary practice. What distinguished the other ancient style? Certainly not exclusive chromaticism, since this was practiced by those who were unfamiliar with and intolerant of the older styles—effeminate louts who would vomit bile when they heard true enharmonic music, as Aristoxenus memorably expressed it.⁶⁰) Although he does equate one of the earlier styles with the enharmonic, it might be facile for us to associate a different *genus* with each phase of music. It is logical to assume, however, that the diatonic played *some* role, since it is not otherwise assigned by Aristoxenus. In fact, it is said that the chromatic was first introduced into tragedy by progressive musicians of the later fifth century like Euripides and Agathon, earlier composers using either the enharmonic on its own—or *combining it with the diatonic*.⁶¹)

It appears then that the diatonic occurred in one or both of the two earlier styles, and this is hardly surprising given Aristoxenus' assertion of the diatonic's historical priority. It is only to be expected that a more difficult and refined style like the quarter-tone enharmonic should be a secondary development. Quite possibly the first style also saw the enharmonic in its more archaic form without the quarter-tone divisions, as established centuries earlier.⁶²) Yet this, too, leads us back to the diatonic, which Aristoxenus believed to be older still, and the point of departure for the enharmonic. So either the first ancient style was largely diatonic; or, if it was mixed with the enharmonic—for Aristoxenus too recognized music of mixed

60) Aristox. fr. 85 = Plut. *Quaest. conviv.* 711c: οἱ δ' ἄνδρες καὶ διατεθρυμμένοι τὰ ὅσα δι' ἀμουσίαν καὶ ἀπειροκαλίαν, οὓς φησιν Ἀριστόξενος χολὴν ἐμεῖν ὅταν ἐναρμονίου ἀκούσωσιν.

61) Plut. *Quaest. conviv.* 645e: Ἀγάθωνος, ὃν πρῶτον εἰς τραγῳδίαν φασὶν ἐμβαλεῖν καὶ ὑπομίξει τὸ χρωματικόν; Psell. *De trag.* 5: ἡ δὲ παλαιὰ τραγικὴ μελοποιία γένει μὲν τῷ ἐναρμονίῳ ἐχρήσατο ἀμιγῆ καὶ μικτῷ γένει τῆς ἁρμονίας καὶ διατόνων, χρώματι δὲ οὐδεὶς φαίνεται κεχρημένος τῶν τραγικῶν ἄχρις Εὐριπίδου; cf. West (1992), 351.

62) As Professor West suggests (correspondence); cf. West (1992), 351 f.

*genera*⁶³)—we may suppose a still earlier phase of diatonic music, according to the Aristoxenian view of musical development.

7. *The Diatonic Basis of Modulation*

The testimonia which concern μεταβολή provide further evidence that the σύστημα τέλειον was founded upon an earlier diatony, the ‘continuity’ (συνέχεια) of whose scales had already allowed them to be fully interrelated. According to an earlier precept which Aristoxenus attributed to Eratocles, acceptable modulation (μεταβολή) could only take place at consonant ‘intersections’.⁶⁴ An important fragment of Ion of Chios confirms that this was a standard theoretical approach to modulation not later than 422 BC, when Ion died (and probably by his *floruit* mid-century):

ἐνδεκάχορδε λύρα, δεκαβάμονα τάξιν ἔχουσα

τάς συμφωνούσας ἀρμονίας τριόδους·

πρὶν μὲν σ' ἐπτάτονον ψάλλον διὰ τέσσαρα πάντες

Ἕλληνες σπανίαν μοῦσαν ἀειράμενοι. (Ion of Chios fr. 32 (West) = Cleonid. 12 (202.14-7)⁶⁵)

‘Eleven-stringed lyre with a ten-stepped arrangement— / The three-way, consonant crossroads of ἀρμονία. / Hitherto all the Greeks played you heptatonic—two tetrachords— / Summoning up a sparse Muse.’

This is the earliest testimony bearing on the tetrachordal perspective fundamental to the later theorists (cf. Rocconi [1998], 346). It corresponds very closely, moreover, to the Eratoclean conception of μεταβολή as a melodic road which splits at consonant intersections, with three choices (besides the one just traveled). According

63) Aristox. *Harm.* 7: μὴ γινυμένων πάλιν τῶν γενῶν; 44: πᾶν μέλος ἔσται ἢ τοι διάτονον ἢ χρωματικὸν ἢ ἐναρμόνιον ἢ μικτὸν ἐκ τούτων ἢ κοινὸν τούτων (‘every μέλος will either be diatonic or chromatic or enharmonic or mixed from these or the common-ground of these’).

64) Aristox. *Harm.* 5 ἀπὸ τοῦ διὰ τεσσάρων ἐφ’ ἐκάτερα δίχα σχίζεται τὸ μέλος (‘From the fourth the μέλος splits in two in either direction’); Aristox. *Harm.* 67 ἀπὸ πυκνοῦ δ’ ἐναντίως ἐπὶ μὲν τὸ βαρὺ δύο ὁδοί, ἐπὶ δὲ τὸ ὀξὺ μία (‘After the πυκνὸν [sc. when descending] there are, in opposite directions, two roads continuing the descent and another one that goes back up’).

65) See the discussion of West (1992a), 25 f., adducing the Aristoxenus-Eratocles passages (*v. supra*).

to the rule of melodic ‘junctures’, modulation in the enharmonic and chromatic *genera* can only take place at the consonant ‘bounding’ notes of each tetrachord (οἱ περιέχοντες φθόγγοι), not from the variable, ‘moving’ inner notes (οἱ κινούμενοι) whose intonation was so often microtonal. In the διάτονον γένος, however, each φθόγγος is by definition such an intersection, and so each can serve as a departure point for μεταβολή. Created by the strictest application of συνέχεια—Ptolemy’s διατονικοῦ συνεχοῦς (*Harm.* 2.6 [55.12-15])—the diatonic species served as the skeleton of the σύστημα τέλειον, regulating, indeed enabling, modulation between the various συστήματα of the enharmonic and chromatic in all their shades. Thus the fragment implies knowledge of the complete diatonic connectability of all the species, at approximately the same time that Eratocles was rotating the enharmonic octachords. Once again his researches are seen against a diatonic background.

Given that Aristoxenus was musically conservative, railing against the practices of his day and prepared to sacrifice popularity for purity of technique (fr. 70, 76, 85), it follows that his contemporaries, for whom the New Music was now becoming mainstream (West [1992], 371 f.), were pursuing modulations and joining pitch systems that transgressed the rule he lays down. If this is right, his positive allowance for modulation represents an older, classical practice, known to Ion and Eratocles, and acceptable to the musician of conservative taste and traditional training. What is surprising about this is that scholars generally assume that the New Music was objectionable because it involved modulation. It now appears that modulation was a regular part of music prior to this movement, and that the New Music was controversial because it used too much modulation, and/or modulations which were improperly constituted.

In fact, as early as the early sixth century (!), according to Heraclides of Pontus, the aulete Sacadas of Argos—a renowned musician from a musical city, with three consecutive Pythian victories under his belt—was modulating with each strophe of his τριμελής νόμος (‘Etude in Three Tunings’).⁶⁶ Lasserre (1998) made much of this, noting

66) Ps.-Plut. *de Mus.* 1134b. Sacadas’ victories began in the third year of the forty-eighth Olympiad (thus 586, 582 and 578); Paus. 10.7.4-5; ps.-Plut. *de Mus.*

that, despite the fact that the ethnic names Dorian, Lydian and Phrygian suggest, *prima facie*, independent geographical origins for these tunings, they must nevertheless have been somehow mutually compatible, implying a unified musical system which could accommodate diverse tunings.⁶⁷⁾ We cannot say certainly what Dorian, Lydian and Phrygian mean in this context.⁶⁸⁾ Nor do we have any precise understanding of the ‘multiplicity of ἀυλός notes’ (τῇ τῶν ἀυλῶν πολυφωνίᾳ) used in the late sixth century by his countryman Lasus of Hermione (ps.-Plut. *de Mus.* 1141c). But both testimonia are clear evidence that the particular acoustic properties of the ἀυλός affected the course of Greek tonality, since according to the traditional Terpendrian practice of the Archaic period, only one ἁρμονία was used in a given composition (*v. infra*). (One should also note that the peculiar intonation of the ἀυλός could have left some further mark in the microtonal shadings of the *genera*. For all the philological shortcomings of the work, should Schlesinger [1959] be entirely ignored? The structures she discusses might provide, if not the basis of the ἁρμονίαι [as she saw it], at least a practical foundation for the higher superparticular ratios which appear in so many theorists outside of Aristoxenus, beginning with Archytas.) A lyre used for such ‘polyphonic’ pieces, if it were to avoid retuning between strophes or elaborate mechanisms like the ‘tripod’ of Pythagoras of Zacynthus (Ath. 14.637c-f), would require more strings than the traditional seven—nine in the case of the τριμελής νόμος. In fact,

1134a; cf. West (1992), 212. Herodotus (3.131-2) reports that, in the time of Polycrates, ‘the Argives were held to be first among the Greeks in music’ (Ἀργεῖοι ἥκουον μουσικὴν εἶναι Ἑλλήνων πρῶτοι).

67) Lasserre (1988), 82: “[sc. the τριμελής νόμος] presuppone, accanto ad una tecnica relativamente facile da mettere a punto sull’aulo, una teoria della scala musicale che identificava già perfettamente la funzione degli intervalli nella trasposizione. Questa teoria presuppone a sua volta una struttura comune ai tre modi armonizzati da Sacada, in altri termini un’origine comune”.

68) It is not clear whether these three names were preserved with the original tradition, or have been introduced anachronistically. Ps.-Plut. (*de Mus.* 1134a) claims that these were the only three tunings known at the time, a belief attested in other late sources, e.g. Ptol. *Harm.* 2.6 (56.4 ff.), 2.10 (62.19 f.). Thus these specific tunings may be mere inference from the name τριμελής νόμος. Curiously enough, Heraclides of Pontus, who seems to be the source here, insisted elsewhere that the three true ἁρμονίαι should correspond to the three Hellenic races, Dorian, Ionian and Aeolian: see Ath. 14.624c.

such an instrument is already attested in the mid-sixth century,⁶⁹) though literary traditions of dubious value variously assign an eighth and/or ninth string to Phrynis or Timotheus (West [1992], 64). At any rate, we have here good evidence for modulation well back into the Archaic period.

It would seem then that Pindar—who also celebrated the *παμ-φωνία* or *πολυφωνία* of the *αὐλός*⁷⁰) and musical *ποικιλία* (a word glossed as *πολυχορδία* in ps.-Plutarch *de Mus.* 1137a), and was said to have been a student of Lasus (West [1992], 344 n. 68)—was no stranger to *μεταβολή*. This would have been under certain well-defined conditions at first, between strophes for instance (following the example of Sacadas), and perhaps limited to the dithyrambic genre—or at least eschewed by the heptachordal Aeschylus and his contemporaries until such *πολυφωνία* was introduced in the time of Euripides (*v. supra*). In the well-known fragment of Pherecrates, Music complains of the progressive indecencies she has suffered during the course of the fifth century from the likes of Melanippides, Cinesias, and Phrynis—with her ultimate violation at the hands of Timotheus who, with Philoxenus, marked the furthest progress of the New Music. Of Cinesias, the effeminate dithyrambist of the later fifth century, she says:

Κινησίας δέ <μ> ὁ κατάρατος Ἀττικός,
ἐξαρμονίους καμπὰς ποιῶν ἐν ταῖς στροφαῖς,
ἀπολώλεχ' οὕτως, ὥστε τῆς ποιήσεως
τῶν διθυράμβων, καθάπερ ἐν ταῖς ἀσπίσιν,
ἀριστέρ' αὐτοῦ φαίνεται τὰ δεξιὰ. (Pherec. fr. 155.8-12 K-A)

'And Cinesias, that damned Athenian, / Making exharmonic bends in his strophes, / So destroyed me that in the composition / Of his dithyrambs—as with [*sc.* the reflection of] shields [*or* 'as with snakes?']— / The left appears in the same spot as the right.'

It is universally acknowledged that *ἐξαρμονίους καμπὰς* are modulations; as 'exharmonic' suggests, these are pitches which do not occur within a given *ἁρμονία*. If interstrophic modulation was accepted practice since the time of Sacadas, the criticism *ἐν ταῖς*

69) Paris E643; cf. Maas/Snyder (1989), 38, 51 fig. 15a; West (1992), 62.

70) Pi. *I.* 5.27, *O.* 7.12, *P.* 12.19: *αὐλῶν . . . πάμφωνον μέλος*; cf. *Adesp.* 29b (PMG 947): *πολύχορδος αὐλός*; Pl. *Resp.* 399d2 ff.

στροφαῖς becomes intelligible as a violation of the convention.⁷¹) Moreover, the images of invertibility and reflection—or the coils of snakes—fit well enough with a circular conception of μεταβολή and συνέχεια. In *Birds*, Aristophanes brings together the image of road and circle in his travesty of Cinesias and the modern dithyrambic style:

KIN.: πέτομαι δ' ὁδὸν ἄλλοτ' ἐπ' ἄλλαν μελέων . . .

ΠΕΙΣ.: ἀσπαζόμεσθα φιλύρινον Κινησίαν.

τί δεῦρο πόδα σὺ κυλλὸν ἀνὰ κύκλον κυκλεῖς; (Ar. *Av.* 1374-9; cf. Anacr. fr. 33 [PMG 378])

CIN.: 'I fly on first one and then another road of μέλη' . . . / PEIS.: 'We welcome thee, lime-wood Cinesias. / Why do you come here circling your lame foot round the circle?'

The language is complex. Though the primary reference of τί δεῦρο πόδα σὺ κυλλὸν ἀνὰ κύκλον κυκλεῖς—with the punning language of κυλλὸν ('lame') and κύκλον ('circle')—may be the halting, modernist dance of a circular dithyrambic chorus (Dunbar [1995], *ad* 1379), it combines with ὁδὸν μελέων (the melodic path) to form a gloss on the modulatory nature of the music (πέτομαι δ' ὁδὸν ἄλλοτ' ἐπ' ἄλλαν). This serves to support the interpretation of Pherecrates' καθάπερ ἐν ταῖς ἀσπίσιν, / ἀριστερ' αὐτοῦ φαίνεται τὰ δεξιὰ, and confirms the familiarity of cyclic modulation prior to Aristoxenus, as emphasized by the pleonastic and frequentative ἀνὰ κύκλον κυκλεῖς.

Thus what distinguished the interstrophic modulation of Sacadas from the μεταβολή of the later fifth century was not the basic principle of an interrelationship between two tunings, but the reckless abandon with which the New Musicians crossed from one to the next, breaking down all distinctions in the ἀρμονία. Sacadas moved slowly from one ἀρμονία to another, so that each was identifiable;

71) Cf. D. H. *Comp.* 19 (194.5-196.7 Roberts): τοῖς δὲ τὰ μέλη γράφουσιν τὸ μὲν τῶν στροφῶν τε καὶ ἀντιστροφῶν οὐχ οἶόν τε ἀλλάξαι μέλος, ἀλλ' ἐάν τ' ἐναρμονίους ἐάν τε χρωματικὰς ἐάν τε διατόνους ὑποθῶνται μελωδίας, ἐν πάσαις δεῖ ταῖς στροφαῖς τε καὶ ἀντιστροφῶν τὰς αὐτὰς ἀγωγὰς φυλάττειν . . . οἱ δὲ γε διθυραμβοποιοὶ καὶ τοὺς τρόπους μετέβαλλον, Δωρίους τε καὶ Φρυγίους καὶ Λυδίους ἐν τῷ αὐτῷ ᾠσμάτι ποιοῦντες, καὶ τὰς μελωδίας ἐξήλλαττον, τοτὲ μὲν ἐναρμονίους ποιοῦντες, τοτὲ δὲ χρωματικὰς, τοτὲ δὲ διατόνους . . . οἱ γε δὴ κατὰ Φιλόξενον καὶ Τιμόθεον καὶ Τελεστήν, ἐπεὶ παρὰ γε τοῖς ἀρχαίοις τεταγμένος ἦν καὶ ὁ διθύραμβος.

but the New Music was ‘exharmonic’, not belonging to any recognizable tuning.

8. *The Terpandrian Style*

Just as Phrynis threatened the inherited Archaic style and its honored place in education, so too we read in ps.-Plutarch that

τὸ δ' ὅλον ἢ μὲν κατὰ Τέρπανδρον κιθαρωδία καὶ μέχρι τῆς Φρύνιδος ἡλικίας παντελῶς ἀπλῇ τις οὔσα διετέλει· οὐ γὰρ ἐξῆν τὸ παλαιὸν οὕτως ποιεῖσθαι τὰς κιθαρωδίας ὥς νῦν οὐδὲ μεταφέρειν τὰς ἁρμονίας καὶ τοὺς ῥυθμούς· ἐν γὰρ τοῖς νόμοις ἐκάστω διετήρουν τὴν οἰκείαν τάσιν.⁷²⁾

‘In general, the style of citharody practiced by Terpander persisted even unto the time of Phrynis as one which was altogether simple. For in the old days it was not allowed to make citharodic compositions like today, nor to transfer the ἁρμονίαι and the rhythms (*sc.* beyond their proper boundaries). For in the νόμοι they guarded the proper tuning for each.’

The practice of adhering to one diatonic tuning per piece is attested in the Middle Assyrian song catalogue VAT 10101 (= KAR 158); the same was probably true of the Hurrian hymns, to judge from the best preserved example, a cult song to Nikkal in the *nīd qabli* tuning.⁷³⁾ But though the Archaic composers were reluctant to ‘transfer the ἁρμονίαι’, it does not follow that they were unaware of how the tunings were structurally interconnected—just as the compilers of VAT 10101 knew of seven distinct tunings, whose connectivity was celebrated in the Retuning Text (UET 7/74). Again the reference is to αἱ ἁρμονίαι, *the* tunings. (Note too that ps.-Plutarch or his source did not use the normal Aristoxenian term for modulation, μεταβάλλειν.) Thus we read later in the same treatise:

καὶ οἱ παλαιοὶ δὲ πάντες, οὐκ ἀπείρως ἔχοντες πασῶν τῶν ἁρμονιῶν, ἐνίαις ἐχρήσαντο. οὐ γὰρ ἢ ἄγνοια τῆς τοιαύτης στενοχωρίας καὶ ὀλιγοχορδίας αὐτοῖς αἰτία γεγένηται, οὐδὲ δι' ἄγνοιαν οἱ περὶ Ὀλυμπον καὶ Τέρπανδρον καὶ οἱ ἀκολουθήσαντες τῇ τούτων προαιρέσει περιεῖλον τὴν πολυχορδίαν τε καὶ ποικιλίαν. (Ps.-Plut. *de Mus.* 1137a-b)

72) Ps.-Plut. *de Mus.* 1133b-c; for τάσιν read perhaps τάξις, which can apply to rhythmic as well as tonal arrangement.

73) For the Mesopotamian material discussed here, with bibliography, see Kilmer (1997), 475, 477.

‘And all the ancient poets, though not without experience of all the ἁρμονίαι, only used some of them. For it was not ignorance that was responsible for such narrow melodic range and the moderate number of strings they used, nor was it through ignorance that the circles of Olympus and Terpander, and those who followed the preference of these men, rejected a large number of strings and complexity.’

Because it was long assumed that seven tunings were a necessary correlate of the traditional seven-stringed art,⁷⁴) one should take seriously a curious, seven-part division of the citharodic νόμος, attributed to Terpander himself:

μέρη δὲ τοῦ κιθαρωδικοῦ νόμου, Τερπάνδρου κατανείμαντος, ἑπτὰ· ἀρχά, μεταρχά, κατατροπά, μετακατατροπά, ὁμφαλός, σφραγίς, ἐπίλογος. (Poll. *Onom.* 4.66)

‘The parts of the citharodic νόμος, as apportioned by Terpander, were seven: beginning, after-beginning, down-turn, after-down-turn, center (lit. navel), seal, conclusion.’

A number of sources attribute specific compositions to Terpander, allegedly named from ethnics, rhythms, and styles.⁷⁵) Like other νόμοι of which there is notice, these titles probably derive, for the most part, from the musicologists of the Classical and Hellenistic periods, on the basis of internal features or scholarly deduction (Barker [1984-9], 1.250). But this passage of Pollux is somewhat different. It does not seem to be a case of individual citharodic νόμοι, for he has already mentioned some of the more familiar Terpandrian

74) Cf. the *v.l.* at Arist. *Metaph.* 1093a14 (ἑπτὰ δὲ χορδαὶ ἢ ἁρμονίαι rather than ἑπτὰ δὲ χορδαὶ ἢ ἁρμονία), with the comment of Alex. Aphr. *In Metaph.* 1093a13: ἑπτὰ δὲ φθόγγοι τῆς διὰ πασῶν καὶ ἁρμονίαι τοσαῦται (‘Seven are the pitches of the octave, and the ἁρμονίαι are the same in number’), which shows that, if the variant is not in fact the correct reading, the mistake was made already in antiquity, and was besides readily intelligible in its own right. Similarly, in one manuscript of Porph. *in Ham.* 5 (96.16), the title of Thrasyllus’ work is given as Περὶ ἑπταχόρδων, as against Περὶ ἑπταχόρδου at 91.14—which itself rests upon an emendation: see further Düring’s apparatus *ad* 91.13.

75) Heraclid. Pont. *ap.* ps.-Plut. *De mus.* 1132d: ἐκείνος γοῦν τοὺς κιθαρωδικοὺς πρότερος ὠνόμασε, Βοιωτίον τινα καὶ Αἰόλιον Τροχαῖον τε καὶ Τερπάνδρειον καλῶν, ἀλλὰ μὴν καὶ Τετρασιδίον; Schol. ΕΓ *ad* Ar. *Ach.* 13: τὸ δε Βοιωτίον μέλος οὕτω καλούμενον, ὅπερ εἶρε Τέρπανδρος, ὥσπερ καὶ τὸ Φρύγιον; *Suda* s.v. ὄρθιον νόμον καὶ τροχαῖον: τοὺς δύο νόμους ἀπὸ τῶν ρυθμῶν ὠνόμασε Τέρπανδρος, ἀνατεταμένοι δ’ ἦσαν καὶ εὐτονοί.

pieces.⁷⁶⁾ Nor does it seem to be a particular composition with many sections, for Pollux speaks of *the* citharodic νόμος, as though the sevenfold division somehow embraced the genre as a whole. These names are not attested elsewhere, but Photius also speaks of ‘the citharodic style of melody, having an ordered [*sc.* method of] tuning and definite rhythm; there were seven according to Terpander’ (ὁ κιθαρωδικὸς τρόπος τῆς μελωδίας, ἀρμονίαν ἔχων τακτὴν καὶ ῥυθμὸν ὀρισμένον· ἦσαν δὲ ἑπτὰ οἱ ὑπὸ Τερπάνδρου [Phot. *Lex.* s.v. νόμος]). Interestingly, Photius gives only three names (ὄρθιος, τετράδιος, ὀξύς)—all of which are attested in the other sources as titles of individual compositions. This motley collection might be accounted for by the same logic Barker used to explain the names of other νόμοι; an historically accurate sevenfold division could have been filled in with terms cobbled together from incomplete information by educated guess-work. Together these sources suggest that Terpander was associated with some canonical seven-fold organization of citharodic tuning, even if the precise terminology had been largely forgotten or overwritten. Overall, then, Terpander’s seven-part citharodic νόμος could distantly attest the full cycle that would naturally have accompanied the heptatonic instrument he is said to have invented.

9. Conclusion

Without going further into the development of the σύστημα τέλειον and the nature of its antecedents, we get an idea of the important role of diatony in the fifth century, and good evidence for it throughout the Archaic period from Terpander onwards. Diatonic tuning, an essential theoretical precursor to any more elaborate developments, appears in the earliest fragment of music theory, Philolaus fr. 6a, and was still presupposed in most of the relevant Aristotelian problems with their fundamental musical study and test questions. The process of interval rotation, mentioned in connection with Eratocles, would in fact be easiest to effect with the diatonic for, as we see in the Mesopotamian system, this method of tuning both

76) Poll. *Onom.* 4.65: νόμοι δ’ οἱ Τερπάνδρου ἀπὸ μὲν τῶν ἐθνῶν ὅθεν ἦν, Αἰόλιος καὶ Βοιωτικός, ἀπὸ δὲ ῥυθμῶν ὄρθιος καὶ τροχαῖος, ἀπὸ δὲ τρόπων ὀξύς καὶ τετραοῖδιος, ἀπὸ δ’ αὐτοῦ καὶ τοῦ ἐρωμένου Τερπάνδρειος καὶ Καπίων.

derives from and gives rise to cyclical properties which are latent in the phenomena of resonance. Moreover, if it is correct that this process predates Eratocles, the 'road map' conception (marked by Aristoxenus as an innovation) should represent an early stage of the cycle's conversion to the graphic two-dimensionality of the σύστημα τέλειον. By contrast, ἡ περιφορά was demonstrable solely with the lyre, with each species or σχῆμα transformable into another in some progressive fashion.

Thus there is good evidence to support the early existence of an integrated cyclical system of diatonic tunings, what Aristoxenus remembered as 'the heptachords which they used to call the ἁρμονίαι', and Aristophanes as 'the method of tuning (ἁρμονία) handed down by our forefathers'. This does not necessarily exclude other approaches to practical and theoretical lyre music in the early Classical and Archaic periods; it may have been only one tributary to a complex music-stream. Nevertheless, the diatonic component at least emerges as a self-sufficient and definite τέχνη, with the σύστημα τέλειον encrusted thereupon as being an essential substructure. Since the various microtonal tunings were themselves required to follow the diatonic principles of συνέχεια, the achievement of the Aristoxenian system was to allow an intrinsically diatonic connection of a wide array of tone structures. Thus he succeeded in protecting the Archaic heptachordal integrity of ἁρμονική.

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