

THE SPONDEION SCALE.

PSEUDO-PLUTARCH DE MUSICA, 1134F-1135B AND 1137B-D.

OUR information about the early stages of Greek music is so slight that these references of the Pseudo-Plutarch to a scale employed by the legendary figure Olympus take on an immense value for us. The dialogue itself is an unskilful patchwork, but the author's sources are often good. These particular passages are almost certainly both derived with small alteration from Aristoxenus, in whose time the traditional music ascribed to Olympus was still in use. For the elucidation of the scale's history and structure we have three¹ pieces of evidence to help us. There is the first passage mentioned above, which deals with the discovery of the enharmonic genus by Olympus, which is connected, at first sight obscurely, with the Spondeion scale; and the second passage, which discusses the scalar limitations of the σπονδειαίων τρόπος, with especial reference to an elementary polyphony. There are also the ancient scales quoted by Aristides Quintilianus (ed. Meibom, p. 21).

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(104) Ὀλυμπος δὲ, ὡς Ἀριστόξενός φησιν, ὑπολαμβάνεται ὑπὸ τῶν μουσικῶν τοῦ ἐναρμονίου γένους εὐρετῆς γεγενῆσθαι. (105) τὰ γὰρ πρὸ ἐκείνου πάντα διάτονα καὶ χρωματικά ἦν. (106) ὑπονοοῦσι δὲ τὴν εὐρεσιν τοιαύτην τινὰ γενέσθαι. (107) ἀναστρεφόμενον τὸν Ὀλυμπον ἐν τῷ διατόνῳ καὶ διαβιβάζοντα τὸ μέλος πολλάκις ἐπὶ τὴν διάτονον παρυνπάτην, τοτὲ μὲν ἀπὸ τῆς παραμέσης τοτὲ δὲ ἀπὸ τῆς μέσης, καὶ παραβαίνοντα τὴν διάτονον λιχανόν, (108) καταμαθεῖν τὸ κάλλος τοῦ ἤθους, καὶ οὕτω τὸ ἐκ τῆς ἀναλογίας συνεστηκὸς σύστημα θαυμάσαντα καὶ ἀποδεξάμενον, ἐν τούτῳ ποιεῖν ἐπὶ τοῦ Δωρίου τόνου. (109) οὔτε γὰρ τῶν τοῦ διατόνου ἰδίων οὔτε τῶν τοῦ χρώματος ἄπτεσθαι, ἀλλ' οὐδὲ τῶν τῆς ἀρμονίας. (110) εἶναι δ' αὐτῷ τὰ πρῶτα τῶν ἐναρμονίων τοιαῦτα· τιθέασι γὰρ τούτων πρῶτον τὸ σπονδεῖον, ἐν ᾧ οὐδεμία τῶν διαιρέσεων τὸ ἴδιον ἐμφαίνει, (111) εἰ μὴ τις εἰς τὸν συντονώτερον σπονδειασμόν βλέπων αὐτὸ τοῦτο διάτονον εἶναι ἀπεικάσῃ· δῆλον δ' ὅτι καὶ ψεῦδος καὶ ἐκμελὲς θήσῃ ὁ τοιοῦτο τιθεῖς· (112) ψεῦδος μὲν, ὅτι διέσει ἑλαττόν ἐστι τόνου τοῦ περὶ τὸν ἡγεμόνα κειμένου· (113) ἐκμελὲς δὲ, ὅτι, καὶ εἴ τις ἐν τῇ τοῦ τονιαίου δυνάμει τιθείῃ τὸ τοῦ συντονωτέρου σπονδειασμοῦ ἴδιον, συμβαίνει ἂν δύο ἐξῆς τίθεσθαι δίτονα, τὸ μὲν ἀσύνθετον, τὸ δὲ σύνθετον. (114) τὰ μὲν οὖν πρῶτα τῶν ἐναρμονίων τοιαῦτα· (115) τὸ γὰρ

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ἐν ταῖς μέσαις ἐναρμόνιον πυκνόν, ᾧ νῦν χρώνται, οὐ δοκεῖ τοῦ ποιητοῦ εἶναι· ῥάδιον δ' ἐστὶ συνιδεῖν, ἐάν τις ἀρχαϊκῶς τινος αὐλοῦντος ἀκούσῃ· ἀσύνθετον γὰρ βούλεται εἶναι καὶ τὸ ἐν ταῖς μέσαις ἡμίτονιον· (116) ὕστερον δὲ τὸ ἡμίτονιον διηρέθη ἐν τε τοῖς Λυδίοις καὶ ἐν τοῖς Φρυγίοις. (117) φαίνεται δ' Ὁλύμπιος αὐξήσας μουσικὴν τῷ ἀγέννητόν τι καὶ ἀγνοούμενον ὑπὸ τῶν ἔμπροσθεν εἰσαγαγεῖν, καὶ ἀρχηγὸς γενέσθαι τῆς Ἑλληνικῆς καὶ καλῆς μουσικῆς.

The text of this passage is fairly sound, and, although we may have doubts about the exact order of the sentences, the meaning is fairly clear.

On the grounds of the last sentence Aristoxenus or Plutarch has been accused of muddle-headedness. This is quite unfair. It is true that Olympus according to this account did not introduce the quarter-tones of the enharmonic genus, but it is equally true that these quarter-tones were not the only characteristic of the enharmonic; the omission (hypothetical) of the G and the resulting *δίτονος λιχανός* were an essential preliminary to the splitting of the semitone, which may originally have been in the nature of an ornament. We need not, of course, believe any actual musician to have omitted a note in the diatonic series. Olympus, as we have seen, was a legendary figure; the enharmonic was no accidental discovery. The tradition amounts to this—that Greeks at some point before accurate musical history begins came in contact with a type of music which used the *δίτονος ἀσύνθετος*, and adopted it and the quarter-tones, which were an elaboration of it. Plutarch calls it 'Hellenic and beautiful.' On any theory it is curious that music, regarded as the invention of Olympus and subsequent to the diatonic, should be called 'Hellenic.' It is accounted for by the later popularity of this style, and particularly by Aristoxenus' glorification of it. The gapped scale, then, which the enharmonic implies, was a real contrast to a completer series of diatonic notes which we can assume to have been pre-existent in Greece, and 'Olympus' really did enrich Greek music with a new element. The legend of the manner of his discovery is a picturesque fiction emphasizing that contrast; we need not pursue its details so far as to ask in what exact scale, mode, or key Olympus was playing when he made his great 'discovery.' We are told, however, that he constructed a Dorian scale *ἐκ τῆς ἀναλογίας*. This can only mean that the later Greeks were aware of an old scale of this sort: EF ABC (E).

'Such,' continues our author, 'was the character of the first enharmonic compositions of Olympus, for they count as the first of them the Spondeion, in which none of the (tetrachordal) divisions manifests its peculiarities.' The *σπονδεῖον*, then, bore some relation, possibly of identity, to the earliest enharmonic music.¹ Further, it contained no notes characteristic of any of the genera—that is, it had neither the diatonic *lichanos* and *δίτονος σύνθετος*, nor, at least as yet, the *πυκνόν*. Weil and Reinach (§ 110, n.) quote a number of passages to prove that it was a Dorian scale. This seems very probable, in which case it must have been very similar to the scale written out a few lines

¹ Probably it was the name given to the Dorian varieties of the early enharmonic, other-wise known as *τὰ Δώρια*. We know that Phrygian and Lydian varieties also existed. See p. 90 n.

above. Further information, however, is given about it in the Plutarch text. There was, he says, in it an element that might be described as diatonic—namely, ‘the higher spondeiasmus’; this, however, was an erroneous way of looking at it, and implied an unmelodious succession of intervals—a ditone (σύνθετον) followed by a ditone (ἄσύνθετον). This is of course impossible according to the principles of Aristoxenus; and it is carefully explained that the σπονδειασμός interval is not a tone, but three-quarters of a tone, smaller, that is, than the disjunctive tone which precedes it. We get, then, a scale of this sort:¹ EF AB C*. The look of it not being liked by editors, it is suggested that Aristoxenus, who can almost certainly be accounted the actual author of the sentences in question (the argument proceeds according to the canons laid down in his *Harmonics*, Bk. III.), has made a mistake, interpreting an old σπονδειασμός of three semitones (the Pythagorean δίεςις, see Philolaus, *ap. Nic.* 9; Adrastus, *ap. Theo.*, p. 55, Hiller) as though it were of three modern δίεςις, or quarter-tones.² When it was seen that this alteration gave a scale EF AB D(E) not only closely resembling the τρόπος σπονδειαζών of the later passage in the dialogue, as usually interpreted, but also the supposed defective heptachords of Terpander and Philolaus, belief in this hypothesis was much strengthened. We shall see that there is no more reason to believe in the one than in the other. Apart from that, however, we should not accuse Aristoxenus of so grave a mistake without good reason. This theory leads us to assume either that the interval known as σπονδειασμός changed from a tone and a half to three-quarters of a tone concurrently with the change of usage of the word δίεςις, which is absurd; or that there never was an interval σπονδειασμός in the σπονδεῖον scale, but merely one of three semitones, which Aristoxenus mistook by a verbal mistake for the later σπονδειασμός that he knew, which is also absurd; or else that the only σπονδειασμός there ever was was of three Pythagorean δίεςις, and that Aristides (p. 28, Meibom) merely perpetuated the mistake of Aristoxenus and described a never existing interval, which is just possible, but unlikely. Aristoxenus in the Plutarch passage is describing, surely, a scale he knew, not one he had laboriously reconstructed from a purely verbal tradition. We must then believe in the scale as given by Plutarch in default of some valid reason for rejecting it.

We come next to the τρόπος σπονδειαζών. Various notes of this scale are mentioned (Plut., § 172, etc.) in an attempt to prove that the ancients had limited their art by omitting from their scales notes they might have employed. It is a curious way of putting it, but not so erroneous as is sometimes suggested if we believe that the complete diatonic series was known comparatively early, and used concurrently with less complete scales of possibly non-Hellenic origin. Three notes in particular, according to this passage, were not employed in the τρόπος σπονδειαζών—namely, τρίτη, νήτη, and ‘τρίτη συνημμένων.’ (The

¹ The symbol * after a note here indicates that it is raised by a quarter of a tone.

² Greif also (*Rev. des Et. G.*, 1910) makes the same assumptions to produce the scale

(D) EF AB $\flat$ C $\sharp$ D. But he assumes, further, that Aristoxenus was completely misinformed about the scale, and imported the disjunctive tone into his account.

erroneous text of Weil and Reinach will provide a convenient starting-point for our argument.) However, though they were not employed in the melody, they were employed in the accompaniment in the following manner: *τρίτη* consonantly with *παρυπάτη*; *νήτη* dissonantly with *παρνήτη* and consonantly with *μέση* and *παραμέση*; *τρίτη συνημμένων* dissonantly with *παρνήτη* and *λιχανός* (again adopting for the moment the readings of Weil and Reinach). According to their interpretation we now have a scale with the following scheme :

$$\begin{array}{rcccccccc} \mu\acute{\epsilon}\lambda\omicron\varsigma & - & & - & E & F & G & A & B & D & \} \\ \kappa\rho\omicron\upsilon\varsigma\iota\varsigma & - & & - & & & & B\flat & C & E & \} \end{array}$$

This is naturally brought into relation with the supposed defective scale of Philolaus, with its *τριημιτόνιον ἀσύνθετον*, and with the *σπονδεῖον* of the earlier Plutarch passage, emended to correct the supposed mistake of Aristoxenus and endowed with a diatonic lichanos. (For the moment we can disregard the notes of the accompaniment; the rest of the scale existed before they were employed, which cannot have been earlier than the time of Archilochus.) We have seen that there is no good reason to believe in this ‘howler’ of Aristoxenus. There is no more reason for supposing that the *σπονδεῖον* ever had a diatonic lichanos. In the earlier passage we are told that the *σπονδεῖον* of Olympus was an enharmonic of the early type which had no quarter-tones—such were the first enharmonics; later the semitone was divided. This is the implication. It is, then, natural to suppose that the *σπονδεῖον* remained enharmonic, and that Aristoxenus (if Aristoxenus it is) in referring to its notes refers to the notes of the enharmonic genus, not the diatonic. This is the natural assumption in the absence of specific instructions to the contrary. The notes of the melody then become EE*F ABC; those of the accompaniment, B* and E (*τρίτη συνημμένων* shall be left for separate and later consideration).

This interpretation, besides being logical, has certain striking advantages and confirmations. In the first place, the scale it gives corresponds very closely with the scale of Olympus’ enharmonic, as deduced from the Plutarch account, differing from it only in the split semitone of the lower tetrachord. It also corresponds with the early *σπονδεῖον* discussed in the same passage, except that there is no suggestion that the B-C interval was widened to a three-quarter tone. But above all it simplifies the account here given of the polyphony of the *σπονδειάζων τρόπος*. Let us take the three accompanying notes one by one.

First, we are told (172) that the ancients abstained from the note *τρίτη*, the omission of which contributed to the characteristic effect of the style. In the accompaniment, however, it was used consonantly with *παρυπάτη*. Of course, the *τρίτη* in any genus would always form the consonance of the fifth with the *παρυπάτη*. There is no need here to mark a lacuna with Weil and Reinach, as there is no reason why Plutarch should necessarily have given more than one example; further, on our interpretation there is no other note

with which the *μεσόπυκνον*, *τρίτη*, would form a likely interval, consonant or dissonant. Apart from the question of polyphony, the absence of the splitting of the semitone becomes most interesting when we turn to § 115. There we are told that the splitting of the semitone in the tetrachord *μέσων* was not the work of Olympus, implying that this was the first step; further, that the old-fashioned style of flute-playing in the day of Aristoxenus (presumably) tended to leave even the semitone in the tetrachord *μέσων* undivided—a *fortiori*, that in the tetrachord *διεzeugμένων*. Here in section 172 we have implied a Spondeion scale,¹ in which only the lower tetrachord has its semitone divided!

Sections 175-177 deal with *νήτη*. All accounts agree that this note did not form part of the early melodic compass, and most of them ascribe its addition to Terpander. It is not surprising, therefore, to find that it was not used in the Spondeion melodies, when even the diatonic scale had not attained to it. When the 'Dorian *νήτη*'² was added, it was not inserted ruthlessly in this well-established style of music, but used when polyphony came into practice in two ways—dissonantly with *παρνήτη*, consonantly with *μέση*. If we interpret *παρνήτη* as the enharmonic *παρνήτη* (= C) we abolish that discordant D-E interval, which has always made the orthodox theory of polyphony, if not slightly ridiculous, at least incomprehensible, and substitute for it an interval, the major third, just such as we should have expected the Greeks to employ if once they had wandered beyond those they recognized as consonant. The concordant use with *μέση* (E-A) needs no comment. It is unnecessary to add with Weil and Reinach *καὶ πρὸς παραμέσῃν* from 179, as we shall see when we examine the following sections.

Before proceeding to the last of the accompanying notes, however, we must digress to discuss shortly the defective scales ascribed to Terpander and Philolaus, which can be closely related to the Spondeion. We will deal with Philolaus first. Nicomachus, in the ninth chapter of his *Encheiridion* (*Musici Scriptores Graeci*, Teubner), quotes from him to illustrate the old Pythagorean terminology. He is describing the well-known harmonic framework (*ἁρμονία*), which can be represented by the notes E-A-B-E. Only he calls the note B, not *παραμέση*, but *τρίτη*. How is this? Nicomachus is at pains to explain, but gets himself into a terrible muddle in doing so. He has to imagine an original heptachord EFGAB DE, different from that he assumes in Chapter XI., and that the disjunctive tone (*τοῦ διεzeugνύτος τόνου*) was inserted between *παρνήτη* (D) and *τρίτη* (B)! *Τρίτη* thereupon suffered a change of name to *παραμέση*. Except for the last statement this is pure invention to account for the terminology of Philolaus, and took this form because Nicomachus imagined Philolaus was dealing with a normal diatonic scale. We in our turn now have to account for the Pythagorean's use of *τρίτη*. It is true it can only apply to a scale in which a single note separated it from *νήτη*. Is the series more likely

¹ Strictly the term 'Spondeion' should be reserved for the scale without quarter-tones.

This is its development, the *σπονδείων τρόπος*.

² Section 270.

to have been B-D-E or B-C-E? In view of what we have seen of the old style (the *ἀρχαῖκοι τρόποι* of Aristoxenus, p. 23), we can have no doubt that Philolaus was using the nomenclature of a scale in which *νήτη* (E) had been added to the old Spondeion without the division of the semitone B-C. B-C-E is not the tetrachord of later music, but the trichord of the archaic style (cf. Plutarch, § 171).

We may now turn to the Aristotelian problems for an account of the work of Terpander. Four problems of the nineteenth book deal with the heptachord, the octachord, and the position of *μέση* in them. Problem 47 takes what we may describe as the orthodox view—that the heptachord was merely the octachord without the disjunctive tone, and that its *μέση* was the lowest note of its upper tetrachord. Problem 44 implies the same point of view. Problems 7 and 32, however, in answering their respective questions, refer to an omission of the note *τρίτη*, and the second of them associates this definitely with Terpander. Gevaert¹ was probably right in regarding these references as interpolations; he was entirely wrong, however, in ascribing them to followers of Nicomachus and interpreting them diatonically. They must have been written by someone who knew the old Spondeion scale, and that in it the note *τρίτη*, the *μεσόπυκνον*, was not regularly employed, who knew also the tradition that Terpander had added the *νήτη*. He therefore conceived that the innovator, finding a scale EE* F ABB*C (a kind of heptachord), had suppressed the *τρίτη* (B*) in order to add the *νήτη* (E). As an historical procedure this is of course improbable. It was not the addition of *νήτη* that caused the omission of *τρίτη*; but the Plutarch passage is borne out in an interesting manner, and we can even believe that *νήτη* came to be used with the old Spondeion before the splitting of the upper semitone. Gevaert objected that the scale in question must be diatonic, not enharmonic, because otherwise the hypothetical omission of *νήτη* would leave a scale bounded not by a seventh, but by a sixth. But it is just such a scale that the interpolator contemplates, similar in compass to the old Spondeion and to the Syntonolydian of Aristides Quintilianus. Nor need we be distressed by the variation in the use of *τρίτη* between Philolaus and the Problems. Before the semitone was divided and the pycnon came into being, the nomenclature preserved by Philolaus may well have been used; the introduction of the *μεσόπυκνον* obviously renders a change necessary. Nicomachus was thus right on at least one point. We can now return to a consideration of the polyphony of the *σπονδειάζων τρόπος*.

A third suppressed note is there dealt with. The MSS. are unanimous in reading *συνημμένων νήτη* (or some minor variant). Weil and Reinach, thanks to their interpretation of the nomenclature as diatonic, felt themselves compelled to emend *νήτη* to *τρίτη*, thus landing themselves in hopeless difficulties. On their theory, of course, *νήτη* *συνημμένων* is the same note as the *παρανήτη*, already mentioned as a melodic note; also, it is not dissonant with the *lichanos* (D-G), as by § 179 it should be. But what is the *τρίτη* *συνημμένων*

¹ *Problèmes Musicaux d'Aristote*, Gevaert et Vollgraf.

doing in this scale at all? The Aeolian used it and perhaps the Mixolydian, but not the Dorian, to which this scale is related. Secondly, it is made to act as accompaniment to a note (*παρὰνήτη*) higher than itself in contravention of what must have been a universal law (Ar. Prob. 19, 12). Thirdly, it is argued in the text that the early knowledge of this note was proved by the Phrygian melodies (*τὰ Φρύγια*). Now what possible part can the note *τρίτη συνημμένων* have had in a Phrygian scale? Weil and Reinach's suggestion of a modulation into the Aeolian is very weak. Yet it is this very mention of the Phrygian that gives us the clue and bids us restore the MS. reading. If we turn to the Phrygian of Aristides we see immediately that it gives us the Dorian, with the substitution of D for E; purged of quarter-tones, it is DEF ABCD. It is this upper D (called here *νήτη συνημμένων* because the term *παρὰνήτη* is already occupied by the enharmonic note of that description) which was used at a later stage in the accompaniment of the old *σπονδείων*. It was so used, to follow the MSS., against *παρὰνήτη* and *παραμέση* and *λιχανός* dissonantly. Weil and Reinach wish to transfer *καὶ πρὸς παραμέσην* to § 176, as on their theory it makes a hideous discord. On ours, however, it is needless; *νήτη συνημμένων* makes the interval of a minor third (D-B) with *παραμέση*, and this is as probable and reasonable as the major third between *νήτη* and *παρὰνήτη* (§ 176). *Λιχανός* also provides the interval of a major sixth (D-F); again perfectly reasonable, and the type of interval which might have been expected. *Παραμέση* is not so obliging; D-C is a tone, which is just the interval which has been so fortunately eliminated from the discussion of the *νήτη διεzeugμένων*. It is perhaps a little arbitrary to reject the *πρὸς παρὰνήτην* altogether, and as we have fortunately been able to confirm the manuscript reading in the rest of the passage it is a pity to abandon it here. It is however conceivable that the *παραμέσην* originally stood alone, then became accidentally duplicated, and one of the two was altered to *παρὰνήτην* by an ignorant copyist. This emendation has no ingenuity to commend it. If it is not accepted it will leave us precisely where we were before as far as the polyphony is concerned. It will only be accepted if it is considered worth while to eliminate the discord of the second. Probably no one would hesitate to do so if he were not already accustomed to the idea of its employment.

Still unexplained is the three-quarter tone interval in the old Spondeion scale. No hint is given in the second Plutarch passage that abnormal intervals were employed; but the first passage is explicit enough, and implies that the interval between *παραμέση* and *παρὰνήτη* (enharmonic) was a three-quarter tone. If the lower tetrachord had a normal semitonal *πυκνόν* (E-F), this would mean dissonance between F and C. Stranger phenomena are known in the history of scales, but this does not seem very like Greek music. Surely we have here the explanation of the debated expression *ὁ συντονώτερος σπονδειασμός*. The three-quarter tone interval occurred in both parts of the scale. Of course it was only the upper interval which, from its vicinity to the

disjunctive tone, could create an illusion of the diatonic.¹ The misconception arose as follows. If F-E is three-quarters of a tone ($\frac{3}{4}$), then the interval A-F is $\frac{11}{8}$, which is almost identical with the interval $\frac{27}{16}$, made up by the disjunctive tone and the upper σπονδειασμός, differing in fact only by $\frac{1}{192}$. The uninstructed, assuming A-F to be a ditone, assumed further that C*-A was the same.

Light is thrown upon the subject from two other sources. In the first place there is to be compared the hemiolic chromatic of Aristoxenus, the small intervals of which together make a three-quarter tone. This shows that he recognised a πυκνόν slightly larger than the enharmonic semitone, but smaller than the (minor) tone of the normal chromatic. The fact that he calls it chromatic, whereas the Spondeion was regarded as enharmonic, need not trouble us. Aristoxenus was always anxious to preserve the purity of the lowest type of enharmonic thanks to his connexion with virtuoso flute-playing. In any case, such a distinction as this was arbitrary and academic. Still more interesting is the ὁμαλον diatonic of Ptolemy (*Harm.* I. 16), of which the lowest interval is $\frac{12}{11}$ —i.e. roughly a three-quarter tone—the complete tetrachord being $\frac{12}{11} \times \frac{11}{10} \times \frac{9}{8}$. It does not occur in the lyre scales he describes in *Harm.* II. 16. In fact, the account suggests that Ptolemy had invented it himself. It may, however, be a more or less conscious reflection of the Spondeion, which may not have become completely obsolete by then. If so, the original intervals of Olympus' scale were $E_{\frac{12}{11}}$ $F_{\frac{11}{9}}$ $A_{\frac{9}{8}}$ $B_{\frac{12}{11}}$ C. We are told that Olympus in his discovery of the scale made frequent use of the tritone B-F, which probably means that this interval was much in use in this style. It is certainly more likely to have been the undecimal tritone $\frac{11}{8}$ than the harsher $\frac{45}{32}$ or the strict tritone $\frac{729}{512}$. It is not so easy to deal with the amplification of the scale through polyphony. The splitting of the three-quarter tones produced an interval of a fifth between the two μεσόποκνα; this is clear enough on any showing. Νήτη (E) was added, making an interval of a fifth with μέση and of $\frac{11}{9}$ with παρανήτη, less harmonious unfortunately than the major third earlier suggested in this connexion. Νήτη συνημμένων also was added, making dissonant intervals with λιχανός and παραμέση. It is therefore extremely difficult to decide how the interval C-E ($\frac{11}{9}$) was divided by the note D. If we take Ptolemy's tetrachord ($\frac{12}{11} \times \frac{11}{10} \times \frac{9}{8}$), we have a reasonable interval between D-B, i.e. $\frac{6}{5}$, a minor third, but an interval of $\frac{33}{20}$ between D-F. If, on the other hand, we make our tetrachord $\frac{12}{11} \times \frac{10}{9} \times \frac{11}{10}$, with the larger tone in the middle, according to the canon which Ptolemy laid

¹ The lower D, the ὑπερυπάτη, was not in use in this scale, as the continuation of the second Plutarch passage informs us in the following words: οὐ δὲ ἄγνοιαν ἀπείχοντο ἐν τοῖς Δωρίοις τοῦ τετραχόρδου τούτου (τῶν ὑπάτων). Now the Dorian scale of Aristides possesses the note D. But there is no need to suppose that τὰ Δώρια necessarily refers to all Dorian melodies. This expression, together with τὰ Φρύγια and τὰ Λύδια,

only occurs in this passage and in the earlier passage about the Spondeion. They must only refer to a special type of early melody, and in sections 183-185 Plutarch is still discussing the τρόπος σπονδείων and cognate scales. Indeed this must be so, as ἀπείχοντο can have no subject but οἱ παλαιοί, which is made more explicit in § 181 (Ὁλύμπου τε καὶ τῶν ἀκολουθησάντων ἐκείνῳ).

down (and broke), the interval D-F becomes $\frac{5}{3}$, but that between D-B is now $\frac{40}{33}$. This problem, however, is not peculiar to the tuning we are investigating. It is a natural law governing scales that a diatonic octave cannot have all its fifths and fourths perfect. Our own diatonic C-C has a false fifth between D-A. The normal Greek tuning has the same false interval, only in the E octave it becomes a false fourth between A-D. If then the Greeks preserved their normal structure of two tetrachords joined by a major tone, it was impossible for all the harmonies deduced from the Plutarch passage to be in tune. We need not here inquire whether they tolerated one harsh interval in their polyphony or in what way they solved this tuning problem.¹ We have only to admit that the harmonies to which the three-quarter tone *σπονδειασμός* leads us are rather more difficult than those given by the normal diatonic tuning. If we believe them to have been too difficult, we must suppose that the $\frac{12}{11}$ interval disappeared in the accompanied version of the scale, which preserved its original character only in the limitation of its melodic notes. All of which does not affect the main purpose of this paper—to demonstrate the enharmonic character of the *σπονδειάζων τρόπος*, and so to vindicate the manuscript readings of the Plutarch passage which describes it.

R. P. WINNINGTON-INGRAM.

¹ The problem is in point of fact soluble only if we suppose that the disjunctive tone (B-A) was a minor tone ($\frac{16}{9}$), and that the consonance of a fifth between *τρίτη* and *παρυπάτη* was obtained

by dividing the two *πυκνά* slightly differently. As this was flute music, and the whole *πυκνόν* was produced from a single hole of the pipe, this may not have presented much difficulty.