its thickneſs; and that, between the finiſhing of one coat and the beginning of the next, there was ſome interval of time, and ſome ſuſpenſion of that attractive power whereby, or of that component matter whereof, the ſeveral coats are reſpectively formed.

Strand, May 8, 1760. H. Baker.

LXVIII. *An Explanation of the Modes or Tones in the antient* Græcian *Muſic*; *by Sir* Francis Haſkins Eyles Stiles, *Bart. F. R. S.*

Read December 1759, and January, &c. 1760.

NOtwithſtanding the valuable editions of the antient muſical and harmonic writers, given by Meibomius and Wallis, and the great pains thoſe two learned editors have beſtowed on the correcting the tables, and throwing light on the difficult paſſages of thoſe works, there are ſome of the doctrines delivered in them, that ſeem ſtill to require a more perfect explanation. Thoſe, that reſpect the tones or modes, in particular, ſeem to have been ill underſtood: and as it was on theſe, that the effects of the antient muſic were ſuppoſed principally to depend, I have thought, that the ſubject might well merit a re-examination.

Concerning theſe modes, we find two diſtinct, and ſeemingly contradictory doctrines delivered by the antients; and this it is, which has perplexed the ſubject;

ject; for ſome, not aware of the diſtinction, have charged the antients with contradictions; and others, who perceived the two doctrines, not being able to reconcile them, have either adopted one, and rejected the other, or given up the ſubject as hopeleſs: but, as they were both admitted by the antients, they muſt both have been true, in ſome ſenſe. What, therefore, I have principally in view in theſe ſheets, is to ſhew, that the difference between the doctrines aroſe only from the different way of conſidering one and the ſame object; and that therefore there was ſuch an agreement betwixt them, as that, under certain reſtrictions, they may be embraced under one common interpretation.

For diſtinction ſake, I ſhall call one of theſe doctrines the harmonic, and the other the muſical doctrine; the reaſon of which will ſufficiently appear, when I come to treat of the diſtinction between the ſcience of harmonic and that of melopœïa or muſical compoſition.

According to the harmonic doctrine, the number of the modes had been augmented to fifteen; but as Ptolemey, who appears to have favoured the muſical, reduces them to ſeven, and as it is on the principles of that writer, that I propoſe to ſhew an agreement between the doctrines, it will be neceſſary for me, in treating of the harmonic modes, to diſtinguiſh the ſeven he admits from the eight he has excluded.

This being premiſed, I ſhall be underſtood in making the diſtribution of what I have to offer upon this ſubject, which I propoſe to treat under the following ſix heads.

Firſt,

Firſt, To explain the harmonic doctrine, as far as concerns the ſeven modes admitted by Ptolemey.

Secondly, To explain the muſical doctrine of the ſame modes, and ſhew its agreement with the harmonic.

Thirdly, To explain the eight harmonic modes rejected by Ptolemey, and give at large his reaſons for excluding them.

Fourthly, To point out ſomething of the origin of the two doctrines.

Fifthly, To ſhew how far the preceding explanations may be ſupported by arguments, or warranted by the teſtimony of antient writers.

Laſtly, To conſider how this ſubject has been underſtood by Meibomius, Wallis, and ſome few others that have wrote ſince, and in what reſpect their explanations differ from my own.

I now proceed to the firſt head; *viz.*

Firſt, To explain the harmonic doctrine, as far as concerns the ſeven modes admitted by Ptolemey.

The harmonic doctrine of the tones we find expreſly delivered in the harmonic treatiſes; which, probably, is the reaſon, why, among the moderns, the later writers at leaſt have, for the moſt part, determined themſelves in its favour: how juſtly it is intitled to the preference, I ſhall have ſufficient occaſion to examine. The treatiſes on harmonic, that are come down to us, are moſtly Ariſtoxenian, which ſchool ſeems to have treated the ſcience, if not better, at

leaſt

leaſt more methodically than any other, of which we can now form a judgment; and hence we find their diviſions often adopted by antient writers, who might not, perhaps, be ready to admit all their principles. In conſidering the phyſical properties of ſound, and the ratios of intervals, the Ariſtoxenians appear to have been leſs exact than the Pythagoreans, the doctrines of the former being more adapted to the groſs and familiar notions of the practical muſician, than to the accurate ſpeculations of the philoſopher. But, however exceptionable their treatiſes may have been in this reſpect, they are the more valuable to us, on this very account, as they give more light into the antient practice of muſic; which is what is chiefly deſired, the philoſophic principles of the ſcience being better underſtood. By this ſchool harmonic was divided into theſe ſeven parts; 1. of ſounds, 2. of intervals, 3. of genera, 4. of ſyſtems, 5. of tones, 6. of mutations, 7. of melopœïa. The propriety of their adding this laſt diviſion I ſhall have occaſion to conſider. Of theſe diviſions, it was the fifth, which contained the doctrine in queſtion; but, to complete it, the ſixth muſt alſo be taken in; for, amongſt other mutations, that of the tones was there treated of, and was indeed the moſt conſiderable object of that diviſion. This doctrine taught, that the difference between one tone and another lay in the tenſion or pitch of the ſyſtem. The ſyſtem (by which I mean the greater perfect one, excluſive of the leſs, of which I ſhall have little occaſion to ſpeak) conſiſted of fifteen ſounds, extending to a diſdiapaſon, or double octave. How theſe ſounds were denominated, and at what intervals they ſucceeded each other, in the

the diatonic genus, to which I ſhall confine this explanation, is ſo well known, that I need ſay no more concerning the ſtructure of the ſyſtem, than that it anſwered to that of our natural ſcale, beginning with Are, and ending with Alamire. This ſyſtem was held immutable, as to the relation of its parts one to another; that is, the order of ſounds and intervals, by which it proceeded, was in the ſame genus to be always the ſame; but the tenſion or pitch of the whole was variable, a different one being aſſigned for each mode. The explanation, therefore, uſually given of the ſyſtem, by comparing it, as I have done, to a double octave, from A in our natural ſcale, is not to be underſtood as fixing its pitch, but as ſhewing its ſucceſſion only; which might as well be done by a double octave from B, taking C# and F# into the ſcale, or from any other note, taking in the flats and ſharps neceſſary to make the tones and ſemitones follow in the ſame order.

The relation of the parts to each other in the ſyſtem being immutable, the fixing the pitch of any one ſound in it, for any mode, was ſufficient to determine that of all the reſt. For this purpoſe, the ſound meſe was commonly uſed; which, by its ſituation, was well adapted to it, being the middle ſound of the ſyſtem. If, therefore, we ſettle the poſition of the meſe for each mode, we ſhall do all, that is requiſite for the clearing up and eſtabliſhing the harmonic doctrine, which conſidered the modes as differing only in the pitch of the ſyſtem.

The modes admitted by the Ariſtoxenians were thirteen in number; to which two more were added by later harmonicians; and to the meſe of each of

theſe fifteen a diſtinct pitch was aſſigned; but, as Ptolemey has rejected eight of them, I ſhall, as I have propoſed firſt, ſeparately conſider the poſitions of the meſe for the ſeven modes he admits.

Concerning the relative pitch of the reſpective meſes for theſe ſeven modes, I find no diſagreement amongſt the harmonic writers. There are not wanting, indeed, who charge the antients with giving, in reſpect thereto, contradictory accounts. Amongſt others, the learned Dr. Gregory aſſerts, that Ariſtides Quintilianus inverts the order of the modes (1): but what led the doctor into this miſtake, was his not diſtinguiſhing the double doctrine. Ariſtides, in the paſſage cited, is not ſpeaking of the pitch of the ſyſtem for the ſeven modes in queſtion, but of the ſeven ſpecies of diapaſon, as they lay in the ſyſtem; which was, indeed, in the inverted order of the meſes of the ſeven modes, as will appear, when we come to conſider the other doctrine. This, then, is no contradiction in the Greek writer, nor, if it were, would it be chargeable ſingly on him; ſince, if the doctor had but caſt his eye on his own Euclid (2), he would have met with the very ſame doctrine he found in Ariſtides. But his remark is, indeed, entirely without foundation; and I make no ſcruple to aſſert, that the antients agree in their accounts of the relative pitch of the meſes, for theſe ſeven modes;

(1) Atque Ariſtides Quintilianus (pag. 18. editionis Meibomianæ) tonum Hypodorium acutiorem facit quam Dorium, et Hypophrygium quam Phrygium, et Hypolydium quam Lydium. Vide Præfat. ad Opera Euclid.

(2) Pag. 540. verſ. 6. et ſeq. ſeu pag. 15. verſ. 15. edit. Meibom.

for

for though many of the harmonic writers treat of the thirteen or fifteen modes all together, without diſtinguiſhing the ſeven in queſtion, yet they have given them in ſuch order, and at ſuch diſtances, that the ſeven ſtand at the ſame intervals from each other, as are aſſigned for them by thoſe, who have treated of them ſeparately; ſo that all the accounts agree in this particular. The direction we may conveniently take from Bacchius (3), where it is clearly and conciſely delivered; and where it appears, that the Mixolydian was the moſt acute; the Lydian, graver by a ſemitone; the Phrygian, graver than the Lydian by a tone; the Dorian, graver than the Phrygian by a tone; the Hypolydian, graver than the Dorian by a ſemitone; the Hypophrygian, graver than the Hypolydian by a tone; and the Hypodorian, graver than the Hypophrygian by a tone. Now, as the Guidonian ſcale, in uſe amongſt the moderns, when ſtripped of Guido's additions, anſwers to the ſyſtem of the antients, in its natural ſituation, which was in the Dorian mode, and our Alamire conſequently anſwers to the pitch of the Dorian meſe, we have a plain direction for finding the abſolute pitch of the meſes, for all the ſeven in our modern notes, and they will be found to ſtand thus:

Mixolydian meſe in *d*	Hypolydian in - - *g*#
Lydian in - - - *c*#	Hypophrygian in - *f*#
Phrygian in - - *b*	Hypodorian in - - *e*
Dorian in - - - *a*	

But to underſtand this doctrine, as it is delivered by the antients, it will be neceſſary alſo to examine, how

(3) Pag. 12. edit. Meibom.

the meſes of the ſeven modes were ſtationed upon the lyre; and, in order to this, we muſt conſider the ſtructure of that inſtrument. The lyre, after its laſt enlargement, conſiſted of fifteen ſtrings, which took in the compaſs of a diſdiapaſon, or double octave. Theſe ſtrings were called by the ſame names as the fifteen ſounds of the ſyſtem, and when tuned for the Dorian mode, correſponded exactly with them. Indeed there can be no doubt, but that the theory of the ſyſtem had been originally drawn from the practice of the lyre in this mode, which was the favourite one of the Greeks, as the lyre was alſo their favourite inſtrument. In this mode, then, the meſe of the ſyſtem was placed in the meſe of the lyre; but in every one of the reſt, it was applied to a different ſtring, and every ſound of the ſyſtem tranſpoſed accordingly. Hence aroſe the diſtinction between a ſound in power and a ſound in poſition; for when the ſyſtem was tranſpoſed from the Dorian to any other mode, (ſuppoſe, for inſtance, to the Phrygian) the meſe of the lyre, though ſtill meſe in poſition, acquired, in this caſe, the power of the lichanos meſon; and the parameſe of the lyre, though ſtill parameſe in poſition, acquired the power of the meſe. In theſe tranſpoſitions, one or more of the ſtrings always required new tunings, to preſerve the relations of the ſyſtem; but, notwithſtanding this alteration of their pitch, they retained their old names, when ſpoken of, in reſpect to their poſitions only; for the name implied not any particular pitch of the ſtring, but only its place upon the lyre, in the numerical order, reckoning the proſlambanomenos for the firſt.

I thought

I thought this remark the more neceſſary, as I ſuſpect it was the not attending to this circumſtance, that led Dr. Wallis to aſſign *c* and *g* natural, for the places of the meſe in the Lydian and Hypolydian modes, inſtead of *c*# and *g*#, where I have placed them (4). But, to return,

We are now to give the places of the meſe for theſe ſeven modes upon the lyre, which are thus ſettled by Ptolemey (5).

			String
Mixolydian	Meſe in	Paranetediezeugmenon	11
Lydian		Tritediezeugmenon -	10
Phrygian		Parameſe - - - - -	9
Dorian		Meſe - - - - - -	8
Hypolydian		Lichanos meſon - -	7
Hypophrygian		Parhypate meſon - -	6
Hypodorian		Hypate meſon - - -	5

The poſitions aſſigned for the meſes of theſe ſeven modes, by the harmonic doctrine, being thus ſettled, both in our modern ſcale, and upon the lyre, I come now,

Secondly, To explain the muſical doctrine of the ſame modes, and ſhew its agreement with the harmonic.

The muſical doctrine taught, that the difference between one mode and another conſiſted in the manner of dividing an octave, or, as the antients expreſs it, in the different ſpecies of diapaſon. The elementary principles of theſe ſpecies we find delivered

(4) See his edition of Ptolemey, p. 137.
(5) Ibidem.

in

in the harmonic writers; but as in the Ariſtoxenian treatiſes, they are not found under the fifth diviſion, of tones; nor under the ſixth, of mutations, where it was natural to expect them; but under the fourth, of ſyſtems; and it not being there expreſly affirmed, that the ſpecies had a relation to the tones, though, from their denominations, and other circumſtances, it might well be inferred, this has created a difficulty in admitting their connection with the ſubject. The obviating of this objection I ſhall reſerve for my fifth head; where I ſhall take occaſion, particularly, to juſtify this doctrine, and the uſe I ſhall have made of it; and I ſhall therefore proceed to explain it, as I find it in the harmonic writers.

To underſtand how this doctrine of the ſpecies of diapaſon came to be treated under the head of ſyſtems, it will be neceſſary to conſider the definition given of the term ſyſtem by the Ariſtoxenians, and their ſubdiviſion of this branch of harmonic.

With this ſchool, whatever conſiſted of more than one interval, was a ſyſtem. So comprehenſive a definition could not but make this branch a very large one; and ſo we accordingly find it. It was ſubdivided in the manner following: ſyſtems were there conſidered as differing in reſpect, firſt, to magnitude; ſecondly, to genus; thirdly, to the being conſonant or diſſonant; fourthly, to the being rational or irrational; fifthly, to the being ſequent or tranſgreſſive; ſixthly, to the being conjunct or disjunct; ſeventhly, to the being mutable or immutable. Now, of theſe ſeven differences, it was under the third that the doctrine of the ſpecies of diapaſon came to be treated, the conſonant ſyſtems being there enumerated, and explained.

explained. By a consonant system was understood a system, whose extreme or comprehending sounds were consonant: of these, there were six within the compass of the immutable system, *viz.* the diatessaron, diapente, diapason, diapason and diatessaron, diapason and diapente, and disdiapason. These consonant systems were considered as admitting each of a variety in the order of the intervals, of which it was composed. A system of a determined magnitude, composed of the same intervals, and of the same number of them, might, if the component intervals were not equal, differ in respect to their order or succession. These variations of each system they called *ειδος*, its species, or *σχημα*, its figure, for these terms were synonymous (6). The species of diatessaron were three; those of the diapente four, and those of the diapason seven, being the sum of the species of the other two consonances, of which the diapason itself was composed: and here the doctrine of the species stopped; for, in the three larger consonant systems, they seem not to have considered the species of the whole magnitude, but only those of the three smaller systems, of which they were composed, and which are called, by Ptolemey, the first consonances (7). As the species of diatessaron and diapente do not immediately concern this doctrine, the explaining them will be unnecessary; and I shall therefore proceed to those of the diapason.

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(6) Μετὰ δὲ ταῦτα λεκτέον, Τίς ἐςι, καὶ πόια τις, ἡ κατ᾽ εἶδος διαφορά; διαφέρει δ᾽ ἡμῖν οὐδὲν, εἶδος λέγειν ἢ σχῆμα· φέρομεν γὰρ ἀμφότερα τὰ ὀνόματα ταῦτα ἐπὶ τὸ αὐτό. Aristox. p. 74. v. 9.

(7) Προδιοριςέον τὰς κατὰ τὸ καλούμενον εἶδος τῶν πρώτων συμφωνιῶν διαφοράς. Ptol. lib. ii. c. 3.

Concerning

Concerning theſe, I find no diſagreement amongſt the writers of antiquity: they all agree, that they were ſeven in number, and had the denominations of Mixolydian, Lydian, Phrygian, Dorian, Hypolydian, Hypophrygian, and Hypodorian; circumſtances, which leave no doubt of their connection with the modes. The ſucceſſion of intervals, or manner of dividing the diapaſon for each ſpecies, has been variouſly explained by the antient writers; but the reſult of theſe explanations is the ſame, excepting the generic differences. It will be ſufficient here to give what reſpects the diatonic genus only, as the queſtion concerning the tones does not turn upon the diſtinction of the genera.

In the diatonic genus, the diapaſon conſiſting of five tonic and two ſemitonic intervals, the Ariſtoxenians fixed the ſucceſſion for each ſpecies, by the poſition of the two ſemitones; ſhewing, at the ſame time, between which of the ſounds of the immutable ſyſtem the ſpecies in queſtion was comprehended: for this ſyſtem conſiſting of fifteen ſounds, contained eight octaves, two of which, *viz.* that from proſlambanomenos to meſe, and that from meſe again to netehyperboleon, were divided after the ſame manner, and therefore conſtituted the ſame ſpecies: but the ſix others were all differently divided; ſo that the ſyſtem contained within itſelf the ſeven ſpecies of diapaſon, and thence obtained the denomination of perfect; the leſſer perfect ſyſtem, which reached only to a diapaſon and diateſſaron, being improperly ſo called for want of this qualification, as Ptolemey has

has ſhewn (8). According to this method of explaining the ſpecies of diapaſon, they ſtand as follows:

Species.	
1. Mixolydian	From hypate hypaton to parameſe. Semitones, firſt interval in the grave, fourth in the acute.
2. Lydian	From parhypate hypaton to trite diezeugmenon. Semitones, third interval in the grave, firſt in the acute.
3. Phrygian	From lichanos meſon to paranete diezeugmenon. Semitones, ſecond interval in the grave, ſecond in the acute.
4. Dorian	From hypate meſon to nete diezeugmenon. Semitones, firſt interval in the grave, third in the acute.
5. Hypolydian	From parhypate meſon to trite hyperbolæon. Semitones, fourth interval in the grave, firſt in the acute.
6. Hypophrygian	From lichanos meſon to paranete hyperbolæon. Semitones, third interval in the grave, ſecond in the acute.

(8) Ὅθεν τὸ συντιθέμενον ἐκ τῆ διαπασῶν καὶ διὰ τεσσάρων σύστημα τέλειον ἐ καλῶς ἔχει καλεῖν· τὰ μὲν γὰρ ἑπτὰ εἴδη τῆ διαπασῶν ἐδέποτε παρείξει. Ptol. Harm. p. 106. v. 3.

Species.		
7. Hypodorian	From meſe to nete hyperbolæon, or proſl. to meſe.	Semitones, ſecond interval in the grave, third in the acute.

It muſt be here obſerved, that theſe ſpecies, as they ſtand in the ſyſtem, are, with reſpect to acuteneſs and gravity, in the inverted order of the ſeven modes, as ſettled by the harmonic doctrine, which will account for the miſtake, which Dr. Gregory (as was ſhewn above) and others have fallen into, in imagining the antients did not agree in their accounts of the modes; ſince it is plain theſe writers did not obſerve, that, in the one caſe, the modes were ſpoken of with reſpect to the poſition of the ſyſtem itſelf, and in the other, with reſpect to the poſition of the ſeven ſpecies within the ſyſtem.

Theſe ſpecies may alſo be more readily ſhewn, by examples out of the Guidonian ſcale, where, keeping the natural notes, they will ſtand thus:

Mixolydian	from	B to *b*.
Lydian		C to *c*.
Phrygian		D to *d*.
Dorian		E to *e*.
Hypolydian		F to *f*.
Hypophrygian		G to *g*.
Hypodorian		*e* to *aa*, or A to *a*.

But as well this, as the former way of ſhewing them, we are to underſtand only as exemplifications of the ſucceſſion of the intervals, and not as an aſſignment of the pitch for each, which was to depend on that of the ſyſtem, out of which they are exemplified; and

and it may not be amiſs therefore, in order to prevent any limited conception of theſe ſpecies, to ſtate generally the order of the intervals, of which each is compoſed; which will be as follows, proceeding in each from grave to acute.

Mixolydian.	Semitone, tone, tone, ſemitone, tone, tone, tone.
Lydian.	Tone, tone, ſemitone, tone, tone, tone, ſemitone.
Phrygian.	Tone, ſemitone, tone, tone, tone, ſemitone, tone.
Dorian.	Semitone, tone, tone, tone, ſemitone, tone, tone.
Hypolydian.	Tone, tone, tone, ſemitone, tone, tone, ſemitone.
Hypophrygian.	Tone, tone, ſemitone, tone, tone, ſemitone, tone.
Hypodorian.	Tone, ſemitone, tone, tone, ſemitone, tone, tone.

Beſides the manner above-mentioned of explaining the ſpecies of diapaſon, the antients have given us another, the reſult of which is the ſame; and that is, by the poſition of the diazeuctic tone, or interval from meſe to parameſe. In the Mixolydian ſpecies, the diazeuctic tone was the firſt interval, reckoning from acute to grave; in the Lydian, it was the ſecond; in the Phrygian, the third; in the Dorian, the fourth; in the Hypolydian, the fifth; in the Hypophrygian, the ſixth; and in the Hypodorian, the laſt.

Now, either of theſe methods fixes the ſucceſſion of intervals peculiar to each ſpecies; but as the examples are taken from a ſyſtem, whoſe pitch was variable, we are ſtill to ſeek, at what abſolute pitch the ſeveral ſpecies were taken in the modes, to which we ſuppoſe them to have been reſpectively ſubſervient; and it is, perhaps, the ſeeming difficulty of ſettling this, that has induced ſo many to reject this doctrine entirely, and fall in with the harmonic writers, who conſidered the modes as differing only

in the pitch of the ſyſtem: but, by taking in the aſſiſtance of the harmonic doctrine, we ſhall not only gain the true pitch for each ſpecies in the muſical, but be led to ſee the agreement between the two doctrines, which, I have already ſaid, was my principal view in theſe ſheets, and which, having gone through the explanation of each doctrine ſeparately, as far as concerns the ſeven modes, we are now ripe for conſidering; for the eight modes, whoſe explanation I have deferred, have no concern in this agreement, being rejected by Ptolemey, as will appear, for this very reaſon, in ſubſtance, that they would ſtand the trial of the harmonic doctrine only, whereas the reſt had the ſupport of both. Let us then conſider how the two doctrines, as I have explained them, may be made to agree.

By the harmonic doctrine, we are told the pitch of the ſyſtem for each mode; and by the muſical, in what part of the ſyſtem to take the ſpecies of diapaſon: now, by combining theſe two directions, we gain the following plain canon, for finding any mode required.

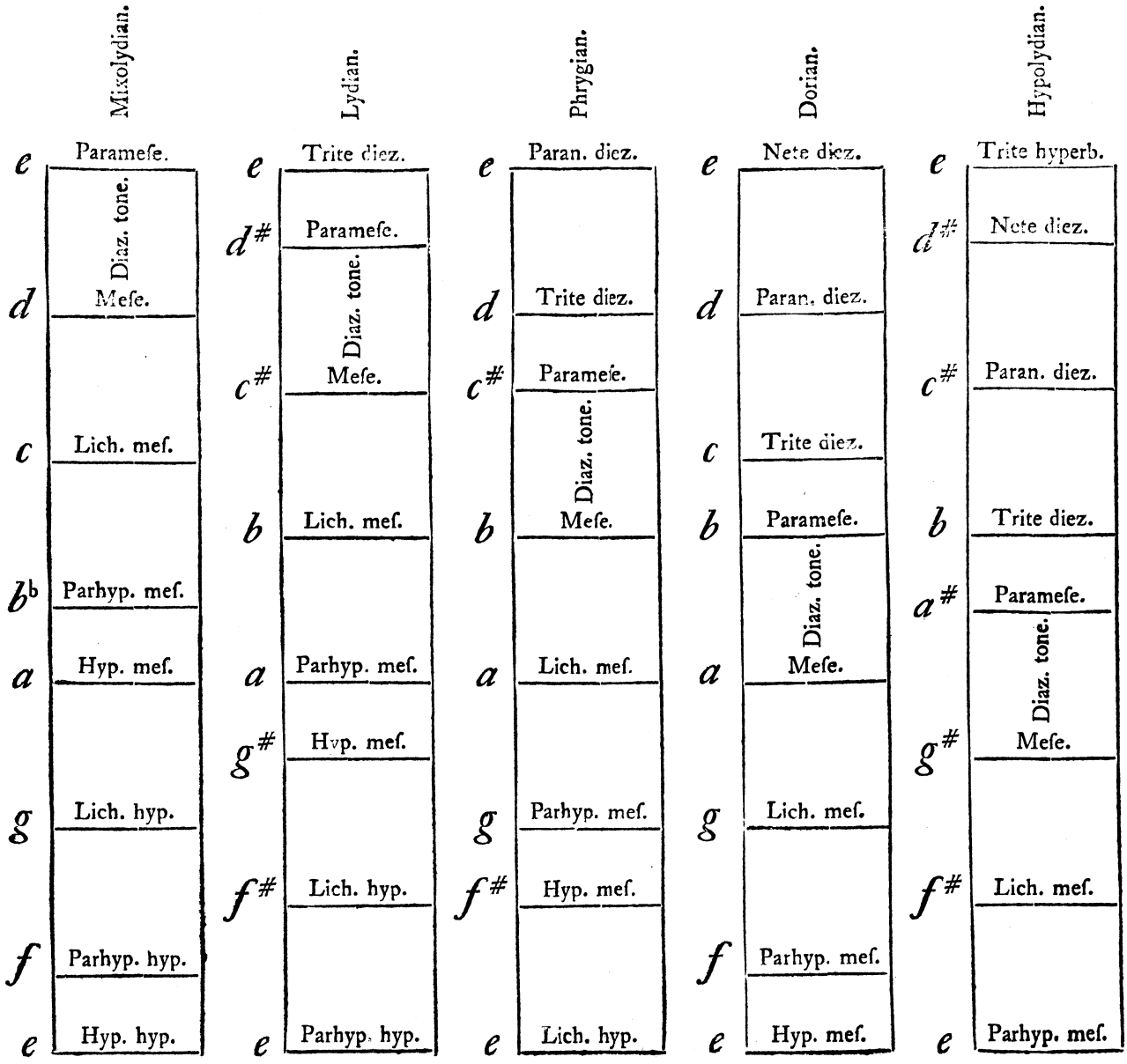
CANON.

Firſt pitch the ſyſtem for the mode, as directed by the harmonic doctrine; then ſelect from it the diapaſon, directed by the muſical; and we have the characteriſtic ſpecies of the mode in its true pitch.

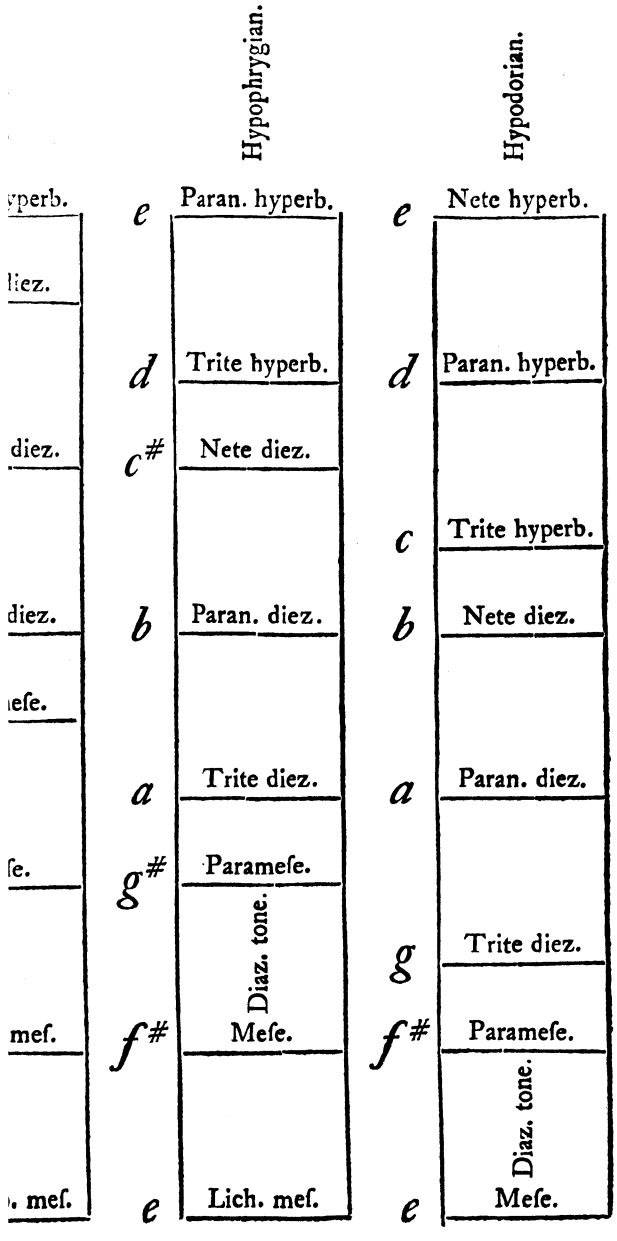
To make this more plainly appear, and alſo to avoid the length of particular explanations, I have annexed a diagram of the ſeven ſpecies, which will ſhew at what pitch of the Guidonian ſcale each ſound

of

DIAGRAM I. Of the Species of Diapaſon in the Seven Modes admitted



mitted by PTOLEMEY.



of the diapaſon is brought out by the canon for each of the ſeven modes. As in the conſtruction of this diagram, the directions of the canon have been ſtrictly purſued, ſo it will appear, that the reſult of it is, in all reſpects, conformable to the principles of both doctrines. Thus in the Dorian, for inſtance, it will be ſeen, that the meſe is placed in Alamire, and that the reſt of the ſounds exhibited in that diapaſon, are placed at the proper diſtances, for preſerving the order of the ſyſtem, as required by the harmonic doctrine. It will be alſo ſeen, that the diapaſon ſelected lies between hypate meſon and nete diezeugmenon; that the ſemitones are the firſt interval in the grave, and third in the acute; and that the diazeuctic tone is in the fourth interval, reckoning from the acute; all which circumſtances were alſo required by the muſical doctrine for this mode; and, in the reſt of the modes, all the circumſtances required by each doctrine will, in like manner, be found to obtain: ſo that no objection can well be raiſed to the principles, on which the diagram has been framed, by the favourers of either doctrine ſeparately; and the very coincidence of the two doctrines therein, might furniſh a probable argument in juſtification of the manner, in which I have combined them in the canon. But as I propoſe to conſider this under the fifth head, where the proofs will be collected, I ſhall leave this argument for the preſent, and proceed to explain,

Thirdly, The eight harmonic modes rejected by Ptolemey, and give at large his reaſons for excluding them.

Six

Six of theſe modes, with the ſeven Ptolemey allowed, made up the thirteen allowed by the Ariſtoxenians: the other two ſeem to have been added afterwards, more with a view to regularity in the names and poſitions of the modes, than to any particular uſe, as will appear in the courſe of the explanation. For the ſettling theſe eight modes, I ſhall have no occaſion to go farther than the fixing the poſition of the meſe for each, according to the harmonic doctrine: the reſult of applying the muſical doctrine to them will ſufficiently appear, when I come to explain the reaſons, which Ptolemey has aſſigned for rejecting tnem.

The old Dorian, Phrygian, and Lydian modes, having, as we have ſeen, their meſes reſpectively in *a*, *b*, *c#*, at the diſtance of a tone from each other, theſe tonic ſpaces were afterwards divided, to make room for the Ionian meſe in *b* flat, and the Æolian in *c* natural. To theſe five modes, whoſe meſes ſucceeded each other at the interval of a ſemitone, and which came, in time, to be called the middle modes, five others were made to correſpond, that lay reſpectively graver by a fourth, and took their denominations from them, but compounded with the prepoſition *hypo*, to diſtinguiſh them. Of theſe, we have already ſhewn the Hypodorian meſe to have been in *e*, the Hypophrygian in *f#*, and the Hypolydian in *g#*. Now, the two tonic ſpaces between *e*, *f#*, and *g#*, being likewiſe diviſible, the Hypoionian meſe was inſerted in *f* natural, and the Hypoæolian in *g* natural, at a fourth reſpectively from the Ionian and Æolian. To theſe ten modes, it was conceived that five more might properly be ranged towards

towards the acute, at the diſtances of a fourth reſpectively from the five firſt mentioned, and taking their denominations from them alſo, but compounded with the prepoſition *hyper*, which would complete them to fifteen, divided into five grave, five middle, and five acute. But the Ariſtoxenians limiting the poſitions of the meſe to the compaſs of an octave, had eſtabliſhed only three out of theſe laſt five, *viz.* the old Mixolydian, whoſe meſe we have ſhewn to be in *d*, at a fourth from the Dorian, and which was therefore afterwards called Hyperdorian; the Hyperionian, whoſe meſe was in *e* flat, at a fourth from the Ionian; and the Hypermixolydian (for ſo it had been originally named, the prepoſition being taken in a different ſenſe), the meſe of which was in *e*, at a fourth from the Phrygian, and which was therefore afterwards called the Hyperphrygian. To make theſe acute modes therefore five in number, as well as the grave and middle ones, two new modes were added, *viz.* the Hyperæolian, whoſe meſe was in *f*, and the Hyperlydian, whoſe meſe was in *f*♯, at a fourth reſpectively from the Æolian and Lydian.

The modes being thus augmented to fifteen, upon the ſingle principle of the harmonic doctrine, their meſes will be found to ſtand all together in the following order.

Acute	Hyperlydian	in *f*♯
	Hyperæolian	*f*
	Hyperphrygian, or Hypermixolydian	*e*
	Hyperionian	*e*♭
	Hyperdorian, or Mixolydian	*d*

Middle

Middle	Lydian	in $c\#$
	Æolean	c
	Phrygian	b
	Ionian	$b\flat$
	Dorian	a
Grave	Hypolydian	in $g\#$
	Hypoæolian	g
	Hypophrygian	$f\#$
	Hypoionian	f
	Hypodorian	e

Having now ſhewn, how theſe fifteen modes were ſituated according to the harmonic doctrine, I come to the objections raiſed by Ptolemey againſt the eight laſt explained. For the right underſtanding of which, it will be neceſſary to give an account of all that he has delivered on the ſubject of the modes, a taſk of ſome difficulty; for though his reaſoning appears to me moſt clear and methodical, it is rather too prolix to be given exactly in his own words, as this, with the neceſſary explanations of thoſe paſſages, of which the ſenſe is leſs obvious, would carry me to too great a length. I muſt therefore endeavour to abridge his doctrines, though at the hazard of leaving out ſome of the ſubſtantial parts, and thereby doing injuſtice to his argument.

It will be expedient to premiſe ſomething concerning his apparent intention, and method of reaſoning in this part of his work, which will ſerve as a key to his argument: and this ſeems the more neceſſary, as he has been thought by ſome (9) to

(9) So obſcurely has the beſt of all the antient writers (Ptolemey) delivered himſelf on this article (the tones), that deſerved to have been moſt clearly handled. Malcolm's Treatiſe on Muſic, p. 539.

have

have written very obſcurely upon the ſubject. His chief view was to reduce the fifteen modes, admitted upon the principle of the harmonic doctrine, to thoſe ſeven, which had the ſupport alſo of the muſical: but this reformation was to be attempted with great precaution, on account of the obſtinate prejudices it was likely to meet with, from the harmonicians of his own time: And we ſhall therefore find him firſt artfully treating the modes upon the foot of the harmonic doctrine only, and arguing *ad homines* for the reduction of the modes, even upon their own principles; but, before he drops the ſubject, his true reaſons will appear; and, indeed, it will eaſily be ſeen, that he had them conſtantly in view from the firſt, though he does not argue openly upon them. This will account for that mixture of the two doctrines, which is found in his writings, and will, with the aſſiſtance of a few explanations, render intelligible what he has delivered upon the ſubject.

The tones he conſiders, after the harmonic doctrine, as mutations by whole conſtitutions, which, he tells us, are therefore properly called tones, as they are differences in reſpect to tenſion. Theſe differences he admits to be infinite in poſſibility, but argues, that in efficacy, and in reſpect to ſenſe, they are finite, and liable to certain limitations. Theſe limitations he derives from the theory of the conſonances, by which means, he lays a foundation for his future argument, for reducing the modes to the number of ſpecies of the conſonance diapaſon. The limitations of the tones, which he propoſes to regulate by thoſe of the conſonances, are, as he tells us, threefold; *viz.*

1. As to the diſtance, or ratio, as he expreſſes it, of the extreme tones; for the Pythagoreans, whoſe method he adopts with ſome improvements of his own, meaſured intervals by the ratios of the comprehending ſounds.

2. As to the number of tones to be admitted between theſe extremes. And,

3. As to the intervals, at which they were to ſtand in ſucceſſion, which he calls their exceſſes.

Thus in the diateſſaron conſonance, which he inſtances, theſe three circumſtances are obſervable; firſt, That the ratio of the extreme ſounds is ſeſquitertian; ſecondly, That the component intervals, or ratios, are three; and thirdly, That ſuch and ſuch are the differences of thoſe ratios, meaning the intervals in ſucceſſion. But here he obſerves, that, in the conſonances, theſe limitations have each their diſtinct cauſe; whereas in the tones, the firſt being determined, the other two neceſſarily followed, as being dependent on the ſame conditions. This remark will hardly be intelligible, without ſome explanation. The interval, or ratio of the extreme ſounds in each conſonance, though differently treated by the Ariſtoxenian and Pythagorean ſchools, were yet determined, both by the one and the other, upon principles, which concerned not their intermediate diviſion: their intermediate diviſion again was ſettled by a doctrine, that required, in the compoſition of intervals, either that every fourth ſound ſhould complete the diateſſaron, or every fifth the diapente; without one or other of which circumſtances, the compoſition was held inconcinnous

nous (10); and hence the diateſſaron could not be divided into more than three ratios, nor the diapente into more than four; and again, the exceſſes of the ratios, or intervals in ſucceſſion, were aſſigned by the doctrine of the genera; ſo that in the conſonances, each of the three limitations had a ſeparate cauſe; but in applying the ſame limitations to the tones, there was a connection between them; ſo that the determining the firſt, determined the reſt. Thus, for inſtance, if the interval diateſſaron, or ſequitertian ratio, ſhould be aſſigned for the limitation of the extreme tones, the other limitations could only be ſuch, as were aſſigned for that conſonance; that is, the component ratios muſt be three, and the exceſſes of thoſe ratios ſuch, as were eſtabliſhed for the diateſſaron by the doctrine of the genera. But the not knowing the neceſſity of this conſequence, he tells us, had occaſioned a great diſagreement amongſt the harmonicians in determining theſe points, ſome making the interval of the extreme tones leſs than a diapaſon, others equal to it, and others again exceeding it; the later harmonicians, in particular, being fond of adding ſomething to what had been admitted by thoſe, who went before them. To bring theſe various opinions to ſome determination, he propoſes the reſtitution of ſimilitude in the hermoſmenon, or harmoniſed melos, as the chief circumſtance, by which to regulate the

(10) Ἐν παντὶ δὲ γένει ἀπὸ παντὸς φθόγγου διὰ τῶν ἑξῆς τὸ μέλος ἀγόμενον, καὶ ἐπὶ τὸ βαρὺ, καὶ ἐπὶ τὸ ὀξύ, ἢ τὸν τέταρτον τὸ ἑξῆς διὰ τεσσάρων, ἢ τὸν πέμπτον διὰ πενῆε συμφωνον λαμβάνεσθαι. ᾧ δ' ἂν μεθ' ἑτέρᾳ τῶν συμβαίνῃ, ἐκμελὴς ἕως ἕτος πρὸς ἅπαντας, ἐν οἷς συμβέβηκεν ἀσυμφώνῳ εἶναι κατὰ τὰς εἰρημένας ἀρμονίας. Ariſtox. p. 54. edit. Meibom.

firſt limitation; and this, he ſays, is effected by the diapaſon, for, at that diſtance, there was always a return of ſimilar harmony; ſo that the tone, that was a diapaſon diſtant from that firſt taken, was a repetition of it; and the tone ſtill farther diſtant, as for inſtance, at a diapaſon and diateſſaron, the ſame with the tone diſtant a diateſſaron only, and ſo of the reſt. For a proof of this, he appeals to the practice of muſic; where it was well known, that in ſuch mutations, as were at the interval of a diapaſon, no one of the ſtrings required new tuning, though in all other mutations ſome alterations were neceſſary. And hence he concludes, that thoſe, who make the diſtance of the extreme tones leſs than the diapaſon, do not reſtitute the hermoſmenon, there being ſtill other tones beyond the limit they aſſign, unlike to thoſe before taken; and that thoſe, who exceed the diapaſon, admit redundancies, by repeating ſome of the harmonies before taken; and further inſiſts, that even they, who proceeded no farther than the diapaſon, were yet to blame, inaſmuch as they took in the tone, that was a diapaſon diſtant from the firſt, ſince, in ſo doing, they admitted one redundancy, and thereby gave a handle to thoſe, whom they charged with paſſing the proper limits for the modes, to accuſe them, in turn, with being really the authors of this licence, ſince, if one uſeleſs tone be admitted, the ſame privilege may be fairly claimed for a greater number. This laſt argument ſeems levelled at the Ariſtoxenians, who admitted no more than thirteen modes; becauſe they would not exceed the diapaſon; but whoſe Hyperphrygian was, according to this argument, a repetition of the Hypodorian. The

author

author ſupports this argument ſtill farther, by an appeal to the circumſtance of the ſpecies of diapaſon, the ſounds of which were eight, but the number of the ſpecies ſeven only, anſwering not to the number of terms in the diviſion, but to that of the component ratios: for that the diapaſon taken from the graveſt ſound towards the grave, yielded the ſame ſpecies with the firſt diapaſon taken from the acuteſt ſound towards the ſame parts, was out of diſpute, it holding true univerſally, that whatever takes its beginning in the ſame manner from either of the extremes of the diapaſon, produces the ſame power. And here he leaves the firſt limitation, without expreſly aſſigning the interval for the extreme tones; for the title of the chapter, which ſeems to fix it to a diapaſon, ought to be underſtood only in this ſenſe, that it ſhould not exceed it; which agrees with the reaſoning in the chapter itſelf. As to the concluſion, which depended on the two other limitations, if I may venture to draw it for him, it will ſtand thus, that into what number ſoever of terms the diapaſon be divided, the diſtance for the extreme tones ſhould be the interval between the firſt term and the laſt but one.

The firſt limitation being thus far conſidered, he proceeds to determine the next, upon which depended the number of the tones; and here he again oppoſes the Ariſtoxenians, rejecting, by his theory of this limitation, five of their thirteen modes, beſides the Hyperphrygian, which ſtood condemned by the former one, and leaving only ſeven, according to the number of the ſpecies of diapaſon, which he propoſes as the propereſt rule, by which to govern this limitation; and aſſigns for this the following reaſons.

The

The number of the ſpecies of diapaſon was equal to that of the ſpecies of the two firſt conſonances taken together, and the ſpecies of theſe laſt were taken according to the condition of the ratios in each, the number of which the very nature of them would not permit to be either increaſed or diminiſhed. Now the tones contained within the diapaſon following the nature of the conſonances, and being indeed eſtabliſhed on their account, *viz.* that the whole ſyſtems might have conſonant differences, he argues, that thoſe, who were either for admitting more than ſeven, which was the number both of the ſpecies and of the ratios in the diapaſon, or for making all the exceſſes of the tones equal, were not to be aſſented to, ſince they could not aſſign any ſatisfactory reaſon, either for the equality of the increments in general, which, in the harmonic genus, was particularly inconvenient, or for fixing either on the tone, hemitone, or dieſis, in particular, for the common exceſs, (from the ſuppoſition of one or other of which, they determined the number of tones, according to the number of ſuch intervals contained within the diapaſon). For what was there to determine ſuch a preference, when the conſonance (meaning the diapaſon) was, as they themſelves allowed, ſuſceptible not only of all theſe exceſſes, but of many others, in the orders both of the genera and of the diſtances? Nor could they ſay, that ſuch a magnitude divides the diapaſon exactly, and ſuch another not exactly, or one, perhaps, into an even number of parts, and another into an uneven: for though the diapaſon was divided into ſix by the tone, into twelve by the hemitone, into eighteen by the third of the tone, and into twenty-four by the quarter,

quarter; yet, in all theſe diviſions, there was a variation from the exact truth, even perceptible to the ear. All this reaſoning is again manifeſtly levelled at the Ariſtoxenians, who, falſely eſteeming the diapaſon to conſiſt exactly of ſix tones, or twelve hemitones, had admitted thirteen modes, at the diſtance of a ſemitone from each other: and here we ſee the author ſtill combats them fairly on the principles of the harmonic doctrine. But, to go on with his arguments; having thus fixed the number of the modes to ſeven only, he proceeds to conſider the third limitation. It will be aſked, ſays he, what are to be the exceſſes choſen for theſe ſeven modes, ſince the diapaſon cannot be divided into ſeven equal parts; and, if unequal intervals be admitted, there is ſtill room for variety in the choice? In anſwer to this, he propoſes, that the intervals in queſtion ſhall be taken by means of the firſt conſonances, diateſſaron and diapente, and their differences or exceſſes, whatſoever they may be: for he argues, that the mutations, by conſonant intervals, ought to be firſt eſtabliſhed; and next to theſe, the mutations, by concinnous intervals. Thoſe, who admitted eight tones, he tells us, had found their poſitions after the following manner. The Dorian, Phrygian, and Lydian, the three moſt antient, being firſt ſet at the diſtance of a tone from each other, they made the next mutation conſonant, at a diateſſaron from the Dorian, towards the acute, and at a limma from the Lydian, calling it Mixolydian; becauſe it lay not at the diſtance of a tone from the Lydian, but only at the diſtance of a limma, or difference between ditonus and diateſſaron; then this new mode having the

the Dorian graver than it by a diateſſaron, that the reſt of the four might be attended with the like circumſtance, they eſtabliſhed the Hypolydian, Hypophrygian, and Hypodorian, a diateſſaron graver reſpectively than the Lydian, Phrygian, and Dorian; and laſtly, they placed the Hypermixolydian at a diapaſon from the Hypodorian, towards the acute, giving it that denomination from its poſition above the Mixolydian, miſuſing, as he tells us, the prepoſition *hypo* to ſignify the grave, and *hyper* to expreſs the acute. But though the reſult of this method is the ſame with that of his own, excepting as to the Hypermixolydian, (which he excludes for the reaſon aſſigned in treating of the firſt limitation) yet he objects to it; becauſe the concinnous intervals are firſt aſſumed, which ought to be taken by the conſonances; and gives his own, which is by the continual addition of the conſonance diateſſaron, but, however, within the compaſs of the diapaſon. Wherefore, when ſuch addition would exceed it, he directs taking the diapente in its ſtead, the contrary way; whereby the diviſion will be kept within the limits aſſigned. This method, and its reſult, will perhaps be better underſtood, and will alſo be more ſuccinctly couched in our modern expreſſions, in which I ſhall therefore give it, applying to it the correſponding characters of the Guidonian ſcale.

Having firſt taken the Mixolydian tone, which was the acuteſt of the ſeven, ſuppoſe in D, fall a fourth to A, for the Dorian; another fourth to E, for the Hypodorian; then, to avoid paſſing the bounds of the diapaſon, riſe a fifth to B, for the Phrygian; fall a fourth again to *f#*, for the Hypophrygian;

phrygian; riſe a fifth to *c*♯, for the Lydian; and fall a fourth to G♯, for the Hypolydian.

By this method, the poſitions of the ſeven modes come out exactly, as I fixed them from Bacchius, in explaining the harmonic doctrine; and we ſee, that, for ſettling them, Ptolemey has really recourſe to no other theory of the modes, than that admitted by thoſe he contends with, though he makes the ſpecies of the conſonances, and thoſe of the diapaſon more particularly, the governing rule for fixing their poſitions, as the only means, by which the two doctrines could be made to coincide. But it remained, after thus ſettling the ſeven modes, to ſhew more fully the conſequence of following the method of the Ariſtoxenians, and others, who divided the tonic ſpaces found by his method, and placed the modes in a ſemitonic ſucceſſion, by which their number had been raiſed to thirteen, even within the compaſs of the diapaſon; and, in doing this, we ſhall find he ventures to aſſign the true reaſon for his reduction, which was grounded on the muſical doctrine. This argument, which is contained in the eleventh chapter of his ſecond book, being very remarkable, and ſeeming ſtrongly to ſupport the combination of the two doctrines in the diagram I have given of the ſeven modes, I ſhall give a tranſlation of the whole chapter, leſt I ſhould be thought to ſtrain his arguments in favour of the muſical doctrine, which has been thought by many to have little or no relation to the modes, and which, if we except what this author has delivered, ſeems indeed, upon a ſlight examination, and compariſon of the evidence, to have the weaker ſupport.

Now, theſe being the tones we have eſtabliſhed, it is plain, that a certain ſound of the diapaſon is appropriated to the meſe, in power of each, by reaſon of their being equal in number to the ſpecies. For a diapaſon being ſelected out of the middle parts of the perfect ſyſtem; that is, the parts from hypate meſon in poſition to nete diezeugmenon, (becauſe the voice is moſt pleaſed to be exerciſed about the middle melodies, ſeldom running to the extremes, becauſe of the difficulty and conſtraint in immoderate intentions and remiſſions), the meſe in power of the Mixolydian will be fitted to the place of paranete diezeugmenon, that the tone may, in this diapaſon, make the firſt ſpecies; that of the Lydian, to the place of trite diezeugmenon, according to the ſecond ſpecies; that of the Phrygian, to the place of parameſe, according to the third ſpecies; that of the Dorian, to the place of the meſe, making the fourth and middle ſpaces of the diapaſon; that of the Hypolydian, to the place of lichanos meſon, according to the fifth ſpecies; that of the Hypophrygian, to the place of parhypate meſon, according to the ſixth ſpecies; that of the Hypodorian, to the place of hypate meſon, according to the ſeventh ſpecies; that ſo it may be poſſible, in the alterations required for the tones, to keep ſome of the ſounds of the ſyſtem unmoved, for preſerving the magnitude of the voice (meaning the pitch of the diapaſon), it being impoſſible for the ſame powers, in different tones, to fall upon the places of the ſame ſounds. But, ſhould we admit more tones than theſe, as they do, who augment their exceſſes by hemitones, the meſes of two tones muſt, of neceſſity, be applied to the place of one ſound; ſo that,

in

in interchanging the tunings of thoſe two tones, the whole ſyſtem in each muſt be removed, not preſerving any one of the preceding tenſions in common, by which to regulate the proper [pitch] of the voice. For the meſe in power of the Hypodorian, for inſtance, being fixed to hypate meſon by poſition, and that of the Hypophrygian to parhypate meſon, the tone taken between theſe two, and called by them the graver Hypophrygian, to diſtinguiſh it from the other acuter one, muſt have its meſe either in hypate, as the Hypodorian, or in parhypate, as the acuter Hypophrygian; which being the caſe, when we interchange the tuning of two ſuch tones, which uſe one common ſound, this ſound is indeed altered a hemitone in pitch, by intention or remiſſion; but having the ſame power in each of the tones, *viz.* that of the meſe, all the reſt of the ſounds are intended or remitted in like manner, for the ſake of preſerving the ratios to the meſe, the ſame with thoſe taken before the mutation, according to the genus common to both tones; ſo that this tone is not to be held different in ſpecies from the former, but the Hypodorian again, or the ſame Hypophrygian, only ſomewhat acuter or graver in its pitch. That theſe ſeven tones, therefore, are ſufficient, and ſuch as the ratios require, be it thus far declared (11).

With

(11) Δῆλον δὲ ὅτι, καὶ τούτων μὲν ὑποτεθειμένων ἡμῖν τῶν τόνων, τῆς καθ' ἕκαστον τῇ δυνάμει μέσης, ἴδιός τις γίνεται τοῦ διὰ πασῶν φθόγγος, διὰ τὸ ἰσάριθμον αὐτῶν τε καὶ τῶν εἰδῶν. Ἐκλαμβανομένου γὰρ τοῦ διὰ πασῶν κατὰ τοὺς μεταξύ πως τοῦ τελείου συστήματος τόπους τουτέστι, τοὺς ἀπὸ τῆς τῇ θέσει τῶν μεσῶν ὑπάτης ἐπὶ τὴν νήτην διεζευγμένων ἕνεκα τοῦ τὴν φωνὴν ἐμφιλοχώρως ἀναστρέφεσθαι καὶ καταγίνεσθαι περὶ τὰς μέσας μάλιστα μελῳδίας· ὀλιγάκις ἐπὶ τὰς ἄκρας ἐκβαίνου-

σαν,

With this chapter he ends his doctrine of the modes, and of their reduction; and we ſee he here makes the muſical doctrine of the ſpecies the baſis of his theory, as far as concerns the rejecting the eight redundant modes; though, out of caution, and to obviate objections, he had eſtabliſhed the ſeven upon the harmonic doctrine of the pitch of the

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σαν, διὰ τὸ τῆς παρὰ τὸ μέτειον χαλάσεως ἢ καλατάσεως ἐπίπονον καὶ ἐβιασμένον. Ἡ μὲν τῶ μιξολυδίε μέση κατὰ τὴν δύναμιν, ἐφαρμόζεται τῷ τόπῳ τῆς παρανήτης τῶν διεζευγμένων· ἵν' ὁ τόνος τὸ πρῶτον εἶδος, ἐν τῷ περικειμένῳ, ποιήσῃ τὸ διὰ πασῶν. Ἡ δὲ τῶ λυδίε, τῷ τόπῳ τῆς τείτης τῶν διεζευγμένων, κατὰ τὸ δεύτερον εἶδος. Ἡ δὲ τῶ φρυγίε, τῷ τόπῳ τῆς παραμέσης, κατὰ τὸ τείτον εἶδος. Ἡ δὲ τῶ δωείε, τῷ τόπῳ τῆς μέσης, ποιῶσα τὸ τέταρτον καὶ μέσον εἶδος τὸ διὰ πασῶν. Ἡ δὲ τῶ ὑπολυδίε, τῷ τόπῳ τῆς λιχανῶ τῶν μέσων, κατὰ τὸ πέμπτον εἶδος. Ἡ δὲ τῶ ὑποφρυγίε, τῷ τόπῳ τῆς παρυπάτης τῶν μέσων, κατὰ τὸ ἕκτον εἶδος. Ἡ δὲ τῶ ὑποδωείε, τῷ τόπῳ τῆς τῶν μέσων ὑπάτης, κατὰ τὸ ἕβδομον εἶδος. Ὡς τε δύνασθαί τινας ἐν τῷ συήματι τηρεῖσθαι φθόγγες ἀκινήτως, ἐν ταῖς τῶν τόνων μεθαρμογαῖς, παραφυλάσσοντας τὸ μέγεθος τῆς φωνῆς· διὰ τὸ μηδέποτε τας ἐν διαφόροις τόνοις ὁμοίας δυνάμεις, τοῖς αὐτῶν φθόγγων τόποις περιπίπτειν. Πλειόνων δὲ τῶν τόνων παρὰ τέτες ὑποτιθεμένων· ὁ ποιῶσιν οἱ ἐν τοῖς ἡμιολίοις τὰς ὑπερχὰς αὐτῶν παραύξοντες· ἀναγκαῖον ἔσαι, δύο τόνων μέσας ἑνὸς φθόγγε τόπῳ παύλως ἐφαρμόζειν· ὡς δ' ὅλα κινεῖσθαι τὰ συήματα, κατὰ τὴν εἰς ἀλλήλας τῶν δύο τέτων τόνων μεθαρμογὴν· μηκέτι τηρεῖν τα κοινήν τινα τὴν ἐξαρχῆς τάσιν, ἢ παραμεθησέσθαι τὸ ἴδιον τῆς φωνῆς. Τῆς μὲν γὰρ τῶ ὑποδωείε, φέρε εἰπεῖν, τῇ δυνάμει μέσης, συνεζευγμένης τῇ κατὰ τὴν θέσιν τῶν μέσων ὑπάτῃ· τὸ δὲ τῶ ὑποφρυγίε τῇ τῶν μέσων παρυπάτῃ· τὸν λαμβανόμενον μεταξὺ τέτων τόνον, καλέμενον δὲ ὑπ' αὐτῶν βαρύτερον ὑποφρύγιον, παρ' ἐκεῖνον, ὀξύτερον, δεήσει τὴν αὐτὴν μέσην, ἤτοι κατὰ τὴν ὑπάτην ἔχειν, ὡς καὶ ὁ ὑποδώειος· ἢ κατὰ τ παρυπάτην, ὡς καὶ ὁ ὀξύτερος ὑποφρύγιος. Οὗ συμβαίνοντος, ἐπειδὰν εἰς ἀλλήλας μεθαρμοζώμεθα τὰς τ κοινὸν φθόγγον εἰληφότας τόνες· κινηθήσεται μὲν ἕτερος ἐπιλαβεῖς ἢ χαλαθεῖς ἡμιολίως· τὸ δὲ τὴν αὐτὴν, ἐν ἑκατέρῳ τῶν τόνων, δύναμιν ἔχειν τετέσι τ μέσης· ἀκολυθήσουσιν δὲ τῶν λοιπῶν ἁπάντων φθόγγων ἐπιτάσεις ἢ χαλάσεις· ἕνεκα τῶ συμπεῖν τὰς πρὸς τ μέσην λόγες, τὰς αὐτὰς τοῖς πρὸ τ μεταβολῆς, κατὰ τὸ κοινὸν ἀμφοτέρων τῶν τόνων γένος, λαμβανομένοις. Ὡς τε μηδ' ἂν ἕτερον ἔτι δόξαι τῷ εἴδει τ τόνον τῶν τ πρότερον· ἀλλ' ὑποδώειον πάλιν, ἢ τ αὐτὸν ὑποφρύγιον, ὀξυφωνότερον τινὸς ἢ βαρυφωνότερον μόνον. Τὸ μὲν ἓν εὔλογόν τε καὶ ἀυλαρχὲς τῶν ἑπτὰ τόνων, μεχεὶ τέτων ὑπολειπώσω. Ptol. lib. ii. c. 11.

ſyſtem.

ſyſtem. That the force of his arguments in this chapter, and the reſult of admitting the eight modes, may be more plainly ſeen, I have annexed a ſecond diagram of the ſpecies, as they lay in the ſpurious modes; by which it will appear, to which ſpecies in the genuine ones they ſeverally anſwered; and the objection, raiſed againſt each of them by Ptolemey will become intelligible.

There is, however, an objection, to which this ſecond diagram ſeems liable. It may be aſked, if the Hypoionian mode, inſtanced by Ptolemey, could give either Hypodorian or Hypophrygian harmony, according as either the eighth or the ninth ſtring was employed for its meſe? and if the reſt of the ſpurious modes were liable to a like alternative, what was it determined me in my choice of the two ſpecies, in the conſtruction of the diagram? To which I anſwer, that the antients have decided for me as to five of them; for we find (12), that the Hypoionian was called the graver Hypophrygian; the Hypoæolian, the graver Hypolydian; the Ionian, the graver Phrygian; the Æolian, the graver Lydian; and the Hyperionian, the acuter Mixolydian. And this, by the way, furniſhes us with an unanſwerable argument of the antiquity of the doctrine enforced by Ptolemey, that the number of the modes ought not to exceed that of the ſpecies of the diapaſon; for theſe appellations, which were given to the modes long enough before Ptolemey flouriſhed, can be accounted for on no other principle, but the ſuppoſing the ſpecies of

(12) Vide Euclid. Introduct. Harm. p. 19. v. 29. & ſeq. Ariſt. Quint. p. 23. v. 7. & ſeq.

diapaſon

diapaſon to have been conſidered as the eſſential characters of the modes; and that theſe five modes therefore, though they had a difference in pitch, were thought to be the ſame, as to their effects, with thoſe, after which they were thus named. As to the other three, the Hyperphrygian, Hyperæolian, and Hyperlydian, their meſes being reſpectively at the diſtance of an octave from the Hypodorian, Hypoionian, and Hypophrygian, it was neceſſary to give them the ſame ſpecies with thoſe three modes; for a tranſpoſition of an octave was always underſtood to give a return of the ſame harmony, as has been already ſhewn.

This ſecond diagram, and that of the ſeven genuine modes, may be thought ſufficient to render the ſubject intelligible: however, as the fifteen modes are parted in the two diagrams, and confined alſo to the compaſs of a diapaſon, for ſhewing the ſpecies, I have added a table, ſhewing the tuning of the fifteen ſtrings of the lyre for all the modes. The letters of Guido's ſcale, placed within the ſquares, ſhew, in their horizontal orders, the tunings of all the ſtrings for each mode; the two broader lines include the ſpecies of diapaſon; and the meſes are diſtinguiſhed by capital letters, by which means, the caſes, where the ſame ſtring is employed for the meſes of two modes, appear at the firſt view; and the reaſoning, upon which Ptolemey rejects the eight modes, is illuſtrated, ſo as to need no farther explanation.

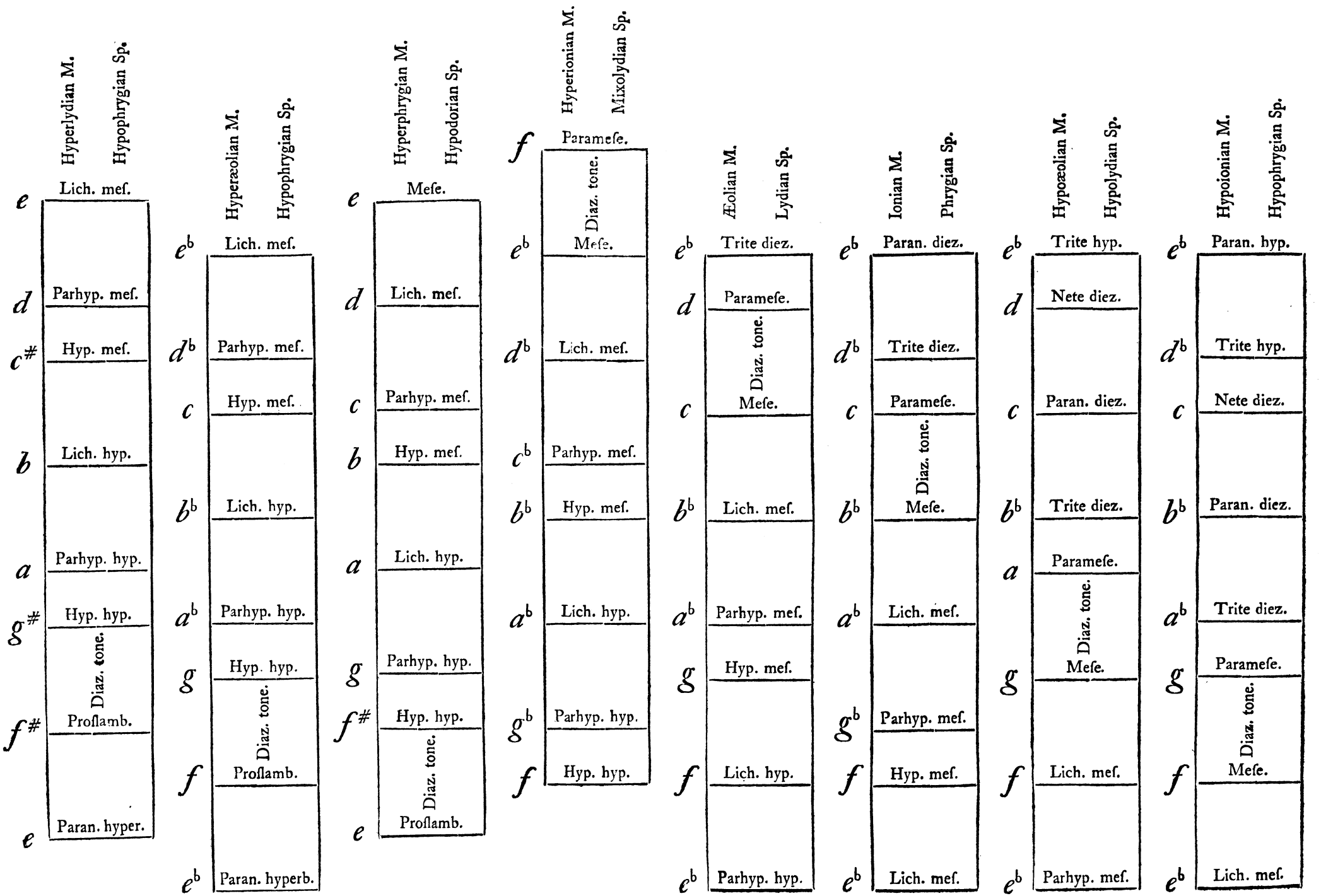
Having now gone through with what I propoſed to explain under the three firſt heads, I come,

Fourthly,

A TABLE, ſhewing the Tuning of the STRINGS of the LYRE for every Mode.

STRINGS of the LYRE.		Hyperlydian.	Hyperæolian.	Hyperphrygian.	Hyperionian.	Hypodorian, or Mixolydian.	Lydian.	Æolian.	Phrygian.	Ionian.	Dorian.	Hypolydian.	Hypoæolian.	Hypophrygian.	Hypoionian.	Hypodorian.
15	Nete hyperbolæon.	*a*	*a*♭	*a*	*b*♭	*a*	*a*	*a*♭	*a*	*a*♭	*a*	*a*♯	*a*	*a*	*a*♭	*a*
14	Paranete hyperbolæon.	*g*♯	*g*	*g*	*a*♭	*g*	*g*♯	*g*	*g*	*g*♭	*g*	*g*♯	*g*	*g*♯	*g*	*g*
13	Trite hyperbolæon.	F♯	F	*f*♯	*g*♭	*f*	*f*♯	*f*	*f*♯	*f*	*f*	*f*♯	*f*	*f*♯	*f*	*f*♯
12	Nete diezeugmenon.	*e*	*e*♭	E	*f*	*e*	*e*	*e*♭	*e*	*e*♭	*e*	*e*	*e*♭	*e*	*e*♭	*e*
11	Paranete diezeugmenon.	*d*	*d*♭	*d*	E♭	D	*d*♯	*d*	*d*	*d*♭	*d*	*d*♯	*d*	*d*	*d*♭	*d*
10	Trite diezeugmenon.	*c*♯	*c*	*c*	*d*♭	*c*	C♯	C	*c*♯	*c*	*c*	*c*♯	*c*	*c*♯	*c*	*c*
9	Parameſe.	*b*	*b*♭	*b*	*c*♭	*b*♭	*b*	*b*♭	B	B♭	*b*	*b*	*b*♭	*b*	*b*♭	*b*
8	Meſe.	*a*	*a*♭	*a*	*b*♭	*a*	*a*	*a*♭	*a*	*a*♭	A	*a*♯	*a*	*a*	*a*♭	*a*
7	Lichanos meſon.	*g*♯	*g*	*g*	*a*♭	*g*	*g*♯	*g*	*g*	*g*♭	*g*	G♯	G	*g*♯	*g*	*g*
6	Parhypate meſon.	*f*♯	*f*	*f*♯	*g*♭	*f*	*f*♯	*f*	*f*♯	*f*	*f*	*f*♯	*f*	F♯	F	*f*♯
5	Hypate meſon.	*e*	*e*♭	*e*	*f*	*e*	*e*	*e*♭	*e*	*e*♭	*e*	*e*	*e*♭	*e*	*e*♭	F.
4	Lichanos hypaton.	*d*	*d*♭	*d*	*e*♭	*d*	*d*♯	*d*	*d*	*d*♭	*d*	*d*♯	*d*	*d*	*d*♭	*d*
3	Parhypate hypaton.	*c*♯	*c*	*c*	*d*♭	*c*	*c*♯	*c*	*c*♯	*c*	*c*	*c*♯	*c*	*c*♯	*c*	*c*
2	Hypate hypaton.	*b*	*b*♭	*b*	*c*♭	*b*♭	*b*	*b*♭	*b*	*b*♭	*b*	*b*	*b*♭	*b*	*b*♭	*b*
1	Proſlambanomenos.	*a*	*a*♭	*a*	*b*♭	*a*	*a*	*a*♭	*a*	*a*♭	*a*	*a*♯	*a*	*a*	*a*♭	*a*

DIAGRAM II. Of the Species of Diapaſon in the Eight Modes rejected by PTOLEMEY.



Fourthly, To point out ſomething of the origin of the two doctrines.

The harmonic doctrine was, as I have ſhewn, expreſly taught in harmonic; and therefore, to account for its reception, it will be neceſſary to conſider the ſcope of that ſcience.

The muſical doctrine I have alſo ſhewn to have been explained in harmonic, as far as concerned the elementary principles of the ſpecies of diapaſon; but the application of thoſe principles to the doctrine of the modes was not taught therein, being reſerved for melopœïa, a ſcience, that looked higher than harmonic, and conſidered the uſe of the elements, when in the hands of the poet or muſician. It is to this ſcience, therefore, that we muſt look for the origin of the muſical doctrine.

But, before I conſider the ſcope of either of theſe ſciences, it will be neceſſary to ſhew my reaſons for ſeparating them, ſince they were blended by the Ariſtoxenians, as has been ſhewn above. For this purpoſe, we muſt have recourſe to the diviſion of muſic, the mother ſcience; which, as treated by the antients, comprehended all, that the moderns now underſtand by muſic and poetry. Its firſt general diviſion, according to Ariſtides Quintilianus (13), was into theoretic and practic. The theoretic was ſubdivided into natural and artificial; the latter of which was again ſubdivided into harmonic, rhythmic, and metric;

(13) De Muſica, p. 7. See alſo Meibomius on the paſſage, who has embraced the diviſion of Ariſtides, in the following table.

metric; which three ſciences more particularly contained the poets elements, as teaching the grounds of tune, time, and verſe. But nothing leſs than a competent knowlege of every branch of the mother ſcience could carry with it the reſpected title of ὁ μουσικος, the muſician. To harmonic, rhythmic, and metric, in the theoretic, reſpectively anſwered melopœïa, rhythmopœïa, and poetic, in the practic. In this author's diviſion therefore, we ſee, that harmonic and melopœïa are diſtinguiſhed, even by the firſt general diviſion. Of the propriety of this even the Ariſtoxenians ſeem to have been ſenſible; ſince, in order to juſtify their blending them, they have defined harmonic as a ſcience, both theoretic and practic (14). And Ariſtoxenus himſelf, in the fragments we have under the falſe title of his three books of harmonic elements, ſeems to aſſign ſuch bounds to harmonic, as might well be underſtood to exclude

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MUSICÆ
- alia eſt pars Theoretica, cujus rurſus partes duæ
  - Phyſica, quæ dividitur in { Arithmeticam, Phyſicam generi cognominem.
  - Artificialis, quæ dividitur in { Harmonicam, Rhythmicam, Metricam.
- alia Practica, cujus item partes duæ
  - Uſualis, cujus partes { Melopœïa, Rhythmopœïa, Poeſis.
  - Enarrativa, cujus partes { Organica, [illegible], Hypocritica.

(14) Ἁρμονική ἐστιν ἐπιστήμη θεωρητικὴ καὶ πρακτικὴ τῶν ἁρμοσμένων φύσεως. Euclid. Introd. Harmon. initio.

melopœïa

melopœïa (15). We have Plutarch alſo on our ſide, who, in a paſſage of his dialogue on muſic, which I ſhall have occaſion to cite, amongſt other proofs, enumerates only the firſt ſix parts of harmoniac, leaving melopœïa out of his diviſion. For this Meibomius blames him (16), but too haſtily; for had the learned critic conſidered the whole paſſage, he muſt have ſeen, that the omiſſion was not through ignorance, but deſign, the author being there expreſly arguing for the confining of harmonic within its proper bounds. However, whether the Ariſtoxenians were right or wrong, in including melopœïa in harmonic, my argument ſeems not materially affected by it; for they gave it only as a laſt diviſion, to be taught after all the reſt had been inculcated; and they agreed in defining it to be the uſe of the harmonic elements, according to the propriety of each ſubject (17): which is diſtinction enough for the uſe I propoſe to make of it.

Having thus far juſtified my dividing theſe ſciences, I ſhall now conſider the ſcope of each; which

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(15) Τῆς περὶ μέλους ἐπιστήμης πολυμεροῦς οὔσης, καὶ διῃρημένης εἰς πλείους ἰδέας, μίαν τινὰ αὐτῶν ὑπολαβεῖν δεῖ, τὴν ἁρμονικὴν καλουμένην, εἶναι πραγματείαν, τῇ τε τάξει πρώτην οὖσαν, ἔχουσάν τε δύναμιν στοιχειώδη. Τυγχάνει γὰρ οὖσα πρώτη τῶν θεωρητικῶν· ταῦτα δέ ἐστιν ὅσα συντείνει πρὸς τὴν τῶν συστημάτων τε καὶ τόνων θεωρίαν. Προσήκει γὰρ μηδὲν πορρωτέρω τούτων ἀξιοῦν παρ᾽ αὐτοῦ τοῦ τὴν εἰρημένην ἔχοντος ἐπιστήμην· τέλος γὰρ τοῦτό ἐστι τῆς πραγματείας ταύτης. Ariſtox. p. 1. init.

(16) Plutarchus dialogo de Muſica ſex tantum priores turbato etiam ordine recenſet, cum tamen crebram μελοποιΐας mentionem injiciat, adeoque, non una ratione excuſari illud poteſt. Not. in Gaudientium, p. 30.

(17) Μελοποιΐα δέ ἐστι χρῆσις τῶν ὑποκειμένων τῇ ἁρμονικῇ πραγματείᾳ, πρὸς τὸ οἰκεῖον ἑκάστης ὑποθέσεως. Euclid. Introd. Harmon. p. 2. v. 5. & p. 22. v. 18.

will lead us to the origin of the doctrines they contained.

The object of melopœïa was propriety in the uſe of the harmonic elements, as appears from the definition juſt cited. In what this propriety conſiſted, it is difficult to know, as no collection of the rules of this ſcience is come down to us: it is not to be learnt from the harmonic writers, who treat very ſlightly of this branch; and thoſe of them, who are the fulleſt upon it, as Ariſtides Quintilianus and Manuel Briennius, wrote in later times, when the faſhion of muſic was changed, and a new kind of melopœïa prevailed, with the rules of which the earlier muſicians could hardly have been acquainted; as, on the other hand, many of the earlier rules muſt have been forgot, or, in a great meaſure, diſuſed. There is more light to be procured from the dialogue of Plutarch, and ſome others, who ſpeak occaſionally of the practice of muſic. I do not propoſe to collect any thing here upon this ſubject, as, indeed, there does not ſeem to be ſufficient materials left us for a thorough explanation of it, which would require no leſs than a complete hiſtory of the ſcience of its muſic, and its improvements: it is ſufficient for my purpoſe to ſay, that, in the earlier times, when the beſt muſic is ſuppoſed to have prevailed, the genera, modes, rhythmi, metres, *&c.* were not employed indiſcriminately, nor even left to the diſcretion of the muſician, but were under particular reſtrictions, which confined them to the arguments, to which they were held reſpectively the beſt adapted; and that it was from the mixture of theſe ingredients, that aroſe the ethic character of the compoſition. Hence the ſeveral

nomi

nomi took their riſe; of which there is, in the dialogue of Plutarch, an ample account. As what I am now advancing cannot but be well known, I need look no farther for the proof of it, than to a paſſage of Plato's third book of laws, where he complains of a licence beginning even in his time to the prejudice of the ſcience. Speaking of times paſt,

Our muſic (ſays he) was then divided according to certain ſpecies, and figures thereof. Prayers to the gods were one ſpecies of ſong, to which they gave the name of hymns: oppoſed to this was another ſpecies, which, in particular, might be called threni; another, pæones; and another, the birth of Dionyſius, which I hold to be the dithyrambus: there were alſo citharœdic nomi, ſo called, as being ſtill another ſong. Theſe, and ſome others, being preſcribed, it was not allowable to uſe one ſpecies of melos for another.——But afterwards, in proceſs of time, the poets firſt introduced an unlearned licence, being poetic by nature, but unſkilled in the rules of the ſcience, trampling upon its laws, over attentive to pleaſe, mixing the threni with the hymns, and the pæones with the dithyrambi, imitating the muſic of the flute upon the cithara, and confounding all things with all, *&c.* (18).

This

(18) Διηρημένη γὰρ τότε ἦν ἡμῖν ἡ μουσικὴ κατ' εἴδη τε ἑαυτῆς ἄττα καὶ σχήματα· καὶ τι ἦν εἶδος ᾠδῆς εὐχαὶ πρὸς θεούς· ὄνομα δὲ ὕμνοι ἐπεκαλοῦντο· καὶ τούτῳ, δὲ τὸ ἐναντίον ἦν ᾠδῆς ἕτερον εἶδος· θρήνους δὲ τὶς ἂν αὐτοὺς μάλιστα ἐκάλεσε· καὶ παιῶνες, ἕτερον καὶ ἄλλο Διονύσου γένεσις, οἶμαι, διθύραμβος λεγόμενος· νόμους τε αὐτὸ τοῦτο τοὔνομα ἐκάλουν ᾠδὴν ὥς τινα ἑτέραν ἐπέλεγον δὲ κιθαρῳδικούς. Τούτων δὲ διατεταγμένων καὶ ἄλλων τινων οὐκ ἐξῆν ἄλλῳ εἰς ἄλλο καταχρῆσθαι μέλους εἶδος. —Μετὰ δὲ ταῦτα προϊόντος τοῦ χρόνου, ἄρχοντες μὲν τῆς ἀμούσου παρα-

νομίας

This paſſage, with what has been ſaid, being ſufficient to give a general idea of the ſcope of melopœïa, I ſhall paſs to that of harmonic.

We have already ſeen, that the theoretic diviſion of muſic was by the author, whoſe diſtribution I have followed, ſubdivided into natural and artificial, and that harmonic came under the latter. The antients, indeed, ſeem not all to have treated the ſcience under ſuch narrow limits, the phyſical properties of ſound, the ratios of intervals, *&c.* appearing to have been conſidered therein, by the Pythagorean and other ſchools, as well as the ſtructure of the ſyſtems in uſe. But not to ſtop at this objection, which is not very material, thus far muſt be allowed, that harmonic, as to the greateſt part of its ſcope, was an artificial ſcience, its moſt conſiderable object being to explain and teach the denominations, poſitions, powers, *&c.* of the ſounds of the ſyſtem, and all other inventions in uſe, for facilitating the ſtudy of muſic, or bringing it to greater perfection. Now, in this ſhort view of the ſcience, which is ſufficient for our purpoſe, we may already begin to account for the difference between its doctrines and thoſe of melopœïa, artificial ſciences being but too prone to admit doctrines for convenience, that are repugnant to the truth. This was indeed the caſe with harmonic, as the two doctrines of the tones ſufficiently teſtify; the origin of which I ſhall now conſider.

νομίας ποιηταὶ ἐγίγνοντο, φύσει μὲν ποιητικοὶ, ἀγνώμονες δὲ περὶ τὸ δίκαιον τῆς μούσης καὶ τὸ νόμιμον, βακχεύοντες, καὶ μᾶλλον τοῦ δέοντος κατεχόμενοι ὑφ᾽ ἡδονῆς, κεραννύντες δὲ θρήνους τε ὕμνοις καὶ παιῶνας διθυράμβοις· καὶ αὐλῳδίας δὴ ταῖς κιθαρῳδίαις μιμούμενοι, καὶ πάντα εἰς πάντα ξυνάγοντες. Plat. de Legibus, lib. iii.

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The musical doctrine I look upon as the most antient, and that which exhibited the modes in their proper character; for which reason, it could not avoid making a part, and probably the most essential one, of the doctrines of melopœïa. The precise time when it first came into use, I pretend not, in the midst of uncertainties, to be able to determine; but we may, perhaps, be near the truth, if we refer its origin to the age of Pythagoras, if the eighth string of the lyre was really, as we are told, the addition of that philosopher. The story of his discovering, at a forge, the ratios of hypate, mese, paramese, and nete, is well known. These ratios, which gave rise to the harmonic proportion, and the numbers of which were so vainly applied afterwards, by philosophers, to all the parts of the universe, were drawn from the Dorian species of diapason, which we cannot suppose to have been well understood, till its form existed upon the instrument. What doctrine of the modes prevailed, before the addition of the eighth string, we can only guess at; for it was a question, even with Aristotle (19), how the heptachord lyre had been adjusted; and Nichomachus speaks of that instrument so

(19) Διὰ τί οἱ ἀρχαῖοι ἑπταχόρδους ἁρμονίας ποιοῦντες τὴν ὑπάτην, ἀλλ᾽ οὐ τὴν νήτην κατέλιπον; πότερον τοῦτο ψεῦδος, ἀμφοτέρας γὰρ κατέλιπον, τὴν δὲ τρίτην ἐξῄρουν; ἢ οὔ, ἀλλ᾽ ὅτι ἡ βαρυτέρα ἰσχύει τὸν τῆς ὀξυτέρας φθόγγον, ὥστε μᾶλλον ἡ ὑπάτη ἀποδίδου τὸ ἀντίφωνον ἢ ἡ νήτη· ἐπεὶ τὸ ὀξὺ δυνάμεως μᾶλλον, τὸ δὲ βαρὺ ῥᾷον φθέγξασθαι. Aristot. Probl. sect. 19. qu. 7.

Διὰ τί οἱ ἀρχαῖοι ἑπταχόρδους ποιοῦντες τὰς ἁρμονίας τὴν ὑπάτην ἀλλ᾽ οὐ τὴν νήτην κατέλιπον; ἢ οὐ τὴν ὑπάτην, ἀλλὰ τὴν νῦν καλουμένην παραμέσην ἀφῄρουν καὶ τὸ τονιαῖον διάστημα, ἐχρῶντο δὲ τῇ ἐσχάτῃ μέσῃ τοῦ ἐπὶ τὸ ὀξὺ πυκνοῦ, διὸ καὶ μέσην αὐτὴν προσηγόρευσαν; ἢ ὅτι ἦν τοῦ μὲν ἄνω τετραχόρδου τελευτή, τοῦ δὲ κάτω ἀρχή, καὶ μέσον εἶχε λόγον τόνῳ τῶν ἄκρων. Probl. sect. 19. qu. 48.

confusedly,

confuſedly, as to have given room for a ſuppoſition (20), that it had received two forms, the ſeven ſtrings anſwering, in the oldeſt form, to our notes *e*, *f*, *g*, *a*, *b*♭, *c*, *d*, and in the new one, to *e*, *f*, *g*, *a*, *b*, *d*, *e*. However this may have been, neither the muſical nor the harmonic doctrines could be then in uſe, exactly as they were taught in after times; and the probability ſeems to be, that the modes were in thoſe days characterized by the ſpecies of the leſſer conſonances, diateſſaron and diapente; but the theory of the Dorian ſpecies of diapaſon, we may be ſure, took place about the time, when the lyre was brought to that compaſs; and the other ſpecies, though they might have exiſted before, in the melody of particular inſtruments; as for inſtance, the barbarous Phrygian, upon its flute, could hardly have been taken into the Greek theories of the ſcience, till the extenſion of their own favourite inſtrument had brought the diapaſon under conſideration: ſo that the origin of the muſical doctrine of the modes, is, with great probability, to be referred to this improvement of the lyre.

I come now to the harmonic doctrine, for the origin of which we muſt look to the invention of the ſyſtem. The greater perfect ſyſtem, upon whoſe pitch the modes depended, by the harmonic doctrine, conſiſted, as I have already ſhewn, of fifteen ſounds, anſwerable to thoſe of the lyre; and it is reaſonable

(20) Ut ex his difficultatibus nos expediamus, duas, non opiniones, ſed ætates ſtatuere debemus, quibus aliter obtinuerint intervalla in ſeptem chordis. Meibomius in Nichomachum, p. 52. See alſo Nichomachus, p. 9. v. 14. & ſeq. & p. 17. v. 24. & ſeq.

to

to think, that the ſtructure of it was not ſettled, till the inſtrument had been again extended to the compaſs of a diſdiapaſon, by the additions of the tetrachords hyperbolæon and hypaton, and of the ſound proſlambanomenos: for this change the age of Alexander the Great may, perhaps, be a probable æra; for, in the muſical problems of Ariſtotle, I obſerve no mention of the new tetrachords, though many of the queſtions concern the ſtrings of the lyre; and yet there is no doubt of their being in uſe in the time of Ariſtoxenus, his diſciple. Should I be near the truth in this, the muſical doctrine will then appear to have been earlier than the harmonic, by the whole period from Pythagoras to Alexander. But, without being ſollicitous about the preciſe time when the harmonic doctrine was introduced, I ſhall, with more certainty, endeavour to point out what muſt have given occaſion to it.

The ſtudy of the muſic of the antients, though they ſeem not to have much uſed compoſition in parts, muſt yet have been very perplexing, from the variety only of the tones and genera; and ſome help might well be thought neceſſary, even in the time of the octachord lyre. But when ſeven new ſtrings were given to the inſtrument, and theſe placed not all at one end, but three at the acute, and four at the grave, the eight old ſtrings, upon which the characteriſtic ſpecies of melody for each mode had been always exhibited, became confounded by theſe additions; and poſſeſſing now the center of the lyre, it was difficult to diſtinguiſh them, and to preſerve for each mode its proper character as before. This difficulty muſt alſo have been increaſed, by the change introduced

introduced in the practice of the ſcience; for both the players and compoſers, having now a greater latitude, would not fail to take advantage of the enlargement; and though the ſkilful among them might, in their excurſions upon the new ſtrings, preſerve a due attention to the proper characters of the ſeveral modes, yet the melody peculiar to each could not be ſo eaſily comprehended, when carried beyond its uſual limits. An artificial help, therefore, to the learner, was now become indiſpenſably neceſſary; and with this view, I make no doubt, but that the ſyſtem was invented. It was, indeed, admirably well contrived for the purpoſe; for its ſucceſſion being the ſame with that of the lyre, in its Dorian tuning, with which the Greeks muſt have been the beſt acquainted, as being the proper mode of their favourite inſtrument, it was the moſt eaſy to be learnt and retained, and the knowlege of this ſucceſſion was all now required; for, by imagining only the ſyſtem removed to ſome other pitch, and tuning all the ſtrings in the ſame relations to a new meſe, the melody of the old eight ſtrings was thereby changed, and a new ſpecies of diapaſon gained thereon, without the trouble of ſtudying the the muſical doctrine, which was now left to the muſician, or melopœius, who was anſwerable for the choice of the ſucceſſions he ſelected for his various ſubjects, whilſt the harmonician followed him through the intricacies of his compoſitions, by the eaſier method of the tranſpoſition of the ſyſtem. And this I apprehend to have been the origin, both of the ſyſtem itſelf, and of the harmonic doctrine of the tones. But now, as it often happens, what was deſigned for the improvement of the ſcience, became,

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in time, the ruin of it; for, after the reception of the diſdiapaſon ſyſtem, the elementary treatiſes, as we ſee by what is left to us of them, became filled with this new doctrine of the parts and relations of the ſyſtem, of its tranſpoſitions, of the poſitions of the meſe, of ſounds in power, and ſound by poſition, and many other doctrines flowing from the ſame ſource, till, in time, the ſyſtem itſelf came to be conſidered as the true type of a mode; and a number of new modes were introduced, that were grounded on no other principle than this, which I ſcruple not to call a falſe doctrine of them, though the antients admitted it for convenience, as I have ſhewn, and thereby almoſt loſt their impreſſions of the new one.

Having thus pointed out the origin of theſe two doctrines, as far as was poſſible, from a general view of them, and without entering into a critical examination of the many paſſages of the antients, that might help us to greater certainty, I ſhall now proceed,

Fifthly, To ſhew how far the preceding explanations may be ſupported by arguments, or warranted by the teſtimony of antient writers.

Here I muſt repeat, that the harmonic doctrine of the tones, as I have explained it, is found, expreſly delivered under its proper head, in almoſt every writer on the ſubject; and that the doctrine of the ſpecies of diapaſon is found alſo in the harmonic treatiſes, though not under the head of tones, nor expreſly applied to them. Now, this being the caſe, I ſhall have no occaſion to waſte time in bringing

particular proofs, to ſupport the explanations I have given of theſe two doctrines ſeparately. What immediately lies upon me is, to prove, that the doctrine of the ſpecies of diapaſon had a connection with the modes; and to juſtify the manner, in which I have combined the two doctrines in the canon, and in the diagrams framed from it. With this view, therefore, I ſhall direct my arguments to the proving of the five following points.

1. That the doctrine of the ſpecies of diapaſon was a doctrine of the modes.

2. That this doctrine was not diſtinct from, nor independent of, the harmonic, but ſo connected with it, that a mutation, according to the one, produced the alteration required by the other.

3. That the ſpecies of diapaſon, as taken practically on the lyre, lay all at the ſame pitch.

4. That this pitch was the diapaſon, between the ſtrings hypate meſon and nete diezeugmenon, as they ſtand in the diagram.

5. I ſhall endeavour to ſhew, that it was the muſical doctrine, and not the harmonic, that exhibited the true character of the modes, as conſidered in reſpect to their effects.

To begin with the firſt point. That the doctrine of the ſpecies of diapaſon was a doctrine of the modes, might, perhaps, be inferred from ſome of the definitions given of a mode; but as theſe definitions are moſtly intermixed with, if not drawn ſolely from, the harmonic doctrine, and hence have given room for diſputes, I ſhall reſt this point upon three arguments, in which the definitions are not concerned.

Firſt,

Firſt, Becauſe the ſpecies are denominated after ſeven of the modes, which could hardly have ariſen from any other cauſe, than their connection with them.

2dly, Becauſe the whole reaſoning of Ptolemey, in the ſixth, ſeventh, eighth, ninth, tenth, and eleventh chapters, of his ſecond book, tends to reduce the modes to the number of the ſpecies of the diapaſon; which, as far as his opinion goes, is an expreſs confirmation, that the muſical doctrine was a doctrine of the modes.

3dly, Becauſe Ptolemey is not ſingle in this opinion, as ſome may have thought, but is ſupported in it by the Ariſtoxenian writers, who, though they admitted thirteen modes, upon the falſe principle of the harmonic doctrine, did, in fact, reduce them to eight, on the very principle of Ptolemey, calling the Hyperionian mode, which gave the ſame ſpecies with the Mixolydian, the acuter Mixolydian; and calling alſo the Æolian, the graver Lydian; the Ionian, the graver Phrygian; the Hypoæolian, the graver Hypolydian; and the Hypoionian, the graver Hypophrygian; the former of all which modes gave, reſpectively, the ſame ſpecies with the latter. So that, to make their doctrine anſwer to that of Ptolemey, there wanted but the reduction of one mode more, which was their Hyperphrygian. And it is not to be conceived, but that they ſaw this mode alſo to be a repetition of the Hypodorian; but as this repetition was at the diſtance of an octave, and the other five were repeated at the difference only of a ſemitone in pitch, they could not have called this the acuter Hypodorian, without uſing the ſame expreſſion in too great a lati-

tude of ſenſe. And this might be the reaſon why they omitted taking notice of that circumſtance attending this mode; though we might perhaps, with ſafety to the argument, go a ſtep farther, and ſuppoſe, that the Ariſtoxenians might think a difference of an octave in pitch worthy of a diſtinct denomination, though they would not allow it to that of a ſemitone. And this is the more probable, as we find they did not abſolutely reject theſe modes, as Ptolemey did, but admitted them upon the principles of the harmonic doctrine, though, by their denominating five of them from the genuine modes, it is plain they acknowleged them to be ſuperfluous, in reſpect to the muſical. I cannot ſay more to this point, without defrauding the ſubſequent ones; and I ſhall therefore leave it, with this remark, that whatever is proved of the ſubſequent points, and eſpecially of the fifth, muſt hold true of this, *à fortiori*; ſo that it may really be ſaid to have the ſupport of the whole teſtimony.

2. To the ſecond point, the firſt diagram ſpeaks very ſtrongly; for had the two doctrines no relation to each other, no ſuch coincidence, as is there found, could have been expected, in the reſult of their combination; and this proof, from the coincidence of the doctrines in the diagram, becomes much ſtronger, if we attend to theſe two circumſtances. Firſt, That in the canon, upon which the diagram has been conſtructed, there is no ſtrain of either doctrine, but a plain and natural combination of them, as they are ſtated ſeparately by the antient writers. And ſecondly, That the ſpecies of diapaſon, as brought out by this combination, all fall upon the ſtrings of the old octachord

octachord lyre, where it was natural to expect them; for when the lyre had but eight ſtrings, the ſpecies could be taken no where elſe; and it cannot be thought, but that, after the extenſion of the inſtrument, they were taken at the ſame pitch as before, unleſs we ſhould ſuppoſe, that the new ſtrings brought with them an immediate change, both of the theory and practice of the ſcience, which is moſt improbable. We ſee our modern harpſichords have more keys given to them than thoſe of the laſt century; and yet neither the poſitions of the cliffs, nor any other circumſtances attending our theories of the ſcience, have been altered by them. But that this point may not reſt wholly on the circumſtances of the diagram, I ſhall produce four paſſages, that plainly ſhew the relation between the two doctrines. The firſt from Ariſtoxenus.

"Now, as ſome of thoſe [ſyſtems] which we employ in muſic, are ſimple, and others mutable, we muſt treat of mutation; and firſt of this, what mutation is, and how it is accompliſhed; now, I ſay, there happens, as it were, a pathos in the melody; afterwards, how many mutations there are in all, and according to what intervals (21)."

In this paſſage, the author is ſpeaking of the ſixth diviſion of harmonic, which was mutation; and more particularly of mutation with reſpect to tone, which, in this diviſion, was always treated upon the

(21) Ἐπεὶ δὲ τῶ μελῳδουμένων ἐστὶ τὰ μὲν ἀπλᾶ, τὰ δὲ ἀμετάβολα, [corrige, ἐμμετάβολα] περὶ μεταβολῆς ἂν εἴη λεκτέον· πρῶτον μὲν αὐτὸ, τί ποτ' ἐστὶν ἡ μεταβολὴ, καὶ πῶς γινόμενον. Λέγω δ' οὖ πάθος τινὸς συμβαίνοντος ἐν τῇ τῆ μελῳδίας τάξει. Ἔπειτα πόσαι εἰσὶν αἱ πᾶσαι μεταβολαὶ, καὶ κατὰ πόσα διαστήματα. Ariſtox. p. 38. v. 7.

principle

principle of the harmonic doctrine, and is ſo here; but he tells us, there was a pathos in the melody, which can only relate to the muſical doctrine, and therefore ſhews their connection. In the next paſſage, from Ariſtides Quintilianus, it is more plainly hinted at.

" For if a certain type of the voice follows each ſyſtem, it is manifeſt, that the ſpecies of the melos will be altered with the harmonics (22)."

But the two following paſſages from Ptolemey will put the matter out of diſpute.

" For we are not to imagine this conſtitution of the mutation, according to the tone, eſtabliſhed for ſake of graver or acuter voices, (ſince the intenſion, or again the remiſſion of whole inſtruments, ſuffices for ſuch a difference, no alteration being produced in reſpect of the melos, the whole being executed by performers of graver or acuter voices); but with this view, that the ſame melos, begun by the ſame voice, now from acuter places, and now from graver, may produce a certain change of ethos; becauſe that in the permutations of the tones, the extremities of the voice do not anſwer to both the extremities of the melos; but in one, the extremity of the voice always falls ſhort of that of the melos; and in the other, the extremity of the melos of that of the voice: ſo as that the ſame melos, which at firſt (meaning in the Dorian) anſwered to the compaſs of the voice, now falling ſhort

(22) Εἰ γὰρ ἑκάστῳ συστήματι καὶ ποιός τις ἐπακολουθεῖ τῆς φωνῆς τύπος δῆλον ὡς ἅμα τῇ ἁρμονίαις καὶ τὸ τῆς μέλους εἶδος ἀλλοιωθήσεται. Ariſtid. Quintil. p. 24. v. ult.

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of it, and now again exceeding it, may give to the ear the impreſſion of another mode (23)."

" For of the mutations in reſpect to tone, ſo called, there are two principal differences, the one by which we run through the whole melos in an acuter tenſion, or again in a graver, preſerving always the ſucceſſion of the ſpecies. The other, by which there is an alteration, not of the whole melos in its tenſion, but only of a part thereof, from the ſucceſſion it ſet out with. Wherefore, this laſt might be called rather a mutation of the melos, than of the tone; for, according to the former, the melos is not altered, but the tone (tenſion) of the whole; whereas, according to the latter, the melos varies from its proper order, and the tenſion varies not as tenſion, but as on account of the melos. Hence the former does not ſtrike the ſenſe with an idea of that alteration, according to power, by which the ethos is changed, but only of an alteration in reſpect to the being acuter or graver; whereas the latter cauſes the ſenſe to drop from the uſual and expected melos, the ſucceſſion being preſerved ſome time, and then making a tran-

(23) Οὐδὲ γὰρ ἕνεκεν τῶν βαρυτέρων ἢ ὀξυτέρων φωνῶν ἔυρεσιμον ἂν τὴν σύστασιν ἢ κατὰ τὸν τόνον μεταβολῆς γεγεννημένην· ὥστε πρὸς τὴν τοιαύτην διαφορὰν ἡ τῶν ὀργάνων ὅλων ἐπίτασις, ἢ πάλιν ἄνεσις ἀπαρκεῖ, μηδεμιᾶς γε παραλλαγῆς περὶ τὸ μέλος ἀποτελουμένης, ὅταν ὅλον ὁμοίως ὑπὸ τῶν βαρυφωνοτέρων ἢ τῶν ὀξυφωνοτέρων ἀγονισῶν διαφαίνηται· ἀλλ' ἕνεκα τῆς κατὰ τὴν μίαν φωνὴν τὸ αὐτὸ μέλος ποτὲ μὲν ἀπὸ τῶν ὀξυτέρων τόπων ἀρχόμενον, ποτὲ δὲ ἀπὸ τῶν βαρυτέρων, τεθπήν τινα τῆς ἤθους ἀποτελεῖν τοῦ μηκέτι πρὸς ἑκάτερα τὰ πέρατα τῆς μέλους συναπαρτίζεσθαι τὰ τῆ φωνῆς ἐν τοῖς τόνων ἐναλλαγαῖς· ἀλλ' ἀεὶ παραλαλήγειν, ὅπη μὲν θάτερα, τὸ τῆ φωνῆς πέρας τῆς τοῦ μέλους· ὅπη δὲ τἀναντία, τὸ τῆς μέλους πέρας τῆς τῆ φωνῆς· ὥσπερ τὸ ἐξαρχῆς ἐφαρμόσαν τῆ διαστάσει τῆ φωνῆς μέλος, πῆ μὲν ἀπολεῖπον ἐν ταῖς μεταβολαῖς, πῆ δὲ ὑπολαμβάνον, ἑτέρας ἤθους φαντασίαν παρέχει τοῖς ἀκροαταῖς. Ptol. Harm. lib. ii. c. 7.

sition,

ſition to another ſpecies, whether according to genus or tenſion (24)."

3. The third point will receive much ſupport from theſe two conſiderations; firſt, That diapaſons, variouſly divided and variouſly bounded, alſo ſeem to form a more complicated theory, than can well be ſuppoſed to have prevailed in early times, when muſic had not yet loſt its natural ſimplicity; and ſecondly, That the compaſs of the inſtrument, in its octachord ſtate, would not admit of any variation, in reſpect to the bounding ſounds. But there is teſtimony to this point alſo: I ſhall cite one pretty remarkable paſſage, from Ariſtides Quintilianus, which will be ſufficient, as the proof of the next point neceſſarily carries this along with it. Ariſtides, who, in his explanations of the harmonic doctrines, follows the method of the Ariſtoxenians, coming under the head of ſyſtems, to treat of the ſpecies of diapaſon, after explaining their ſituation in the immutable ſyſtem, and aſſigning their denominations, immediately ſubjoins:

" Hence it is plain, that if we make our firſt ſign the ſame, though denominated in different caſes from

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(24) Εἰσὶ δὲ αἱ, παρὰ τὸ ὅτῳ λεγόμενον τόνον, μεταβολῶν δύο πρῶται διαφοραί· μία μὲν καθ' ἣν ὅλον τὸ μέλος ὀξυτέρᾳ τάσει διέξιμεν, ἢ πάλιν βαρυτέρᾳ, τηρήσεις τὸ διὰ παντὸν τῆς εἰδύος ἀκόλουθον· δευτέρα δὲ, καθ' ἣν οὐχ ὅλον τὸ μέλος ἐξαλλάσσεται τῇ τάσει, μέρος δέ τι παρὰ τὴν ἐξαρχῆς ἀκολουθίαν· διὸ καὶ καλοῖτ' ἂν αὕτη, τῆς μέλους μᾶλλον, ἢ τῆς τόνου μεταβολή. Κατ' ἐκείνην μὲν γὰρ οὐκ ἀλλάσσεται τὸ μέλος, ἀλλ' ὁ δι' ὅλου τόνος· κατὰ ταύτην δὲ, τὸ μὲν μέλος ἐκφέρεσθαι τὴν οἰκείας τάξεως· ἡ δὲ τάσις, οὐχ ὡς τάσις, ἀλλ' ὡς ἕνεκα τῆς μέλους· ὅθεν ἐκείνη μὲν οὐκ ἐμποιεῖ τὴν αἴσθησιν φαντασίαν ἑτεροτήτος τῆς κατὰ τὴν δύναμιν, ὑφ' ἧς κινεῖται τὸ ἦθος, ἀλλὰ μόνης τῆς κατὰ τὸ ὀξύτερον ἢ βαρύτερον· αὕτη δὲ ὥσπερ ἐκφαίνειν αὐτὴν ποιεῖ τῆς συνήθους καὶ προσδοκωμένης μέλους, ὅταν ἐπὶ πλέον μὲν συνείρηται τὸ ἀκόλουθον, μεταβαίνῃ δὲ τῆς πρὸς ἕτερον εἶδος, ἤτοι κατὰ τὸ γένος, ἢ κατὰ τὴν τάσιν. Ptol. Harm. lib. ii. cap. 6.

a different

a different power of ſound, the quality of the harmony will become manifeſt, from the ſucceſſion of the ſounds in order (25).

In this paſſage, it is to be obſerved, that the term σημειον, a ſign, ſignifies a muſical character, ſuch as the antients uſed to write over the words of a ſong, to expreſs the air, or tune; and that each of theſe characters repreſented not a ſound of the ſyſtem, ſubject to tranſpoſition, but, like the notes of our gamut, a ſound of a certain pitch, or at leaſt liable to very ſmall variations only, from the generic differences. The term, therefore, is properly uſed here by Ariſtides, in oppoſition to φθογγος, a ſound of the ſyſtem, whoſe pitch depended on the mode in which it was employed. As to the expreſſion, quality of the harmony, it evidently reſpects the ſpecies of diapaſon; ſo that the author plainly means to tell us, that if we begin a diapaſon always with the ſame note, the ſucceſſion of its ſounds, that is, the manner in which it is divided, will determine the ſpecies: and ſo far he ſpeaks to our purpoſe. But this point will receive farther proof, from what we ſhall ſay upon the next.

4. The fourth point being the natural reſult of the combination of the two doctrines, carries a ſort of conviction with it; and the ſtronger, as not only the ſeven modes, but the whole fifteen, aſſiſt the proof, as will appear, on examining the table I have given of them: for there the ſounds lying between the

(25) Ἐκ δὴ τούτου φανερὸν, ὡς ἡ ταυτὸν ὑποδεμένοις σημεῖον πρῶτον, ἄλλοτε ἄλλη δυνάμει φθόγγε καλουμαζόμενον, ἐκ τῆς τ ἐφεξῆς φθόγγων ἀκολουθίας τὴν τῆς ἁρμονίας ποιότητα φανερὰν γίνεσθαι συμβαίνει. Ariſt. Quint. p. 18. v. 7.

ſtrings hypate meſon and nete diezeugmenon fall out ſo, as to give the proper ſpecies for every mode; which circumſtance will not attend any other boundaries, common or varying, without altering the poſitions of the meſe, and thereby diſturbing the harmonic doctrine. But we have from Ptolemey ſufficient teſtimony to this point. In the eleventh chapter of his ſecond book, of which I have given a tranſlation above, we ſee, that the diapaſon in queſtion is choſen by him, to exhibit the diviſions, that belong to the ſeveral ſpecies. 'Tis true, he ſeems to inſinuate, that any other diapaſon might have been choſen, were it not for the difficulty the voice finds in running to the extremes: and in this, as a theoriſt, he is right; for muſical relations and proportions, conſidered as objects of mere ſpeculation, may be conceived at any pitch; but in the caſe before us, it was the practice of the inſtrument, that governed the theory. The pitch of the lyre had been made to anſwer to the double octave of the human voice; the pitch of the ſyſtem, in the Dorian mode, anſwered to that of the lyre; and, in every other mode, the difference in pitch from that of the Dorian was determined. Now, under ſuch limitations, that took their riſe from practical muſic, it is evident, that no other diapaſon, but that inſtanced by Ptolemey, could have ſerved his purpoſe.

But that the boundary of the ſpecies is rightly adjuſted in the diagram, there is yet another ſtrong teſtimony, from the tables of Ptolemey, annexed to the fifteenth chapter of book ſecond. To make this proof evident, it will be neceſſary to give ſome account of this part of his work.

In

In the twelfth chapter of book ſecond, he begins to treat of the ſections of the harmonic canon, for proving, by experiment, the truth of the ratios he had delivered for the genera, and propoſes to exhibit theſe ſections for each genus, in all the ſeven tones. Then, after ſhewing the defects of the monochord canon in uſe, and (chapter thirteenth) the inſufficiency of the improvements made thereon by Didymus, he propoſes, and explains, his own method of applying the canon to eight ſtrings tuned in uniſon. But, before he proceeds to give the ſections upon all the tones, he thinks it neceſſary to ſhew, by experiment, the advantage of his own numbers, above thoſe of preceding harmonicians; for which purpoſe, the expoſition of them in one tone, that is, in the immutable ſyſtem, was ſufficient. Accordingly, in chapter fourteenth, (the greateſt part of which has been loſt, and is ſupplied from conjecture by Wallis) and in the tables annexed, he gives the ſections of the Dorian ſpecies of diapaſon; where the diazeuctic tone, lying in the middle, left a complete tetrachord on each ſide, for the expoſition of the generic numbers; and compares his own ratios with thoſe of Archytas, Eratoſthenes, Ariſtoxenus, and Didymus. Then, in the fifteenth chapter, he proceeds, as he propoſed, to give the ſections according to his own ratios, for the genera moſt in uſe in all the ſeven tones: theſe ſections he has included in two ſets of tables, each ſet containing ſeven, *viz.* one for each mode; and each table being again ſubdivided into five, for the generic differences. Now, of theſe two ſets of tables, the firſt juſtifies the diagram; for here he has given his numbers upon the eight ſtrings, from nete diezeug-

menon to hypate meſon; ſo that the diagram and the tables agree in every reſpect, except the generic differences, which I had no occaſion to conſider. In the ſecond ſet, indeed, the numbers are applied to the diapaſon, from meſe to proſlambanomenos; and there being no explanation in this chapter of the diſtinct uſe of this ſecond ſet, nor any reaſon aſſigned for giving it, but the convenience of having the option, to begin the tuning from nete or meſe (26), this may ſeem to furniſh an objection to the proof propoſed to be gained from theſe tables: but if we look forward to the ſecond chapter of his third book, we ſhall there ſee his meaning; which I ſhall proceed to explain.

Having, in the ſixteenth chapter, ſhewn how the numbers, given in the two ſets of tables, are to be applied to an octachord canon, he propoſes, in the firſt chapter of the third book, to ſhew, how the diviſions for the fifteen ſounds of the whole diſdiapaſon ſyſtem might, if required, be found, according to the ſame ratios he had already aſſigned for the extent of a diapaſon. Now, for the doing this, two inconveniences were to be obviated. Firſt, If the inſtrument, on which this experiment was to be tried, was to receive an addition of ſeven ſtrings, to complete the diſdiapaſon, and theſe additional ſtrings were all to be in uniſon with the eight before applied, it would happen, that, in ſhifting the moveable magas, or bridge, to the ſections required, thoſe ſtrings, which were to exhibit the acute ſections of the tetra-

(26) Ἵν' ἔχωμεν ἀφ' ὁποτέρας ἂν τῶν ἀρχῶν πειρώμεθα ποιεῖσθαι τὰς ἁρμογάς. Ptol. Harm. p. 174. v. ult.

chord

chord hyperbolæon, would have ſo little ſpace left between the magas and the extremity of the ſtring, that it would be difficult for them to yield a diſtinct ſound. And ſecondly, The canon muſt be crowded with theſe additional diviſions, which would alſo have its inconvenience. To remedy this, he propoſes ſeveral methods; the firſt of which is, to fit the inſtrument with fifteen ſtrings, of which the eight, that were to receive the diviſions from meſe to nete hyperbolæon, ſhould be in uniſon, at the pitch of meſe, and the other ſeven in uniſon, at the pitch of proſlambanomenos. Now, as the ſucceſſion from the ſtring proſlambanomenos to the ſtring meſe, though it varied with the modes, was yet, in the ſame mode, always the ſame with that from meſe to nete hyperbolæon, the difference of a diapaſon in pitch excepted, it is plain, that, under this adjuſtment, a canon divided for the one diapaſon would ſerve equally for the other, the difference in pitch being eſtabliſhed before in the open ſtrings. By this method, therefore, the diviſions for the acuter diapaſon would be as large as thoſe for the graver, and the canon needed not to be crowded with a greater number of diviſions, than had been uſed for the ſingle diapaſon, by reaſon of its double application. The other methods, which he propoſed, I need not go through the explanation of, farther than to remark, that, for thoſe, as well as for this, a freſh ſet of numbers was neceſſary, thoſe contrived for the ſucceſſion of the diapaſon, from hypate meſon to nete diezeugmenon, being no-ways applicable to a ſucceſſion, which began from proſlambanomenos or meſe. And this, it ſeems, was his reaſon for giving the ſecond ſet of tables in his fifteenth chapter,

chapter, as appears from his own words, in the ſecond chapter of the third book.

In general, for ſuch uſes, as comprehend a diapaſon only, it behoves us to employ, out of the numbers exhibited, thoſe which contain the ſection from nete diezeugmenon, that the melos may be taken in the middle tenſions; but for ſuch as comprehend the diſdiapaſon, thoſe exhibited from nete hyperbolæon, or meſe, that the tuning may be adjuſted at both extremities alike (27).

Here we ſee he fully explains his former meaning; and, in recommending his firſt ſet of tables for the uſes of a diapaſon, gives the ſame reaſon for the choice of that diapaſon in particular, as he aſſigns for it in the eleventh chapter of the ſecond book, *viz.* that the melos may poſſeſs the middle of the inſtrument. But it muſt be obſerved, that when the whole diſdiapaſon has been adjuſted by the ſecond ſet of tables, the tunings of the eight ſtrings, from nete diezeugmenon to hypate meſon, will come out, for every mode and genus, the very ſame, as if they had been tuned by the firſt ſet: ſo that no inference can poſſibly be drawn from thence, either that the author has varied as to his own meaning, or that the diagram, which I have given, does not correſpond with it.

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(27) Καθόλου δὲ προσακτέον, τοὺς ἐκκειμένους ἀριθμοὺς ταῖς μὲν τὸ διὰ πασῶν μόνον περιεχούσαις χρήσεσι, τοὺς ἀπὸ τῆς νήτης τῶν διεζευγμένων ἔχοντας τὴν κατατομήν· ἵν' ἐν ταῖς μέσαις τάσεσιν ἐκλαμβάνηται τὸ μέλος· ταῖς δὲ τὸ δὶς διὰ πασῶν, τοὺς ἀπὸ τῆς νήτης τῶν ὑπερβολαίων, ἢ τῆς μέσης, ἐκτεθειμένους· ἵνα κατ' ἀμφοτέρων τῶν ἄκρων καὶ ὁμοίων ἐφαρμόζεσθαι δύνηται. Ptol. Harm. p. 228. v. 15.

5. I come now to the fifth point, which has been the ſubject of much diſpute, and which might well afford an endleſs controverſy, whilſt the union of the two doctrines was not underſtood; for whatever reaſons, from probability or teſtimony, might be urged in favour of the muſical, the harmonic doctrine appearing to be ſtill better ſupported, and ſeeming to contradict the other, was ſure to ſuſpend the deciſion, at leaſt, if not gain one in its own favour. But the agreement between the two doctrines being ſhewn, and their views diſtinguiſhed, the teſtimony borne to the harmonic doctrine will no longer be in the way of the muſical, and we may ſafely allow whatever appears favourable to the latter, its full weight. I ſhall therefore offer, in ſupport of this point, the ſix following arguments.

Firſt, No one accuſtomed to hear and judge of the effects of muſic, can conceive, that a mere alteration in pitch of the ſame melody, though in the hands of the moſt artful maſter, can have ſo powerful an effect, to change the mode or ſtyle of compoſition, as an alteration of the melodious ſucceſſion: or, if this ſhould be aſſerted, it might be diſproved, by an appeal to the works of all the compoſers of eminence among the moderns; who having, in all the variety of their modulations, but one change, that truly anſwers to the muſical doctrine of the modes, *viz.* the change of the ſucceſſion of the ſame key, from the major third to the minor, have all reſerved this change for their pathetic paſſages. I ſhall give but one inſtance of it, from our countryman Purcell, who, in his *Mad Beſs*, has ſo happily introduced this change, upon the words, "Cold and hungry am I

"grown,"

" grown," that if the performer does juſtice to the compoſition, the hearer can ſcarce help fancying himſelf affected with the very ſenſations, with which the ſtarts of frenzy are there pictured.

2dly, If I have been right in aſſigning a greater antiquity to the muſical doctrine, than to the harmonic, the effects of the modes muſt, in earlier times at leaſt, be referred to the former. And this carries with it an argument for later times alſo; for the old principle of the modes could not be ſuddenly changed. And though it may be urged, from the introduction of the eight ſpurious modes, that the harmonic doctrine came, in time, to be conſidered as a principle independent of the other, this will only prove a corruption of the better doctrine, which may ſafely be admitted; though that the muſical doctrine was ever quite diſuſed, unleſs in very late times indeed, I much doubt, as ſome traces of it are found in almoſt all the writers come down to us.

3dly, Ptolemey's rejecting the eight modes, that wanted the ſupport of the muſical doctrine, is another proof. For, if the harmonic doctrine had been the more eſſential of the two, thoſe modes ought to have been preſerved. Nor does the admiſſion of ſix of them, by the Ariſtoxenians in earlier times, weaken the force of this argument: for though the rejecting them is concluſive, againſt the harmonic doctrine, as far as any weight is allowed to the opinion of the rejecter, the argument from their admiſſion will not conclude in its favour, till it be proved, that in the uſe the ſpecies of diapaſon afforded by theſe modes was not attended to, but only the order from the proſlambanomenos, in power of each, as the favourers of the

the harmonic doctrine ſeem to ſuppoſe: and this proof it would not be eaſy to obtain, ſince each of theſe modes had its ſpecies belonging to it, and was only exceptionable, becauſe it repeated the melody of one or other of the ſeven.

4thly, The denominations given by the Ariſtoxenians to five of the ſpurious modes, after the genuine ones, whoſe ſpecies they afforded, furniſh another ſtrong proof; for this could ſcarce have happened, if the pitch of the ſyſtem had been the principal diſtinction.

5thly, We find in Plutarch, Pliny, and other authors, the invention of particular modes aſcribed to particular muſicians; which may be accounted for, on the ſuppoſition, that the modes were ſo many different ſpecies of diapaſon; ſince it requires great art and ſkill to introduce agreeably melodies, to which the ear has not been accuſtomed: but the taking the ſame melody at a different pitch is a variety, for which the inventor would hardly have had his name ſo carefully delivered to poſterity.

But 6thly, there are paſſages, that ſtrongly confirm the preceding arguments. Ariſtoxenus ſpeaks of modes of the melopœi (28), by which I underſtand him to mean the ſpecies of diapaſon, in contradiſtinction to the modes of the harmonicians; for I ſuſpect the modes of melopœïa, mentioned by Ariſtides Quintilianus (29), and divided by him into three kinds, *viz.* nomic, which was netoides; dithyrambic, which was meſoides; and tragic, which

(28) Pag. 40. v. 21.
(29) Pag. 29. v. ult.

was hypatoides; and which are alſo mentioned by other writers, of a low age (30); theſe modes, I ſay, I ſuſpect to be founded on diſtinctions not in uſe ſo early. The uſe of the ſpecies of diapaſon in melopœïa is confirmed alſo by Bacchius, who, immediately after explaining them, expreſſes himſelf thus:

" So many, therefore, in the art of muſic, are the ſpecies of the conſonances, by which every melopœïa is formed (31)."

And alſo by Ariſtides Quintilianus, who concludes his doctrine of the ſpecies, with theſe words:

" And thus much ſuffices concerning ſyſtems, which the antients alſo ſtyled the ethic principles (32)."

For, by ſyſtems, we are here to underſtand ſyſtems in the general ſenſe, as defined and treated by the Ariſtoxenians, whom Ariſtides follows in this part of his work, and more particularly the three conſonant ſyſtems, whoſe ſpecies he had juſt been deſcribing.

The paſſage I have already cited from Plato, ſerves alſo ſtrongly to ſupport this point; for the terms, ſpecies, and figure, are there uſed in the ſtrict technic ſenſe, and not merely to expreſs variety, as appears from his ſpeaking, in the ſame paſſage, afterwards of the ſpecies of melos, the ſenſe of which cannot be miſtaken; and that he is ſpeaking of muſic, in

(30) Martianus Capella, p. 189. v. 21. Manuel Bryennius in Oper. Walliſii, p. 503. v. 14.

(31) Τοσαῦτα μὲν ἔν ἐστι τὰ συμφωνιῶν τὰ εἴδη ἐν τῇ μουσικῇ τέχνῃ, δι' ὧν πᾶσα μελοποιΐα συνίσταται. Bacch. Sen. Introd. Art. Muſic. p. 19. v. 18.

(32) Περὶ μὲν ἓν συστημάτων, ἃ ἡ ἀρχὰς οἱ παλαιοὶ τῶν ἠθῶν ἐκάλεσν, ἀρκεῖτω τοῦτα. Ariſtid. Quintil. p. 18. v. 12.

reſpect

reſpect to its effects, is manifeſt, from the whole paſſage: ſo that, though the modes are not directly mentioned, they are neceſſarily to be implied. But Ptolemey is ſtill more expreſs; for, in the paſſage cited above, from book ſecond, chapter ſeventh, he directly affirms, that the ethos, or character of the mode, depended on the muſical doctrine, and not on the harmonic; and is ſtill more explicit, to the ſame purpoſe, in the paſſage cited alſo from the ſixth chapter of the ſame book. Theſe two paſſages are ſo clear, that there is no evading their teſtimony, but by ſuppoſing the author to be ſingular in his opinion; which there is, indeed, room to think was his caſe, with reſpect to many of the muſicians, his contemporaries; for the pains he has taken to clear up and diſtinguiſh the two doctrines, is a ſufficient proof, that miſtakes had prevailed concerning them; but that what he has advanced is not repugnant to the doctrines held in earlier antiquity, has, I think, been amply ſhewn. I ſhall now cloſe theſe proofs with three remarkable paſſages from Plutarch's dialogue on muſic, which will all become intelligible from the explanation given of this ſubject, at the ſame time, that they will ſerve to confirm it. The firſt reſpects the invention of the Mixolydian mode, which we ſhall ſee he treats as a ſpecies of diapaſon, telling us between what ſounds of the ſyſtem it lay, and in what part of the diapaſon the diazeuctic tone was ſituated; in both which circumſtances, the paſſage agrees with the preceding explanation, and with the firſt diagram.

" Lyſis informs us, that Lamprocles the Athenian, ſeeing, that it (the Mixolydian harmony) had not the

disjunction (diazeuctic tone), where almost every one imagined (meaning in the middle of the diapason, for so it was in the Dorian, which was most familiar to the Greeks), but at the acute, made the figure of it such as that from paramese to hypate meson (33)."

The next passage informs us of a very remarkable circumstance, *viz.* that, after the addition made to the lyre of the tetrachord hypaton, no use was made of those strings in the Dorian mode, though they were employed in the rest. Speaking of the earlier times, and arguing, that the antients had omitted many things, rather from choice than ignorance;

" It is manifest (says he), that, in respect to the [tetrachord] hypaton, it was not through ignorance, that they abstained, in their Dorian [compositions], from this tetrachord; for they employed it in the rest of the tones, as plainly knowing it; but, for the sake of preserving the ethos, they left it out in the Dorian tone, as respecting the beauty thereof (34)."

From this passage it is evident, that the Dorian melody, which, in its proper character, according to the musical doctrine, was terminated by hypate meson, was in such esteem with the Greeks, from a long habit of hearing their best pieces composed in that succession, and within that compass,

(33) Λύσις δέ (φησι) Λαμπροκλέα τὸν Ἀθηναῖον συνιδόντα ὅτι οὐκ ἐνταῦθα ἔχει τὴν διάζευξιν, ὅπου σχεδὸν ἅπαντες ᾤοντο, ἀλλ' ἐπὶ τὸ ὀξύ, τοιοῦτον αὐτῆς ἀπεργάσασθαι τὸ σχῆμα οἷον τὸ ἀπὸ παραμέσης ἐπὶ ὑπάτην ὑπάτων. Plutarch. Dial. de Musica.

(34) Δῆλον δὲ καὶ τὸ περὶ ὑπάτων, ὅτι οὐ δι' ἄγνοιαν ἀπείχοντο ἐν τοῖς δωρίοις τοῦ τετραχόρδου τούτου, αὐτίκα ἐπὶ τῶν λοιπῶν τόνων ἐχρῶντο, δηλονότι εἰδότες· διὰ δὲ τὴν τοῦ ἤθους φυλακὴν ἀφῄρουν ἐπὶ τοῦ δωρίου τόνου, τιμῶντες τὸ καλὸν αὐτοῦ. Ibidem.

that

that the additional ſtrings could not be ventured upon in that mode, though in the reſt they were admitted.

The laſt paſſage is that, which I have mentioned above to have been cenſured by Meibomius: we ſhall ſee here, that the author is expreſly arguing for confining harmonic within its proper ſphere, and not ſuffering it to encroach on melopœïa, by engaging with the rules of propriety, in the uſe of the elements; ſo that it both juſtifies and explains the diſtinction I have made above, between the two ſciences, and turns the cenſure of Meibomius upon himſelf, who ſeems, indeed, without excuſe, unleſs we ſuppoſe him to mean only, that Plutarch, in giving the Ariſtoxenian diviſion, ought not to have ſunk any part of it: which remark would have been juſt, if Plutarch had given the diviſion as ſuch; but he does not name the ſchool, though he adopts their diſtribution of the ſcience as far as the ſix diviſions he approved; ſo that no inconſiſtence can be charged upon him. The latter part of this paſſage alſo confirms the diſtinction I have made between the two doctrines, and their uſe in the two ſciences; ſo that it aſſiſts moſt of the preceding arguments and proofs: and here I ſhall therefore reſt this point, which will ſcarce be thought to need farther ſupport.

For it is evident, that the immediate objects of harmonic are genera, *viz.* thoſe of the hermoſmenon, intervals, ſyſtems, ſounds, tones, and ſyſtematic mutations; and farther than this it cannot go: ſo that we ought not to expect it ſhould determine how far the poet, in his muſic, has properly aſſumed the

Hypo-

Hypodorian tone, for inſtance, for the outſet; or the Mixolydian and Dorian, for the concluſion; or the Hypophrygian and Phrygian, for the middle; ſince the harmonic treatiſe does not extend ſo far, but has need of many others. For of the force of propriety it cannot judge, ſince neither the chromatic nor the enharmonic genus will ever contain a perfect force of propriety, ſuch as to diſcover the ethos of the compoſition, that being the buſineſs of the artiſt. And again, it is plain, that the voice [pitch] of the ſyſtem is to be diſtinguiſhed from the melopœïa wrought in the ſyſtem, the conſideration whereof does not belong to the harmonic treatiſe (35). Having now finiſhed my head of proofs, I come,

Laſtly, To conſider how far this ſubject has been underſtood by Meibomius, Wallis, and ſome few others that have wrote ſince; and in what reſpect their explanations differ from my own.

In reſpect to the opinion of Meibomius, Malcolm tells us, that that writer, in his notes on Ariſtides Quintilianus, affirms the differences of the modes,

(35) Δῆλον γὰρ ὅτι ἡ μὲ ἁρμονικὴ χρῶν τε τῶ ἡρμοσμένῳ καὶ διαςημάτων καὶ συςημάτων καὶ φθόγγων καὶ τόνων καὶ μεταβολῶν συςηματικῶν ἐςι γνωςική, πορρωτέρω ἢ ἐκέτι ταύτην προσελθεῖν δύναςαι· ὥςε οὐδὲ ζητεῖν ἔξω ταύτης τὸ διαγνῶναι δύναθαι πότερον οἰκείως εἴληφεν ὁ ποιητὴς, ὅμοιον εἰπεῖν, ἐν μέσαις ἢ ὑποδωρίου τόνου ἐπὶ τῆ ἀρχήν, ἢ τῆ μιξολυδίου τε καὶ δωρίου ἐπὶ τῆ ἔκβασιν, ἢ τῆ ὑποφρυγίου τε καὶ φρυγίου ἐπὶ τῆ μέσην. Οὐ γὰρ διατείνει ἡ ἁρμονικὴ πραγματεία πρὸς τὰ τοιαῦτα, περισδεῖται ἢ πολλῶν ἑτέρων· ἢ γὰρ τῆ οἰκειότητι δύναμιν ἀγνοεῖ. Οὔτε γὰρ τὸ χρωματικὸν γένος, ὅτε τὸ ἐναρμόνιον ἕξει ποτὲ ἔχον τῆ τῆ οἰκειότητος δύναμιν τελείαν καὶ καθ' ἣν τὸ τῶ πεποιημένῳ μέλους ἦθος ἐπιφαίνεσθαι, ἀλλὰ τῶτο τῆ τεχνίτε ἔργον. Φανερὸν ἢ ὅτι ἑτέρα τῆς συςήματος ἡ φωνὴ τῆ ἐν τοῖς συςήμασι κατασκευαθείσης μελοποιίας, περὶ ἧς οὐκ ἔςι θεώρησαι τῆ ἁρμονικῆς πραγματείας. Plutarch. Dial. de Muſica.

upon which all the different effects depended, to have been only in the tenſion, or acuteneſs and gravity of the whole ſyſtem (36). And indeed, in the note on page 13. verſe 4. of that author (37), which, I preſume, Malcolm had under his eye, Meibomius clearly decides for the harmonic doctrine, as he does alſo in his note on page 2. verſe 1. of Euclid's Harmonic Introduction (38). But in this laſt note, he had juſt before told us, that tone was by the antients alſo called harmonia, and ſpecies of diapaſon (39). And, in the concluſion of his note on page 1. verſe 10. of the ſame author, he delivers himſelf more fully to the ſame purpoſe.

" The antients (ſays he) having conſidered ſeveral ſpecies of diapaſon in the biſdiapaſon, called theſe alſo harmonics. Whence we read Dorian, Phrygian harmony, in the beſt writers. The ſame were again called tones and tropes, or modes (40)."

In

(36) Malcolm's Treatiſe on Muſic, p. 540.

(37) Hic autem locus oppidò notandus eſt contra recentiorum de tonorum effectibus opiniones, illorum enim varietates, *ſo*, *la*, acuminis atque gravitatis differentia veteres unanimi conſenſu definiunt—Acumen autem ac gravitatem nihil varietatis cantilenæ adferre contra omnem eruditam vetuſtatem, imo communem ſenſum exiſtimant. Meibom. in Ariſt. Quint. p. 219.

(38) Tonus ſeu modus eſt totius ſyſtematis harmonici, hoc eſt biſdiapaſon aut ſimpliciter diapaſon differentia; ut Phrygius tonus à Dorio nulla alia re differt, quam quod totum Phrygii ſyſtema acutius ſit toto Dorii ſyſtemate, tono, qui eſt in ratione ſuperoctava. Meibom. in Euclid. Introd. Harm. p. 46.

(39) Toni vocabulum quatuor modis accipitur;—hîc idem eſt quod modus; cum dicimus tonus, ſive modus Dorius, Lydius, Mixolydius; veteribus quoque harmonia adpellatur, et ſpecies diapaſon. Ibidem.

(40) Cum autem plures diapaſon ſpecies in biſdiapaſon antiqui ſpectarent, illas quoque adpellarunt harmonias. Unde Doria, Phrygia

In his note alſo on the paſſage I have cited above, from Ariſtides, page 18. verſe 11. he explains the expreſſion, quality of the harmony, to ſignify the ſpecies of diapaſon, or tone (41), which is the ſenſe I have put upon it. We ſee therefore, that though he haſtily aſcribes to the harmonic doctrine alone the effects, which I have ſuppoſed to ariſe only from the muſical, yet he clearly admits both the doctrines to be warranted from antiquity; and I am glad to have ſo far the ſupport of this learned critic's opinion: but of the connection between the two doctrines, as I have explained it, I ſee no trace in his notes; nor is it to be imagined, but that, if he had ſeen it, he would have enlarged upon it.

In reſpect to Dr. Wallis, though he had the advantage of the notes of Meibomius, who had cleared up ſo many difficulties, and had alſo taken under his own management the text of Ptolemey, the author, of all others, the moſt likely to have given him a thorough inſight into this ſubject, yet we find him not only defective in his explanations of it, but, contrary to his uſual accuracy, even in miſleading his readers by falſe doctrines. With reſpect to the muſical doctrine, if we may judge by his ſilence, he appears to have ſeen leſs of it than Meibomius; for, in the appendix to his edition of Ptolemey, wherein he

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gia harmonia, apud optimos autores legimus. Deinde eædem toni et tropi, ſeu modi ſunt adpellati. Meibom. in Euclid. Introduct. Harm. p. 42.

(41) Id eſt quæ ſit ſpecies octachordi, ſeu quis tonus; nam duobus modis uſurpatur vox ἁρμονία, uno pro genere enarmonio, altero pro tono, ſeu tropo, ſeu modo; quæ ſignificatio eſt huic loco propria. Meibom. in Ariſt. Quint. p. 230.

under-

undertakes to explain the harmonic elements, after treating of the ſpecies of diapaſon, he gives not the leaſt hint, that they had any relation to the modes, except by giving their denominations; and in doing this, he expreſſes himſelf (42) as if he thought theſe denominations rather aſſigned for ſome ſeparate reaſon, than on account of their connection with the modes; though, as he was going immediately to the doctrine of the tones, this was the place, where he might have been expected to have taken notice of the connection between the two doctrines, if he had obſerved it. In treating of the modes, indeed, though he explains them on the foot of the harmonic doctrine only (43), he aſſigns ſome of his author's reaſons for reducing them to ſeven (44). And his note alſo on the beginning

(42) Atque hæ quidem diapaſon ſpecies ſeptem ſua ſingulæ ſortiebantur nomina; prima dicta eſt Mixolydia; ſecunda, Lydia; tertia, Phrygia; quarta, Doria; quinta, Hypolydia; ſexta, Hypophrygia; ſeptima, tum Locrenſis tum Hypodoria. Tandem de modis, ſeu tonis dicendum reſtat. App. ad Ptol. p. 311.

(43) Modus itaque, ſeu tonus, prout hic ſumitur, denotat vocis locum, non quo una vox, ſed quo tota vocum ſeries, ſeu ſyſtema canitur; acutiorem puta, gravioremve. Utpote prout apud nos *mi* canitur, nunc in *b f b mi*, nunc in *elami*, nunc in *alamire*, &c: Sic apud illos verbi gratia, parameſe poteſtate (quod tantumdem eſt atque noſtrum *mi*), poſita erat nunc in parameſe poſitione, nunc in poſitione nete diezeugmenon, nunc in meſe, &c. Ibid. p. 312.

(44) Contra hos, qui tonos, ſeu modos, ſic augent per hemitonia diſputat Ptolemæus, cap. 7, 8, 9, 10, 11. lib. ii. docetque modorum variorum uſum non in hunc ſolum finem introductum, ut acutior graviorve ſit totius cantus tenor; quippe huic ſufficeret cantoris vox acutior graviorve; aut muſici organi ad hoſce tenores accommodatio.—Sed eo potiſſimum fine fuiſſe introductum, ut in ipſius cantus curriculo tranſitus fiat de modo in modum, quam vo-

ginning of chapter eleventh, book ſecond (45), rightly explains the ſpecies of diapaſon, as they lay between hypate meſon and nete diezeugmenon: but this interpretation is formally introduced with a *nempe hoc vult*, as if he thought his author ſingular in this doctrine, and looked upon the doctrine itſelf, as ſtated in that paſſage, rather as explanatory of an incidental circumſtance attending the harmonic doctrine, than meant to aſſign the true doctrine of the modes. This is manifeſt, from his drawing the ſame inference, both in this note and elſewhere (46), from this muſical doctrine of the ſpecies, as he had drawn before from the harmonic one, *viz.* that the tones thus

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cant (με]αβολην κα]α τονον) mutationem ſecundum tonum: quod à noſtris fit mutata clavis ſignatura adhibitis mollis et duri notis, &c. —Et propterea tonos diſtinctos ponendos eſſe docet omnino ſeptem, Mixolydium, Lydium, Phrygium, Dorium, Hypolydium, Hypophrygium, et Hypodorium. Totidemque admittit hodierna muſica pro varia clavis ſignatura. Ibid. p. 313.

(45) Nempe hoc vult: diapaſon illud expoſitum ab hypate meſon ad neten diezeugmenon; hoc eſt (in muſica hodierna), ab elami ad elami, his vocibus poſt primam cani in tono Mixolydio, *fa, ſol, la, fa, ſol, la, mi*; quæ eſt prima ſpecies diapaſon, habens *mi*, ſeu tonum diazeuctícum in loco præcedente, ſeu acutiſſimo: his in Lydio, *ſol, la, fa, ſol, la, mi, fa*; quæ eſt ſpecies ſecunda diapaſon, habens *mi*, in loco ſecundo ab acutiſſimo: in Phrygio, *la, fa, ſol, la, mi, fa, ſol:* in Dorio, *fa, ſol, la, mi, fa, ſol, la:* in Hypolydio, *ſol, la, mi, fa, ſol, la, fa:* in Hypophrygio, *la, mi, fa, ſol, la, fa, ſol:* in Hypodorio, *mi, fa, ſol, la, fa, ſol, la*; quæ ſunt tertia, quarta, quinta, ſexta, et ſeptima ſpecies diapaſon; habentes *mi*, in loco tertio, quarto, quinto, ſexto, et ſeptimo, ab acutiſſimo: quæ omnia in muſica noſtra mollis et duri notis varie poſitis indicantur, ut mox dicemus. Not. ad Ptol. p. 136.

(46) Ut ſoli ſuperſint Ptolemæi ſeptem, Hypodorius, Hypophrygius, &c. totidemque agnoſcit hodierna muſica poſito *mi* in F, G, A, *b*, *c*, *d*, *e*. Ibid. p. 154, ad finem.

ſettled

ſettled by Ptolemey are acknowleged by the moderns, in their ſeven poſitions of the *mi*. For nothing ſavours leſs of the muſical doctrine, than what the moderns hold in this reſpect. And it is manifeſt alſo, from his neglecting to aſſiſt the explanation of this doctrine of Ptolemey, by any citations from other authors, that ſpeak to the ſame purpoſe; which he would not have failed to do, if it had ſtruck him as an antient and genuine theory of the modes. But it is plain to me, that, however he may have penetrated the ſenſe of theſe particular paſſages, he did not graſp their conſequences. This the miſtakes he has fallen into ſufficiently ſhew; which I ſhall now proceed to point out, and which a thorough comprehenſion of the ſubject could not but have prevented.

In ſpeaking of the meſe of the Hypophrygian mode, he explains it by $c\#$, inſtead of $f\#$ (47), a miſtake, which, I think, muſt be imputed to his haſte.

In the table of the modes, which he has given from Meibomius (48), he has placed the letters in uſe with the moderns, againſt the Hypodorian, as well as the Dorian, making A anſwer to the proſlambanomenos of the former, as well as the latter; by which, it is to be preſumed, he means them to expreſs the abſolute pitch of the ſounds in the Dorian, and in the Hypodorian, to denote only the general relations of the ſyſtem; but this ſhould have been farther explained.

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(47) Not. ad Ptol. p. 154. lin. 41.
(48) P. 155.

But his greateſt miſtake, and which I know not how to reconcile to his uſual caution, is in the method he gives for finding the places of the meſes for the ſeven modes. Not only is this method erroneous, but he gives it expreſly as the method of Ptolemey (49), though no ſuch direction is to be found in his work. As I have already given Ptolemey's method, in our modern terms, for the ſake of brevity, from his tenth chapter, where it is delivered, I ſhall here give that of Wallis, in the ſame terms, that the difference between the two may more eaſily be ſeen.

" Firſt pitch the Dorian, which is the middle tone, ſuppoſe in A; riſe a fourth to D, for the Mixolydian; fall a fifth to G, for the Hypolydian; riſe a fourth to C, for the Lydian. Then begin from the Dorian again, and fall a fourth to E, for the Hypodorian; riſe a fifth to B, for the Phrygian; and fall a fourth to F#, for the Hypophrygian (50)."

By this method, we ſee the meſes of the Lydian and Hypolydian are brought out at *c* and *f* natural; whereas, by Ptolemey's, they come out at *c*# and *f*#, where I have placed them.

This miſtake, I apprehend, the doctor was led into by the eleventh chapter of Ptolemey's ſecond book, where the meſes of the Lydian and Hypolydian are ſettled in trite diezeugmenon and lichanos meſon; which ſtrings, in their natural ſituation, in the Dorian mode, were tuned to *c* and *g* natural;

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(49) Hanc autem methodum adhibet Ptolemæus in tonis ſuis ſeptem deſignandis, &c. — primum omnium facit, &c. ſecundo tonum ſumit, &c. App. ad Ptol. p. 313 & 314.

(50) Ibid. p. 313. lin. ult. uſque ad p. 315. lin. 20.

but,

but, in this chapter, the author means only to fix the numerical ſtring allotted for each meſe, without regard to its pitch, which was to be regulated by the diſtances aſſigned for the tones in the tenth chapter. And by theſe diſtances, and all other concurring circumſtances, it is manifeſt, that the two ſtrings in queſtion were, in theſe modes, to be made a ſemitone, more acute than their natural ſituation, as I have already obſerved, in explaining the harmonic doctrine. How, therefore, the doctor could ſo far wander from the true theory, which lay before him in the text of his author's tenth chapter, as to ſubſtitute a different method, and deliver it, with great prolixity of explanation, as the method of his author, is what I know not how to account for, much leſs reconcile to his accuſtomed care and fidelity. What is ſtill more extraordinary, is, that, after finiſhing the directions and explanations of his own method, he, in the very next paragraph, cites the very tenth chapter of Ptolemey, where the method is given (51), in order to infer with his author, that the Mixolydian tone was diſtant from the Lydian a hemitone; the Lydian from the Phrygian, a tone, *&c.* though this inference, which is true only from Ptolemey's method, directly contradicts all he had been delivering. Could he overlook the falſeneſs of this inference, whilſt he was taking ſo much pains

(51) His poſitis, inde colligitur (ut cap. 10.) toni Mixolydii à Lydio diſtantiam limma, ſeu craſſius loquendo hemitonium; hujus à Phrygio, tonum; hujus à Dorio, tonum; Dorii ab Hypolydio limma; Hypolydii ab Hypophrygio, tonum; hujuſque ab Hypodorio, itidem tonum. App. p. 315. lin. 21.

with

with the ſubject? But not to inſiſt farther on the ſlips of a writer, to whom the learned world ſtands ſo highly indebted, I ſhall take leave of him, with this remark only, that whatever he may have ſeen of the truth of theſe doctrines himſelf, his explanations have not ſucceeded in making the ſubject clear to ſucceeding writers; thoſe I have ſeen having either adopted the harmonic doctrine only, or been ſo confounded between the two, as to give a right account of neither. This has, in particular, been the caſe with Malcolm, who, in his Treatiſe on Muſic, explains that of the antients, and has taken ſome pains to reconcile the two doctrines of the modes. The greateſt part of what this writer delivers is not only falſe, in reſpect to the order, poſitions, and, indeed, almoſt every other circumſtance attending the modes, but, at the ſame time, ſcarce intelligible; or, if any meaning can be put upon it, it is too foreign to the truth of either of the doctrines, to be worth conſidering. I ſhall content myſelf with citing a paſſage from him, where his reaſoning is the cleareſt, and where we may ſee, that, after all the pains he has taken to reconcile the two doctrines, he owns himſelf unable to make any ſure deciſion upon the ſubject.

" He (Ptolemey) ſays, in the beginning of that chapter (cap. 7. lib. ii.), the mutations, which are made by whole ſyſtems (which we properly call tones, becauſe theſe differences conſiſt in tenſion), are infinite, with reſpect to poſſibility, as ſounds are; but actually, and with reſpect to ſenſe, they are finite. All this ſeems plainly to put the difference of the tones only in the acuteneſs or gravity of the whole; elſe, how do their differences conſiſt in tenſion, which ſignifies

ſignifies a certain tenor or degree of tune? and how can they be called infinite, if they depend on the conſtitution of the octave? Yet, elſewhere, he argues, that they are no other than the ſpecies of octaves, and as ſuch, makes their number ſeven; and accordingly, in all his ſchemes, ſets down their different modulations. But, in chapter ſixth, he ſeems more plainly to take in both theſe differences; for he ſays, there are two principal differences with reſpect to the change of the tone, one, whereby the whole ſong is ſung higher or lower, the other wherein there is a change of the melody to another ſpecies than it was begun in; but this, he thinks, is rather a change of the ſong, or melos, than of the tone; as if again he would have us think, this depended only on the acuteneſs and gravity of the whole. So obſcurely has the beſt of all the antient writers delivered himſelf on this article, that deſerved to have been moſt clearly handled. But, that I may have done with it, I ſhall only ſay, it muſt be taken in one or other of the ſenſes mentioned, if not in both; for another, I think, cannot be found (52)."

Notwithſtanding the confuſion in this author's explanations, and his leaving the queſtion thus undecided, it is his account of the modes, that ſeems chiefly to have been adopted by compilers ſince. And hence we find nothing better in the Cyclopædia of Chambers, or the Muſical Dictionary of Graſſineau, than a repetition of theſe doubts and perplexities. Amongſt the French writers, Broſſard, in his *Dictionaire de Muſique*, throws no light upon this ſub-

(52) Malcolm's Treatiſe on Muſic, p. 538. lin. ult.

ject,

ject, his account of the modes reſpecting chiefly thoſe of much later times, which were diſtinguiſhed into plagal and authentic, and with which the preſent queſtion has very little concern. Nor have I met with any thing ſatisfactory from their academicians, though ſome of them appear to have taken great pains with the ſubject. The writer amongſt theſe, who ſeems the moſt converſant with the muſic of the anantients, is Monſieur Burette, who, in the Memoirs of literature, has furniſhed many pieces on the various branches of the ſcience. Amongſt others, there is a diſſertation of his on the melopœïa of the antient muſic, which the learned academician ſhould rather have intituled a diſſertation on harmonic; for it contains an explanation of the elements of that ſcience. This author ſeems little apprized of the muſical doctrine; nor has he given a right account even of the harmonic one, having followed Wallis in his miſtake, in reſpect to the method, by which Ptolemey fixed the poſitions of his ſeven modes (53), and even drawn the ſame contradictory concluſion (54):

(53) Qu'ainſi on devoit renfermer dans l'eſpace d'une octave tous les modes, dont le Dorien devoit occuper, comme le centre, les ſix autres etant diſpoſez de façon, que le Mixolydien fut d'une quarte plus haut que le Dorien; l'Hypolydien d'une quinte plus bas que le Mixolydien; le Lydien d'une quarte plus haut que l'Hypolidien; l'Hypodorien d'une quarte plus bas que le Dorien; le Phrygien d'une quinte plus haut que l'Hypodorien; et l'Hypophrygien d'une quarte plus bas que le Phrygien. Diſſertation ſur le Melopée, &c.

(54) D'ou il paroit, qu'a compter de l'Hypodorien, qui eſt le mode le plus bas, il y à de celui ci à l'Hypophrygien l'intervalle d'un ton; de l'Hypophrygien à l'Hypolydien un autre ton; de l'Hypolydien au Dorien, un demiton; de ce dernier au Phrygien, un ton; du Phrygien au Lydien encore un ton; et du Lydien au Mixolydien, un demiton. Ibidem.

whence

whence it appears, that he relied on the doctor's appendix for this part at leaſt of his explanations. In his notes on the dialogue of Plutarch, printed alſo in the ſame memoirs, the not underſtanding the muſical doctrine has led him into a very falſe explanation of the paſſage cited above, concerning the invention of the Mixolydian mode. He ſets out (55) with excluding the only ſuppoſition, that could lead him to the ſenſe of his author, by denying, that the octachord ſyſtem could have any thing to do with this invention; and then flies (56) to two other ſuppoſitions, *viz.* that either the hendecachord or diſdiapaſon was here meant, both which are equally wide of the truth. The public is much indebted to this writer, for the laborious collections he has made in theſe notes, concerning the antient muſicians; but his harmonic explanations are not always to be relied on.

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(55) Lamprocle n'eſt point ici donné comme l'auteur de l'harmonie Mixolydienne, il en eſt regardé ſeulement comme le reformateur. Mais en quoi pouvoit conſiſter cette reforme? C'etoit, comme le dit Plutarque, à determiner le veritable ſyſteme de cette harmonie, ou de ce mode, quant à ſa disjonction, ou à l'arrangement des divers tetrachordes, qui compoſoient ce ſyſteme. En le reduiſant à l'etendue de l'octave, ou de l'octachorde, c'eſt à dire du double tetrachorde disjoint; le lieu de cette disjonction eſt unique, et par conſequent n'eſt point equivoque, comme on le peut voir par la progreſſion de ce ſyſteme, que voici, *mi*, *fa*, *ſol*, *la*, *ſi*, *ut*, *re*, *mi*; il ne s'agit donc point ici du double tetrachorde disjoint. Note 114.

(56) Mais l'hendecachorde, ou le triple tetrachorde disjoint, pouvoit etre le ſyſteme, dont parle icy Plutarque—ſuppoſé qu'il ſoit icy queſtion du ſyſteme complet de l'ancienne muſique, &c. Ibidem.

The laſt writer, that I have ſeen, who has treated this ſubject, and with whoſe opinion I ſhall conclude theſe ſheets, is the anonymous author of a letter to Mr. Aviſon, concerning the muſic of the antients, publiſhed with the eſſay of the latter on muſical expreſſion, in 1753. This author, who profeſſes but a ſlender knowlege of the theory, either of modern or antient muſic, has, in a few pages, diſcovered himſelf to be poſſeſſed of more than his modeſty will permit him to lay claim to. In the matter of the tones, however, (ſuch is the fatality, that ſeems to have conſtantly attended this doctrine) he does not appear to have ſucceeded better than the writers that have gone before him. He blames Sanadon and Cerceau, for affirming, in their obſervations on Horace, carm. 5. 9. that the Dorian mode anſwered exactly to our A-mi-la with a minor third, and the Phrygian to our A-mi-la with a major third. Now, that theſe French critics, though right, inaſmuch as they ſeem to conſider the modes as different ſpecies of diapaſon, are, nevertheleſs, miſtaken in their application of them, does, indeed, appear from my firſt diagram, where it may be immediately ſeen, that what they aſſert of the Dorian and Phrygian modes, is true only of the Hypodorian and Lydian; and had the anonymous writer gone no farther in his cenſure of them, I ſhould readily have joined with him: but he rejects the muſical doctrine entirely, and admits only of the harmonic. " Surely (ſays he (57), ſpeaking of what theſe critics advance) this is a muſical error, and a dream from the ivory gate. Two modes

(57) Page 6.

with

with the ſame tonic note, the one neither acuter nor graver than the other, make no part of the old ſyſtem of modes." And, agreeably to this opinion, he had before (58) deſcribed the ſeven modes, as reducible to one mode, taken higher or lower; which, he ſays, may be be called the mode of A, and muſt have had a minor third, as *c* natural is a minor third to A-mi-la. Whether this be a juſt account of the nature of the modes, I muſt now ſubmit, having ſaid already what has occurred to me, in ſupport of the contrary opinion.

To conclude, if what has been ſaid ſhould be thought to eſtabliſh any certainty concerning this matter, I ſhould hope it might tend to revive an inquiry into the muſic of the antients, which ſeems to have ſuffered an interruption from the difficulty of arriving at a right underſtanding of this material branch of it. Such an inquiry may, perhaps, be judged well worth purſuing, not only from the advantages, which modern muſic might derive from it, but alſo for the ſake of improving the art of poetry, and of better underſtanding and taſting the noble remains we have of the antient poets; the greateſt beauties of whoſe works, eſpecially the lyric and dramatic, are probably loſt to us, for want of ſeeing their connection with this ſcience.

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(58) Page 5.

DIAGRAM I. Of the Species of Diapason in the Seven Modes admitted by PTOLEMEY.