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### Chapter VIII

#### THE SYMBOLIC AND RELIGIOUS USES OF THE MONOCHORD

The employment of the monochord for symbolic and religious purposes is encountered not infrequently throughout its period of greatest use (up to about 1700). In its role as a symbolic device the monochord is only a part of a widespread utilization of music to represent or explain the intangible aspects of Man's environment.

Two of the intangible aspects of the environment that were explained by means of music are the psychology of behavior, and disease. The Greeks, in attempting to understand and explain human behavior, developed theories of the emotional and moral influence of the modes. In later eras a similar influence of music was also thought to be particularly efficacious in the treatment and cure of disease. Both of these applications survived the Greek and medieval eras, so that one sees the supposed emotional connotations of the modes culminating in the doctrine of affections in the eighteenth century. The employment of music to treat disease still survives in music therapy.

A third intangible that was frequently explained through music was the universe. Music was used in this instance not necessarily to explain the workings of the

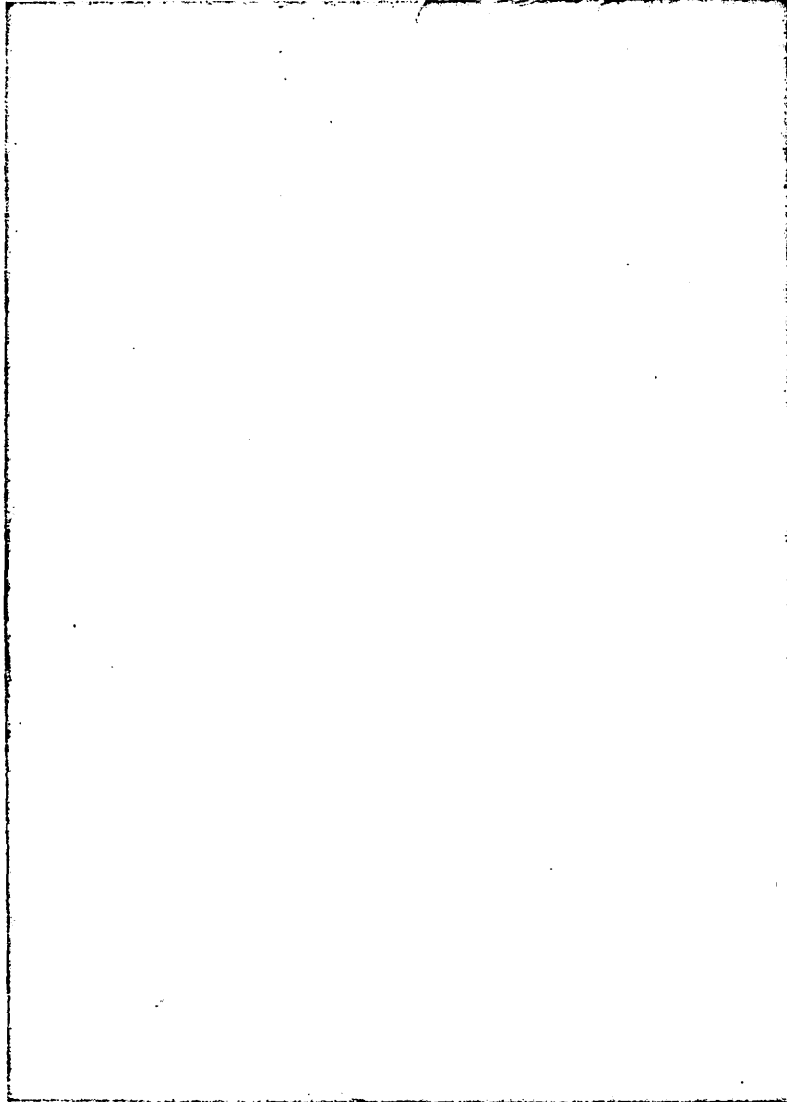
universe so much as to relate the universe to something that was already understood; such a relation could be established because music was in reality only simple numbers -- and numbers were the foundation of all being.

The adoption of music as a way to explain the unknown originated in the number symbolism of the Pythagoreans. In the early Christian Church, number symbolism, and consequently musical symbolism, was used to represent the perfection or unity that existed in God. The symbolic monochord, as an aspect of this number symbolism, was developed in the later Middle Ages as a simple means of showing the unity, through music, of man's environment and God.

Man's environment was always represented upon the monochord by planetary symbols and the unity of God by the single string. In some representations (Plate 33) the hand of God, reaching from the clouds, was shown tuning the string. This feature was added to insure that everyone would recognize the unifying power of God expressed in the single string. The planetary symbols in this drawing, which are of Greek origin, are a manifestation of Pythagorean number symbolism by the harmony of the spheres; the expression of the unity of God is likewise a result of Pythagorean number symbolism, modified

## THE THEORY AND PRACTICE OF THE MONOCHORD

Plate 33. A symbolic illustration  
of the monochord.<sup>1</sup>



In this instance by Christian interpretation. In some representations, the Christian and Pythagorean symbolisms are either combined with, or replaced by, elements of Eastern mysticism in the form of the zodiac.

In order to understand clearly how the harmony of the spheres and Christian unity came to be represented in a single figure, the remainder of this chapter will discuss, in separate sections: the elements of Pythagorean symbolism, including concepts of the universe; the penetration of Pythagoreanism into the Christian Church and the early Middle Ages; the harmony of the spheres in musical writings of the Middle Ages and Renaissance; and the symbolic uses of the monochord. Although the present discussion of the harmony of the spheres is limited mainly to its appearances in musical treatises, references to celestial music are found in all kinds of literature up to the end of the eighteenth century. In discussing the use of the monochord as a symbol, citations will be made of non-believers as well as believers in order to explain its significance to the musician.

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1. Robert Fludd, Mysterium cosmographicum (Copenhagen: Galle, 1617), 103.

Elements of Pythagorean Symbolism

The originality of the Pythagoreans came from the development of two fundamental principles: the decad, which contained all numbers and therefore all things; and the geometric conception of mathematics. The Pythagoreans observed that all their surroundings were based on numerical relationships. They found number patterns in such diverse elements as the growth of plants and animals, the daily movement of the sun and the changes of the seasons, musical intervals, and the relationships of the planets. From these they derived their interpretation of the cosmos and a connection between number and being. The use of music to represent many of these observations came about, partly because of the general knowledge of music, and partly because it appealed to the senses of sight and hearing as well as providing stimulus to the mind. The relationship of music to the numbers of the decad has been mentioned earlier in this study in the discussions of the Pythagorean tuning. Its connection with the universe came about through its numerical similarity to the Pythagorean conception of geometrical mathematical relationships. By means of the philosophical application of the decad and the geometrical conception of mathematics, the Pythagoreans

and their successors developed two interpretations of the universe. The earliest of these, said to have originated with Pythagoras himself, is represented by the harmony of the spheres and may be said to be the more popular, concrete expression of the universe. The other interpretation, best represented by the universe of Plato's Timaeus, is a more abstract expression of the Pythagorean philosophies.

### The Harmony of the Spheres

The harmony of the spheres, the more popular representation of the Pythagorean universe, is mentioned by many writers after Plato, appearing most prominently in the works of the neo-Pythagorean and neo-Platonic writers. One of its earliest detractors was Aristotle, who, in the treatise De caelo, laughingly derided the harmony of the spheres as "Harmony, Heavenly Harmony."<sup>2</sup> Aristotle was, of course, not overly sympathetic with the Pythagoreans; besides ridiculing their concept of celestial music, he also criticized their fundamental teachings. In his conclusion on the relationships of numbers and things in the Metaphysics he wrote:

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2. Henry G. Farmer, Historical Facts for the Arabian Musical Influence (London: W. Reeves, 1930), 107.

Many troubles which these men have with the generation of numbers and their inability to bring them together in any coherent way seems to indicate that mathematical entities are not separate from sensible things, as some would have them to be, and that they are not the first principles.<sup>3</sup>

Aristotle's comments were often cited by writers of the Middle Ages as good reasons for not believing in the harmony of the spheres.

On the other hand, favorable references to the theory were made by Aristotle's contemporary, Plato, who used the harmony of the spheres as part of a representation of the universe in his "Myth of Er." Cicero, in the second century, B.C., also relied heavily on the idea of heavenly music in the Dream of Scipio, describing it more in detail than Plato had. In one passage, when Scipio asked: "What is this great and pleasing sound that fills my ears?" he was answered: "That is a concord of tones separated by unequal but nevertheless carefully proportioned intervals, caused by the rapid motion of the spheres themselves."<sup>4</sup>

Cicero's comment about the "unequal but nevertheless carefully proportioned intervals," is indicative of the

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3. Aristotle, Aristotle's Metaphysics, tr. by Richard Hope (New York: Columbia University Press, 1952), 318.
  4. Macrobius, Commentary on the Dream of Scipio, tr. by William H. Stahl (New York: Columbia University Press, 1952), 72.

direction taken by the writers of the early Christian era, in whose works the discussion of the harmony of the spheres usually centered around the intervals produced by the planets rather than the symbolic aspects of the theory. From the works of the neo-Pythagoreans Nicomachus, Macrobius, Pliny, and Porphyry, Sir Thomas Stanley collected the following quaint account of the harmony of the spheres.

The names of sounds in all probability were derived from the seven stars which move circularly in the heavens and compass the earth. The circum-agitation of these bodies must of necessity cause a sound; for air being struck, from the intervention of the blow, sends forth a noise. Nature herself constraining that the violent collision of two bodies should end in sound.

Now, say the Pythagoreans, all bodies which are carried round with noise, one yielding and gently receding from the other, must necessarily cause sounds different from each other, in the magnitude and swiftness of voice and in place, which are either more fluctuating, or, on the contrary, more reluctant. But these three differences of magnitude, celerity and local distance, are manifestly existent in the planets, which are constantly with sound, circum-agitated through the aetherial diffusion. . . .

Moreover the sound which is made by striking the air, induceth into the ear something sweet and musical, or harsh and discordant; for if a certain observation of numbers moderated the blow, it effects a harmony consonant to itself; but if it be temerarious, not governed by measures, there proceeds a troubled unpleasant noise, which offends the ear. Now in heaven nothing is

produced casually, nothing temerarious; but all things there proceed according to divine rules and settled proportion: whence irrefragably is inferred, that sounds which proceed from the conversion of the celestial spheres are musical. For sound necessarily proceeds from motion, and the proportion which is in all divine things causeth the harmony of this sound. This Pythagoras, first of all the Greeks, conceived in his mind; and understood that the spheres sounded something concordant, because of the necessity of proportion, which never forsakes celestial beings.<sup>5</sup>

The Pythagoreans thought that the musical interval formed by the Earth and the Moon was that of a tone; Moon and Mercury, a semitone; Mercury and Venus, a semitone; Venus and Sun, a minor third; Sun and Mars, a tone; Mars and Jupiter, a semitone; Jupiter and Saturn, a semitone; Saturn and the sphere of fixed stars (or the Supreme Heaven), a minor third. The resulting Pythagorean scale is C D E-flat E G A B-flat B D, although accounts given by different writers vary somewhat. (For example, the scale passed on by Censorinus has a semitone at the top instead of a minor third.)<sup>6</sup> These pseudo-scientific accounts of the neo-Pythagoreans provided the basis of the early medieval conception of the harmony of the spheres.

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5. Sir Thomas Stanley, History of Philosophy (1701), 385-386, reprinted in Sir John Hawkins, A General History of the Science and Practice of Music, 2nd ed., 2 vols. (London: Novello, 1853), I, 63-64.

6. Hawkins, op. cit., I, 63.

When this was combined with the number symbolism of the early Christian church it appears that, for at least several centuries, it was generally believed that the planets actually did make music -- music that was, however, inaudible.

According to tradition, Pythagoras alone had the gift of actually hearing the music of the spheres. Ordinary mortals lacked this gift, either because they were, from the moment of birth, unknowingly but constantly bathed in the celestial humming; or because -- as Lorenzo explains in the Merchant of Venice -- they were too grossly constituted:

. . . soft stillness and the night  
 Became the touches of sweet harmony . . .  
 Look how the floor of heaven  
 is thick inlaid with patines of bright gold;  
 There's not the smallest orb which thou behold'st  
 But in his motion like an angel sings . . .  
 Such harmony is in immortal souls;  
 But, whilst this muddy vesture of decay  
 Doth grossly close it in, we cannot hear it.<sup>7</sup>

The literature of the Renaissance is rich in references both to the harmony of the spheres and to the reasons for its inaudibility. These reasons, based on centuries of Pythagorean tradition, appear even in the musical treatises of this era. For instance, Wolfgang Figulus (1565)

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7. William Shakespeare, The Merchant of Venice (London, 1600), new edition (New York: French, 1860), Act V, Scene I.

attributed both the invention of music and the discovery of the harmony of the spheres to Pythagoras, commenting that the cosmic music "is inaudible by men on account of the custom of neglect."<sup>8</sup>

In addition to references to the harmony of the spheres in literary sources, the basic concepts of the Pythagorean number theories are evident in all areas of medieval and Renaissance endeavor, resulting in applications that seem to center around the following idea.

Among many tenets of the Pythagoreans, one was that there is a general and universal concord or harmony in the parts of the universe, and that the principles of music pervade the whole material world; for which reason they say that the whole world is enharmonic. And in comparison they assert that those proportions into which the consonances in music are resolvable, are also to be found in those material forms, which from the symmetry of their parts excite pleasure in the beholder. The effect of this principle is in nothing so discoverable as the works of the architects of ancient time, in which the proportions of 2:1, answering to the diapason, of 3:2, or sesquialtera; 4:3, or sesquitertia, are perpetually resulting from a comparison between the longitude and latitude of whole or constituent parts, such as porticos, pediments, halls, vestibules, and apertures of all kinds, of every regular edifice.<sup>9</sup>

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8. Wolfgang Figulus, De musica practica (Noribergae: Montani, 1565), a2.

9. Hawkins, op. cit., I, 65.

Hawkins's comments are but a synopsis of the great influence that the Pythagorean symbolisms exerted on Renaissance thought, an influence that came from the teachings of the Greeks, made available through Latin translations of the early Renaissance. Throughout this era, as in the Greek period, these symbolisms were most frequently applied to music. Before Plato's conception of the universe is dealt with, a cross-section of writers reflecting the Renaissance concept of musical and numerical relationships will be cited.

Robert of York, in his Correctorium alchimiae (1348), suggested that both the elements with which the alchemist worked and the projecting rays of the planets, which the astrologer believed dominated the lives of men, might be arranged according to musical proportion.<sup>10</sup> These same ideas were still being re-discovered a hundred years later, undoubtedly owing to the renewed interest in classical studies. In 1450 the architect Alberti wrote: "We shall therefore borrow all our rules from the musicians, who are the greatest masters of this sort of numbers."<sup>11</sup>

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10. Discussed in Lynn Thorndike, History of Magic, 8 vols. (New York: Macmillan, 1923), III, 114.

11. Leone Alberti, Ten Books on Architecture by Leone Battista Alberti Translated into Italian by Cosimo Bartoli and into English by James Leece, Venetian Architect (1726), ed. by Joseph Rykwert (London: A. Tiranti, 1955), 197.

A reference to the use of musical proportions to construct visually attractive structures throughout the Renaissance is made by the architect Palladio, who, in his *L'architettura di Andrea Palladio divina in quattro libri* (1562)

stated that music provided the foundations of an artist's training.<sup>12</sup> Marsilio Ficino, a mid-fifteenth-century

philosopher, sometimes referred to the idea of the harmony of the spheres in order to symbolize the supra-physical origins of music, in relation to which he wrote, "Through the ears the soul perceives certain sweet harmonies and rhythms, and through these images it is exhorted and excited to consider divine music with a more ardent and intimate sense of mind."<sup>13</sup>

### The Platonic Concept of the Universe

The concept of the harmony of the spheres, stemming from the simple relationships of numbers, results in a comparatively simple representation of the universe. In

12. Andrea Palladio, *L'architettura di Andrea Palladio divina in quattro libri* (Veneta: M. A. Brogiolo, 1562), Bk. I. In reference to the extensive use of musical proportions in Renaissance architecture, see Rudolph Wittkower, *Architectural Principles in the Age of Humanism*, 2nd ed. (London: A. Tiranti, 1952).
13. Paul O. Kristeller, *The Philosophy of Marsilio Ficino* (New York: Columbia University Press, 1943), 308.

contrast to this simplicity, the universe presented by Plato in his Timaeus relies on an abstract formulation, and, therefore, is quite complex. Plato's universe, based on the geometric concept of mathematics mentioned earlier, culminates, as does the harmony of the spheres, in a series of musical intervals; but it has as its main objective the creation of unity from chaos, rather than merely a representation of the principles of number symbolism.

The Pythagoreans based their geometrical interpretation of mathematics on the numbers 1-4. The evolution of a solid geometrical figure from the numeral one was done in the following manner. The numeral one was represented as a point. A line joining two points and thereby providing extension of the point represented the numeral two. Neither of these two, the point nor the line, was considered to be a tangible object. The triangle, the first plane figure, was perceivable to the senses and therefore represented the first real number, which was three. Three as the first representative of plane surfaces was capable of being extended into a solid by placing a point over the center of the triangle and extending lines from this point to the three points of the triangle. The resulting figure, the tetrahedron, was the first solid

figure and represented the number four.<sup>14</sup> Continuing in

the same manner, the Pythagoreans eventually derived five solids, all composed of triangles: the tetrahedron, the

cube, the octahedron, the dodecahedron, and the icosahedron.

These solid figures were given tangibility by many

of the Greek writers. Plato, for example, related the

first four to the four elements -- fire, air, water, and

earth--while the fifth was regarded as the master of the

other four.<sup>15</sup> After constructing the body of the world

from the four solids, Plato sets forth the structure of the

world-soul (which is again unity) compounded from exis-

tence, sameness, and difference.<sup>16</sup> From these simple state-

ments of Pythagorean symbolism Plato developed his concept of the universe. It is interesting that of all of the

ideas evolved by Plato and his contemporaries only the

symbolisms of the four elements appear in representations

of the monochord, although the fundamental unity of Plato's

universe is represented, in its Christian interpretation,

in the form of God and the single string. In his concluding

14. Vincent Hopper, Medieval Number Symbolism (New York: Columbia University Press, 1938), 35.

15. Francis M. Cornford, Plato's Cosmology (New York: Liberal Arts Press, 1937), 56-56.

16. Ibid., 35.

comments about the structure of the universe, Plato points out that the four elements are really qualities of being and are not to be considered as having a constant nature. 17

In the Timaeus Plato sets forth a universe in which all spiritual and mundane things are the product of a single entity, the demiurge. This demiurge, or maker, the creator of order from chaos, satisfies the philosophic necessity

of unity. After determining the shape of the world-soul, he then divides it into harmonic intervals, the end result of which is a Pythagorean scale. The Timaeus does not relate this harmonic structure of the world soul to the

harmony of the spheres as its writer does in the "Myth of Er" from The Republic. That is, the harmony of the world-soul is neither audible nor dependent upon the imagined gyrations of the planets, but is instead an innate harmony that characterizes the structure of the soul.

17. Cornford (Ibid., 35, 163), like most philosophers, is adamant in his opinion that the demiurge is not to be confused with God as an object of worship, especially in reference to Christianity. In this respect he states: "It is not fair either to Plato or to the New Testament to ascribe the most characteristic revelations of the founder of Christianity to a pagan polytheist." Let this be the very thing that seems to have been done by the users of the monochord, for the monochord as a symbolic unity inevitably combines the speculations of a polytheistic philosophy with ideas about a monotheistic God.

This philosophy, while having little to do with

the symbolic use of the monochord, proved to be the more

enduring of the two Greek interpretations of the universe.

Both Plato's universe and the harmony of the spheres are

seen to exist in the writings of the neo-Pythagoreans and

neo-Platonists, but these schools added little of value to

either of the basic schemes. In general they were content

to interpret Platonic and Pythagorean philosophy in the

light of their own particular needs, and perhaps their most

important function was the perpetuation of these theories

for later eras.

### The Infusion of Pythagoreanism into the Christian Era and the Early Middle Ages

At the beginning of the Christian era, most of the

neo-Platonic philosophies were firmly entrenched in the

minds of western scientists and philosophers -- without,

however, being connected to religious dogma. In the en-

suing 500 years the influx of eastern "mysteries" into the

Roman Empire provided a link between religion and science.

The Eastern mysteries were the result of the astrological

application of numbers "not as subjects for philosophical

inquiry, but as divine revelation, and were accordingly

invested with all the mystery and power of Holy Secrets." 18

18. Hopper, op. cit., 50.

19. Ido, 62. Gematria is the assignment of numerical values to the letters of the alphabet. This usage was also prevalent in the teachings of the Jews, mainly because the letters of the Hebrew alphabet were used as numbers; thus a selected set of letters was simultaneously a word and a number. The use of Gematria by the Jews resulted in the science of cabala, which is defined as a spiritual exercise by means of numbers.

doctrines of Pythagoreanism, so that by the time of Judaea the interpretation of the New Testament to the steeped in Greek culture, into the Christian faith, however, tance of Roman men of letters, who, as educated men were from the number symbolism of the other sects. The acceptance of Christianity, in its infancy, was relatively free on the science of Gematria.<sup>19</sup>

result the Gnostics based most of their interpretations world was constructed upon a few simple numbers. As a abstraction of the Platonic theology, whose scheme of the traced by both Eastern astrology and by the subtlety and example, were a group of Alexandrian philosophers, at- and Eastern science and religion. The Gnostics, for tempted to combine, in varying degrees, Greek philosophy neo-Platonists, and the Gnostics. Each of these groups at- come into being. These were the neo-Pythagoreans, the Eastern mysticism and Western philosophy, several new sects mainly as a result of these religious connections between

Augustine, number symbolism had become an accepted practice. Thus Augustine himself was able to say: "We must not despise the science of numbers, which, in many passages of Holy Scripture, is found to be of eminent service to the careful interpreter."<sup>20</sup>

Because of the misinterpretations of the above-mentioned Roman men of letters who were busily chronicling the centuries of Greek culture for posterity, the doctrine of the harmony of the spheres was transmitted to the medieval period less as a part of the Christian tradition than as a literal description of fact. As a result the doctrine was, for a time, shorn of its symbolic meaning and it was not until after the ninth century that it began to reassume its former significance as a representative idea of Pythagoreanism. Because of this change of symbolic status, many disbelievers in the harmony of the spheres in the early medieval period actually seem to be saying that the planets do not make music -- but this in no way implies that they are simultaneously refuting number symbolism. The retention of the numbers of the Pythagorean tuning is sufficient evidence of the influences of Pythagorean symbolism on early Christian scholars. The reconciliation of the

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20. Ibid., 78.

doctrine of the harmony of the spheres with its original symbolic meanings, taking place over a period of several centuries, eventually culminated in the combination of the symbolisms of celestial music and the monochord.

The Harmony of the Spheres in the Musical Writings  
of the Middle Ages and the Renaissance

References to the existence of the harmony of the spheres in musical works of the Middle Ages is due largely to the influence of Boethius. Although the other late Latin encyclopedists, among them the musical writers Cassiodorus and Isidore, referred to the theory, none of them impressed successive generations in the same way as Boethius. In his De musica, Boethius divided music into three parts: musica mundana, musica humana, and musica instrumentalis. Musica mundana was expressed in the motions of the spheres, the alternation of the seasons and the numerical order of the elements. Boethius defined musica humana as the harmony between the spiritual and the physical parts of man, and he symbolized it numerically in much the same way that he determined intervals on a string. Musica instrumentalis was music as sound, including some references to instruments, among them the monochord.

The most important of these three divisions to Boethius was musica mundana, for Boethius, a true Pythagorean, was not so much interested in the enjoyment of music or the nature of its sound as he was in the precept that musical proportion was the basis of all understanding. This is borne out by Boethius's complete neglect of vocal music, and his mention, in the classification of musica instrumentalis, of instruments that appear to be more useful for scientific investigation than for performance.<sup>21</sup>

Although Boethius's explanation of music dominated the thought of many medieval musical writers, Pythagoreanism in a more mystical form was evident in the works of others. This mystical version, easily identifiable because of its astrological implications, appeared early in the medieval period in the De divisione naturae of Johannes Scotus (ca. 815-877), who presented many analogies between music and cosmic harmonies. The influence of Eastern thought in the teachings of Scotus, who is considered by many to be the source of European mysticism, culminated in the early seventeenth century in the writings of Robert

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21. Boethius, De institutione musica, ed. by G. Friedlein (Lipsiae: Teubneri, 1867), Bk. I, Cap. II, 187-189.

Fludd.<sup>22</sup> In the symbolic uses of the monochord in the Renaissance, the influence of the occultists appears in the form of the zodiac.

Many of the early medieval theorists were content to parrot Boethius's triple division of music with little amplification, and it was evidently not until the late ninth century that the doctrine of the harmony of the spheres began to resume some of the symbolic significance that had been shorn from it by the late Latin writers. Regino of Prüm (d. 915) appears to have been one of the first medieval writers after Boethius to explain earthly harmony as an imitation of celestial music. He states that the planets produce real sounds. In one passage he says that the Hypate Meson is derived from the sound made by the planet Saturn.<sup>23</sup> Regino's contemporary, Aurelian of Réomé, also helped to reconcile the idea of the music of the spheres with Christian doctrines by interpreting the sounds of the ecclesiastical modes to be duplication of the sounds created by planetary motion. He further

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22. Cf. J. B. Craven, Doctor Robert Fludd (Kirkwall, 1902); and Jacques Handschin, "Die Musikanschauung des Johannes Scotus (Erigena)," Deutsche vierteljahresschrift für Literaturwissenschaft und Geistesgeschichte, V (1927), 316-340.

23. Regino of Prüm, De harmonica institutione, GS I, 235.

stated that in singing the praises of God, man imitated

the chorus of the angels.<sup>24</sup> References to the doctrine of

the harmony of the spheres were also frequent in the

Arabic documents of this period, especially in the form

of answers to those who refused to admit the existence of

such music. In the early tenth century the theory was

denounced by Al-Farabi, who abandoned the Boethian triple

division and postulated an alternate division into only

theoretical and practical music.<sup>25</sup> In spite of Al-Farabi,

however, many Arabians still clung to their beliefs in

celestial music. The physician Al-Randi is said to have

worked out elaborate charts in order to clarify the inter-

vallic relationship between cosmic-human and musical

elements.<sup>26</sup>

The influence of Al-Farabi's dual division of

music, made available to the later Middle Ages by the

early thirteenth-century writer known as pseudo-Aristotle,

is evident in many later treatises which, instead of de-

nouncing the music of the spheres, ignore it; notable

among these works is the *Introducción a la música* of Johannes

24. Aurelian of Reome, *Justice des sciences*, SS I, 32.

25. Al-Farabi, *Grand Traité de la musique*, tr. by  
Rodolphe d'Etlangier (Paris, 1930), 28.

26. George H. Garner, *op. cit.*, 99.

de Garlandia, written about 1240, in which Garlandia does not renounce his faith in the principles of Pythagoreanism, but merely reflects scepticism about the harmony of the spheres.<sup>27</sup>

In refusing to admit the existence of celestial music, the early fourteenth-century musician Johannes de Grocheo says, in his Theoria, that his work will not deal with angelic songs.<sup>28</sup> Walter Odington likewise rejects the physical existence of the harmony of the spheres in his De speculatione musicae.<sup>29</sup> For every writer who decried the existence of cosmic harmony, however, there were one or two others who professed some belief in either the music of the spheres or number symbolism. In the early fourteenth century the author of the anonymous Surma musicae discussed the Boethian triple division of music,<sup>30</sup> as did Marchettus de Padua in his Lucidarium musicae planae of 1274. Marchettus's explanation of the superparticular proportions leads eventually into a comparison of these

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27. Johannes de Garlandia, Introductio musicae, CS I, 157-175.

28. Johannes Wolf, "Die Musiklehre des Johannes de Grocheo," Sammelbände der Internationalen Musikgesellschaft, I (1903), 82.

29. Walter Odington, De speculatione musicae, CS I, 182.

30. Anonymous, Surma musicae, CS III, 194.

numbers to the world and to the four humors.<sup>31</sup> At about the same time Gil de Zamora presented an extensive account of the emotional connotations of the modes.<sup>32</sup>

In the fourteenth and fifteenth centuries the revival of interest in many of the Greek writers, whose works were now available in Latin translations, provided some impetus to the notion of the harmony of the spheres. This renewed interest is reflected in the naming of sections of treatises, or even of whole treatises, in a manner that implies subscription to the theory of celestial music. As examples, the first book of Georgio Anselmi's De musica is entitled "De celesti harmonia,"<sup>33</sup> and the whole of the early seventeenth-century encyclopedias of Mersenne<sup>34</sup> and Kircher<sup>35</sup> are respectively entitled Harmonie universelle and Musurgia universalis.

31. Marchettus de Padua, Lucidarium musicae planae, GS III, 83 f.

32. Gil de Zamora, Ans musica, GS II, 386-88.

33. Georgio Anselmi, De musica, ed. by Giuseppe Massera (Firenze: Olschki, 1961), 65-106.

34. Marin Mersenne, Harmonie universelle (Paris: Cramoisy, 1636-37).

35. Athanasius Kircher, Musurgia universalis, 2 vols. (Rome, 1650).

In these later works, in comparison to earlier treatises, even the space allotted to the discussions of the harmony of the spheres is greatly expanded, as is the breadth of the discussions themselves. Ramos de Pareia, in his Musica practica of 1482, discusses in detail the emotional aspects of the modes, making the assertion that the stars actually determine the character of each of the modes. According to Ramos, the sun influences the character of the Dorian mode. The moon influences the Hypodorian. Mars gives the Phrygian an emotional connotation of anger. Mercury influences the Hypophrygian, Jupiter gives the Lydian mode the character of joy. Venus affects the Hypolydian, and Saturn influences the melancholy aspects of the Mixolydian.<sup>36</sup> Ramos later unified all of these elements by including them in his linear representation of the monochord.<sup>37</sup>

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36. Ramos de Pareia, Musica practica, ed. by Johannes Wolf (Leipzig: Breitkopf und Härtel, 1901), 57-60. Robert Stevenson, in his Spanish Music in the Age of Columbus (The Hague: Nijhoff, 1960), 61, points out that Ramos reflects the numerological tendencies of this era in the division of the Musica practica into three parts, of which the first part is subdivided into three tractates. Each of the first two tractates contains eight parts, and the third tractate contains three.

37. Ibid., 61.

The Spaniards were evidently steeped in the Boethian tradition, because the division of music into parts called *mundana*, *humana*, and *instrumentalis* is encountered frequently in Spanish treatises throughout the next two hundred and fifty years. In 1495, Guillermo Despuig used this division in his *Ars musicorum*,<sup>38</sup> as did Bermudo<sup>39</sup> in 1555, and Pablo Nassarre<sup>40</sup> in 1724. Nassarre, like Ramos, discusses the emotional effects of music, including its beneficial effect on disease and its ability to excite the passions.

The influence of Arabic and Aristotelian thought on the writings of Johannes Tinctoris is particularly evident in the following remarks taken from his *Liber de arte contrapuncti* of 1477.

I cannot pass over in silence the opinion of numerous philosophers, among them Plato and Pythagoras and their successors Cicero, Macrobius, Boethius and our Isidore, that the spheres of the stars revolve under the guidance of harmonic modulation, that is, by the consonance of various concords. But when as Boethius relates,

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38. Guillermo Despuig, *Ars musicorum* (Valencia, 1495), Bk. I, Cap. vii.
  39. Juan Bermudo, *Declaración de Instrumentos musicales* (Ossuna, 1555), facsimile ed. (Kassel: Bärenreiter, 1955), fol. i.v. - ii.v.
  40. Pablo Nassarre, *Escuela musica*, 2 vols. (Zaragoza: Iarunbe, 1724), 8f, 65-69.

some declare that Saturn moves with the deepest sound and that, as we pass by stages through the remaining planets, the moon moves with the highest, while others, conversely, ascribe the deepest sound to the moon and the highest to the sphere of the fixed stars, I put faith in neither opinion. Rather I unshakeably credit Aristotle and his commentator, along with our more recent philosophers, who most manifestly prove that in the heavens there is neither actual nor potential sound. For this reason it will never be possible to persuade me that musical concords, which cannot be produced without sound, can result from the motion of the heavenly bodies.

Concords of sounds and melodies, from whose sweetness the pleasure of the ear is derived, are produced, then, not by heavenly bodies, but by earthly instruments with the co-operation of nature.<sup>41</sup>

Tinctoris, like many others, in attempting to deny the objective reality of musical sound produced by the spheres, overlooked the continued existence of this belief as mainly a symbolic figure of the relationships of music and the spiritual and physical world.

In the sixteenth century many of the references to the music of the spheres were still based on the Boethian concept. In Italy, Pietro Aaron (1523)<sup>42</sup> and

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41. Trans. in Oliver Strunk, Source Readings in Music History (New York: W. W. Norton, 1950), 148.

42. Pietro Aaron, Toscanello in musica (Venice: Vamente, 1523), Cap. III.

Giovanni Maria Artusi (1586)<sup>43</sup> used this classification, as did the Englishman Thomas Morley in his Plain and Easy Introduction to Practical Music of 1597.<sup>44</sup> In the 1590's the French Academy of Bâif and the Cambrata of Bardi accepted the ideas of cosmic harmony. It is recorded that masques staged by Bardi's group as well as Bâif's had subjects based on speculative music, even to the extent of a masque entitled The Harmony of the Spheres, which expressed the concepts of world harmony in the geometrical and mathematical relationships of its dances.<sup>45</sup>

These superficial references to the ideas of cosmic harmonies overlapped a late fifteenth-century trend toward a deeper involvement of the Pythagorean symbolism and religion. The reconciliation of Pythagoreanism and Christianity had started early in the tenth century in the remarks of Aurelian that earthly choirs emulated the music of the spheres.<sup>46</sup> In the sixteenth century these

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43. Giovanni Maria Artusi, L'arte del contrappunto (Venice: Vincenzi Amadino, 1586), 1.

44. Thomas Morley, A Plain and Easy Introduction to Practical Music (1597), ed. by R. Alec Harmon (London: J. M. Dent and Sons, 1952), 106.

45. John Hollander, The Untuning of the Sky (Princeton: Princeton University Press, 1961), 86-87.

46. Aurelian, op. cit., 32.

ideas spread rapidly, so that, as may be seen in the following citations, by the early seventeenth century many musicians spoke freely about the relationships of God, Man, and the musical proportions.

Richard Mulcaster, writing in the prefatory verses to Byrd's and Tallis's Cantiones quae ab argumento sacrae vocantur of 1575, stated:

How valuable a thing music is, is shown by those who teach that numbers constitute the foundation of everything which has form and that music is made up of these.<sup>47</sup>

The composer Robert Jones, in 1608, illustrated the common opinion that "there is musicke in all thinges," when he emphasized in the dedication of his Ultimum Vale the need for harmony in both music and the state.

Politie, or the subject thereof, a commonwealth, is but a well-tunde song where all partes doe agree, and meete together, with full consent and harmony, one serving the other, and everyone themselves in the same labor.<sup>48</sup>

More direct references to celestial music are apparent in such statements as Byrd's in the dedication of his Gradualia of 1610, where he writes that for the praise

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47. William Byrd and Thomas Tallis, Cantiones quae ab argumento sacrae vocantur (London: Wautrollerius, 1575).

48. Robert Jones, Ultimum Vale (London: John Windet, 1605).

of God "none but some celestial harmony will be proper."<sup>49</sup>

That earthly music must resemble the celestial music in

its perfection was also stated by Charles Butler, who

wrote in his Principles of Music (1636) that "Music gave

promise of celestial joys . . . which it doeth resemble."<sup>50</sup>

In his Temple musicum of 1611, Johann Alsted

writes at great length about the relation of music and the

universe. Besides his innumerable comments on the unity

that exists in God and music, he also extensively discusses

the emotional aspects of the modes and the affections.

Alsted's observations conclude with his discussion of the

monochord, about which he says:

The canon, mother, and radix of all instruments is the monochord; which is an instrument most simple and intire . . . and we may observe fully in this instrument, all the proportions of all musical numbers.<sup>51</sup>

To Alsted, the perfection of music is determined by the

purpose for which it is used. Of the modes he writes:

49. William Byrd, Gradualia (London: Humphrey Tonnes, 1610).

50. Charles Butler, Principles of Music (London: John Haviland, 1636), I.

51. Johann Alsted, Templum musicum (1611), tr. by John Brenchensha (London: P. Dring, 1664), 90.

There is a certain imitation of celestial harmony, by which as by a sweet and wholesome medicine, the diseases of the mind are cured, Vices are dissipated, cares are lessened; and the Dew of Divine Grace is lessened, and by little and little dissipated. 52

In 1617 Robert Fludd, whose symbolic use of the

monochord will be discussed in the final section of this

chapter, represented his ideas about the relationships of

man, music, and the universe in the title page of his

Utriusque cecum (Plate 34), where the planetary symbols

on staff lines represent the cosmic harmonies. The implicit

relations of Fludd's mystical beliefs, derived from his

associations with the Rosicrucians, may be seen in the

use of the astrological symbols which are connected to the

various parts of the Vitruvian figure. The whole is connected to God by the cord which is drawn by the winged

figure with hooves. This figure, scaling the clouds

toward a union with the infinite, represents time. On his

head stands an hourglass, which is surmounted by an abbe-

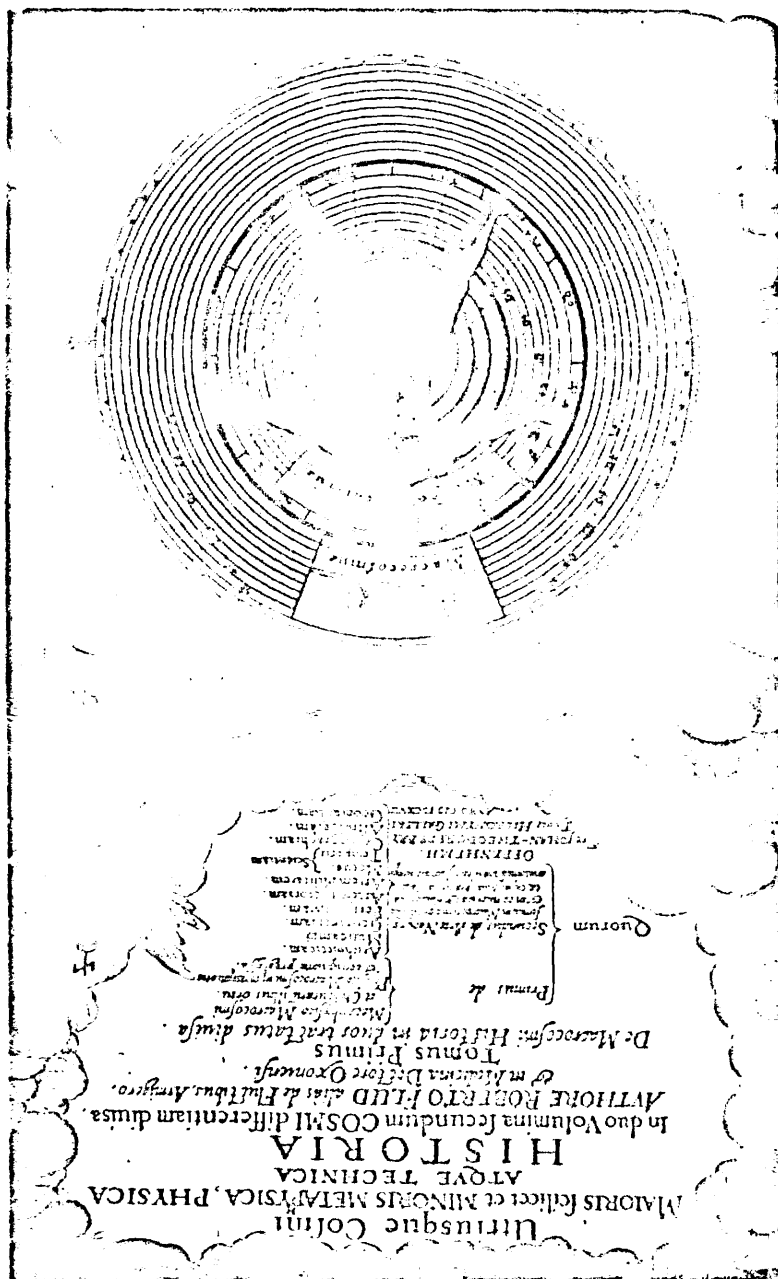
viated emblem of the solar wheel in the form of a

swastika. 53

52. Idic., 78.

53. Robert Fludd, Utriusque cecum (Oxford: Gallie, 1617), title page.

Plate 34. Title page from Robert Fludd's  
Utriusque Cosmi.



Athanasius Kircher published several works that depict, though not so boldly as Fludd, the mystical associations of man and the universe. The *Frontispiece* of Kircher's *Musurgia universalis* of 1650 illustrates, among other things of allegorical significance, the singing of the spheres, by means of a heavenly choir (Plato 35). 54

Thomas Kace, the last writer to be mentioned in this section, exemplifies the prevalent ideas about the relations of music to God and man in the "Contemplative Part" of his *Musick's Monument*, where he uses music to relate himself to God and eternity.

#### GREAT GOD

Mysterious Center of All Mysteries;  
All Things Originate Themselves in Thee;  
And in Their Revolution, wholly tend  
To Thee, Their Octave, Their Most Happy End.  
All Things (what e're) in Nature, are Thus Rounded,  
Thus Mystically Limited, and Bounded;  
Some Harmonize in Diapasons Deep,  
Others again, more lofty Circles keep.  
But Thou, the Moving Cause in every Thing;  
The Mystick Life, from whence All Life doth Spring.  
That Little Spark of Life, which I call Mine,  
It came from Thee; (a Precious Gift of Thine)

54. Athanasius Kircher, op. cit., Frontispiece. See also the Frontispiece of Kircher's *Musurgia nova* (Carpentras: Adolphum Dreher, 1675), and Kircher's allegory of music and the seven days of the creation in the *Musurgia*, II, 366.

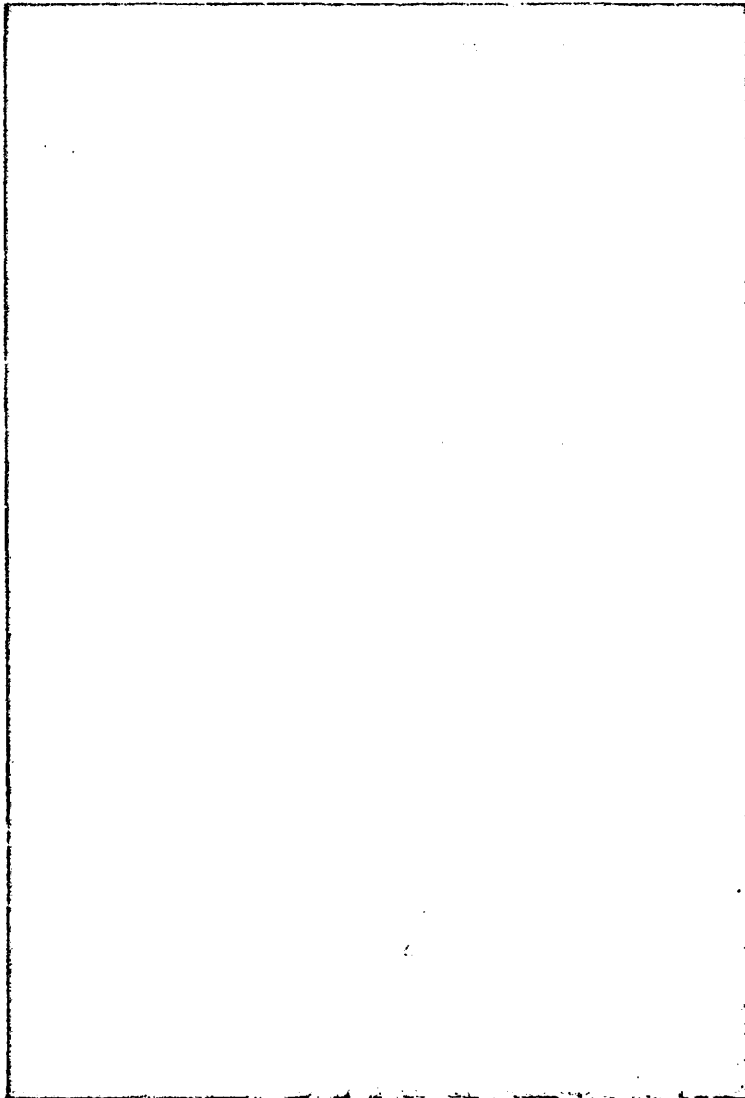


Plate 35. Frontispiece from Athanasius  
Krocher's Musurgia universalis.

56. Thomas Moore, "The Loves of the Planets" (London, 1876), fac-simile ed. (Paris: Editions du Centre national de la recherche scientifique, 1968), 269.  
Moore (ed.), "The Loves of the Planets" (London, 1876), fac-simile ed. (Paris: Editions du Centre national de la recherche scientifique, 1968), 269.
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55. Thomas Moore, "The Loves of the Planets" (London, 1876), fac-simile ed. (Paris: Editions du Centre national de la recherche scientifique, 1968), 269.  
Moore (ed.), "The Loves of the Planets" (London, 1876), fac-simile ed. (Paris: Editions du Centre national de la recherche scientifique, 1968), 269.
- The earliest diagram in which the notes of the  
 dissonance are related to symbols of the universe -- in  
 this case the signs of the zodiac -- appears in the  
 "Harmonics of Ptolemy." Ptolemy's reasons for using the  
 zodiacal symbols are not made clear in his discourse about  
 the universe. He wrote briefly on the harmony of the  
 spheres and referred each of the planets to a different  
 sphere.

### The Symbolic Use of the Monochord

I bless Thy Name, I daily feel it move,  
 And circulate towards Thee, its highest Love.  
 I've almost run my round; 'tis wellnigh past,  
 I joy to think of Thee, (my trust; my last)  
 A Union (at last) I was in Thee;  
 An octave (now at last) I hope shall be,  
 Do Thou Thy Prayers in Eternity,  
 In the Unconceivable Harmonious Mystery.

pitch, but these planetary symbols do not appear in his diagram. Diagram 90 shows both of the illustrations presented by Ptolemy. In Figure 1 the zodiac is related to a linear representation of the monochord. In Figure 2, all the notes of the Greater Perfect System are assigned places within the celestial sphere. The latter kind of representation often appears in Renaissance illustrations of the monochord.

Jacques Handschin, in an article in the Zeitschrift für Musikwissenschaft (1926),<sup>57</sup> describes a medieval manuscript that contains a composition about the harmony of the spheres. A facsimile of the manuscript (Plate 36) shows, on the right side, a linear representation of a monochord containing the notes of the Greater Perfect System and the names of the planets. Handschin says that this manuscript dates from the eleventh or twelfth century, but that the poem, because of its style, is probably from the tenth century. There is a striking similarity between this representation and the monochord shown in Plate 33, even to the non-proportional placement of the notes on

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57. Jacques Handschin, "Ein Mittelalterlicher Beitrag zur Lehre von der Sphärenharmonie," Zeitschrift für Musikwissenschaft, IX (1926), 193-208.

Diagram 90. Ptolemy's representations of the universe.

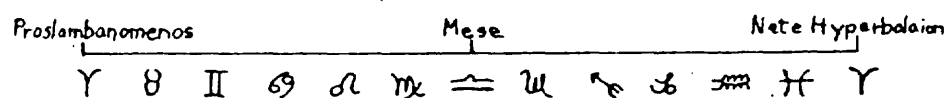
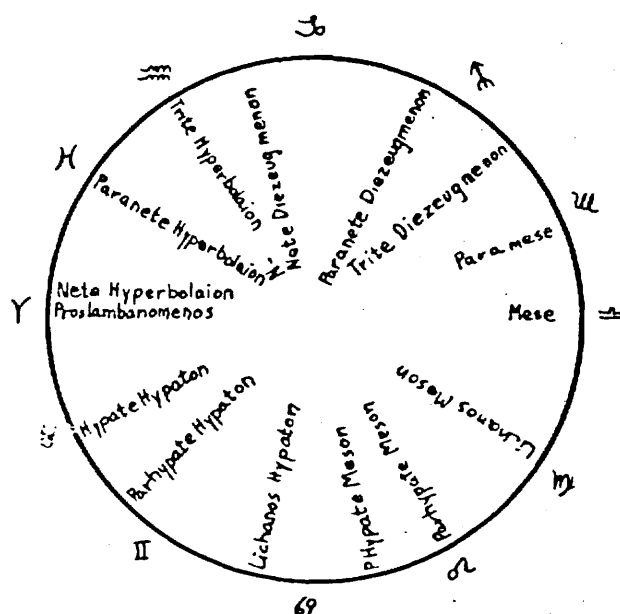


Figure 1.

Figure 2.



the string; this aspect of the drawing is a common feature of many of the monochord drawings of later centuries.

After Ptolemy, all of the early monochord diagrams are used mainly to relate the planets to definite pitches, with little accompanying symbolism of the kind found in the late Renaissance. This way of using the monochord

NATURALIS CONCORDIA VOCU CUM PLANETIS;



ST PLANETARUM SIMILIS CONCORDIA VOCUM.

Circa egle diurnis scandit ordo.

Vultus hos numeros hic sursum scandit ad unum.

Quintus. tertius. unus. et sol. mart. ius. etque saturnus.

Ordine continenti deus uicet modulari.

Primum de lunis quæ feruntur proxima terræ.

Lipide quæ quantum mercurius statit illa.

Haecque totius spacio numerorum multatit ordo.

Namque sequens spacia uicet arce limace dignum.

Post totus ad solem directissimum impli cando.

Tertius æque totum mart. bellus in dispersio.

Supper æque suum breue plangit luri carmen.

Etque totus cælis diuinas parte saturnus.



continued until the early sixteenth century. The Greek influence is often apparent in the use of the Greek note names, the nine muses, and other pagan symbols. Such an illustration appears in the Harmonia musicorum instrumentorum (1514) of Franchinus Gaffurius, where a three-headed serpent represents the single string.<sup>58</sup> Each of the accompanying muses in this illustration is related to one of the pitches of the one-octave scale, as are the various planets. In this instance, the serpent may also represent time -- past, present, and future.

Glareanus's discussion of the harmony of the spheres and the diagram that he prints in the Dodecachordon are about the same as those of Gaffurius. Glareanus, in addition to providing the diagram, explains some of the number symbolisms current in his time, including an explanation of "Why the number seven occurs so frequently among writers on music."<sup>59</sup> The number seven appears in his monochord diagram, as it does in Gaffurius's, in that there are only seven intervals in the scale.

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58. Franchinus Gaffurius, Harmonia musicorum Instrumentorum (Mediolani: Gotardus, 1518), 95.

59. Henricus Glareanus, Dodecachordon, tr. by Clement Miller (Unpublished dissertation, University of Michigan, 1952), 222ff.

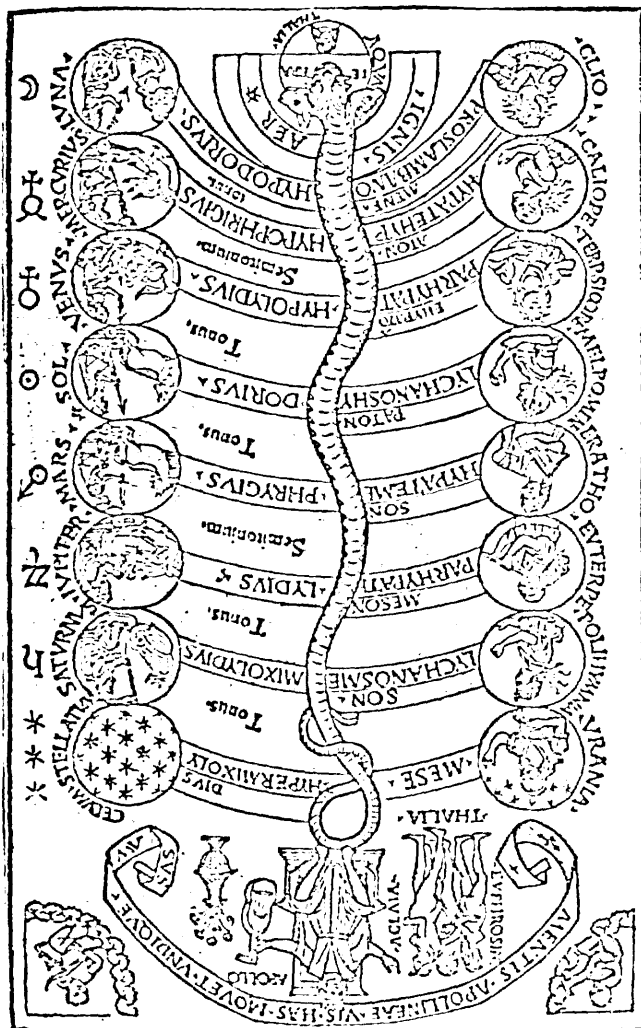
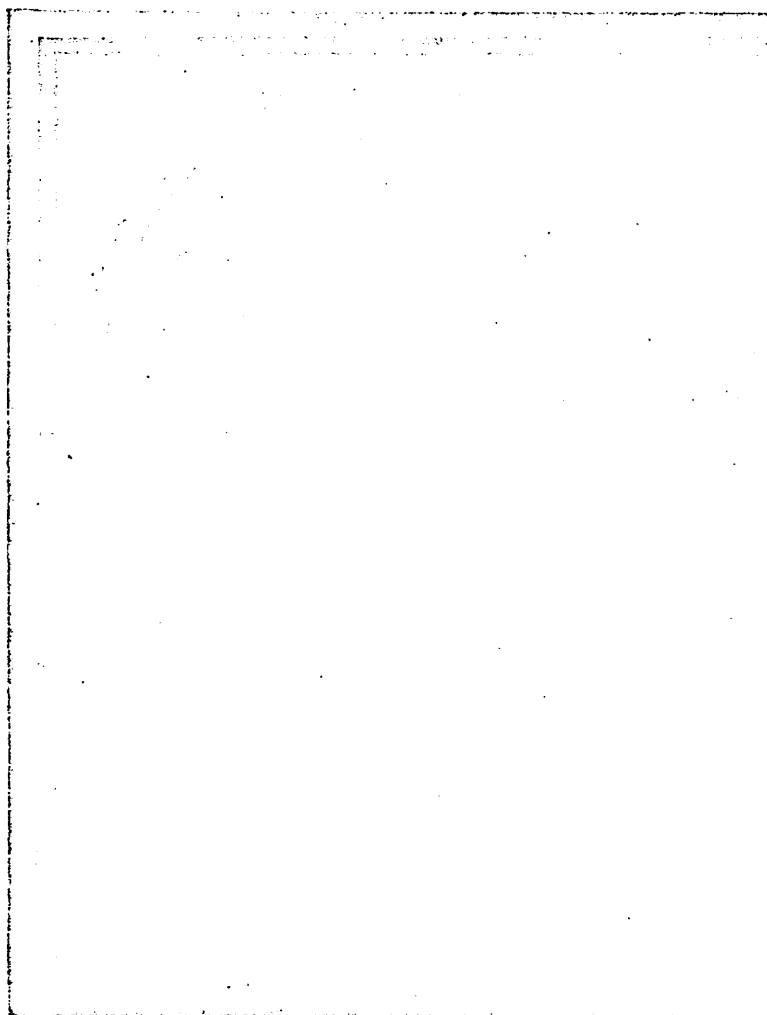


Plate 37. Gallinus's symbolic  
of the monochord.

This same illustration (Plate 38) was used in Zarlino's explanation of Pythagoreanism in his Istitu-  
tion harmonice of 1558 - but with one interesting change in meaning. Zarlino granted the authority of natural law

Plate 38. The monochord diagram of Glareanus.



to the musical ratios of the diagram, stating that they form the basis of everything -- of the heavens, the four elements, the soul and body of man.<sup>60</sup> Although none of

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60. Gioseffo Zarlino, Istitutioni harmonice (Venice: Senese, 1562), 102.

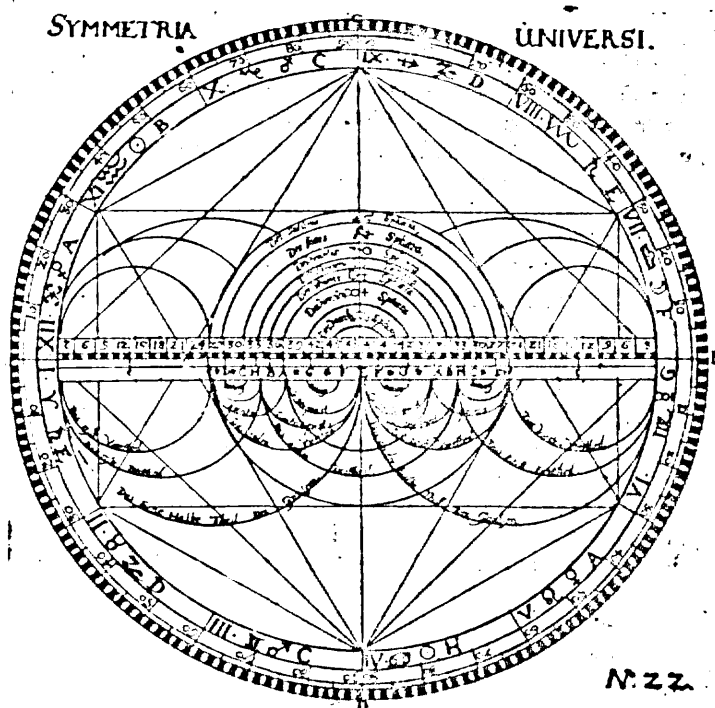
Zarlino's predecessors had gone so far as to relate physical and spiritual being to this kind of representation, all of the later users of the symbolic monochord, perhaps influenced by Zarlino's boldness, give a religious interpretation to their illustrations. It may be recalled that a similar change of attitude in the explanations of the harmony of the spheres was noted in the preceding section (pp. 446-47, above).

Abraham Bartolus was evidently the first of the seventeenth-century musicians to expand the symbolic uses of the monochord beyond the limits set by Zarlino.<sup>61</sup> Bartolus's monochord (Plate 39), drawn as part of a circle, actually contains two separate monochords, placed so that the lowest notes are in the center; the whole is designed so as to present a symmetrical diagram of the universe. Although Bartolus describes many practical uses for the monochord, most of the treatise is taken up with explaining the symbolic interpretations of the instrument. Bartolus covers the gamut of Renaissance symbolism, including the interpretations of the zodiac. In his comments about the doctrine of affections, Bartolus states that the note E,

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61. Abraham Bartolus, "Musica Mathematica," printed as the second part of Heinrich Zeising, Theatri machinarum (Altenburg, 1614), 94-172.

Plate 39. Abraham Bartolus's symbolic monochord.



influenced by Saturn, is sad. He further says that the sound of this note, when it is under the sign of the zodiac in the month of November, is inimical to fishes and fowls.<sup>62</sup> Although the fervor of Bartolus's attempts to relate the sundry aspects of the universe may seem

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62. Ibid., 102.

extreme to twentieth-century sensibility, such zeal appears to typify the first half of the seventeenth century, when such discussions were commonplace, and in many of which the monochord played a symbolic part.

The most famous use of monochord symbolism appears in the Monochordi mundi symphonicum of Robert Fludd.<sup>63</sup> This treatise, written "In apologiam" to Johannes Kepler, was a general disparagement of Kepler for the philosophical mistakes that Kepler had made in his interpretation of the universe. Fludd's argument with Kepler arose over the latter's assertion that the universe was composed of five regular solids (the same ones discussed by Plato). Fludd, in showing Kepler how these solids were part of the earth, invoked the authority of God, and his whole argument culminated in a magnificent diagram of the monochord (Plate 40) that contains much religious symbolism. Regardless of their controversy, the minds of both Kepler and Fludd were cast from the same mold, the main difference appearing in Kepler's consuming passion for finding harmonies in nature after the manner of the Pythagoreans, and Fludd's passion for connecting these harmonies

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63. Robert Fludd, Monochordi mundi symphonicum, issued as part of Fludd's Anatomiae Amphitheatrum (Frankfort, 1623), 238-331.

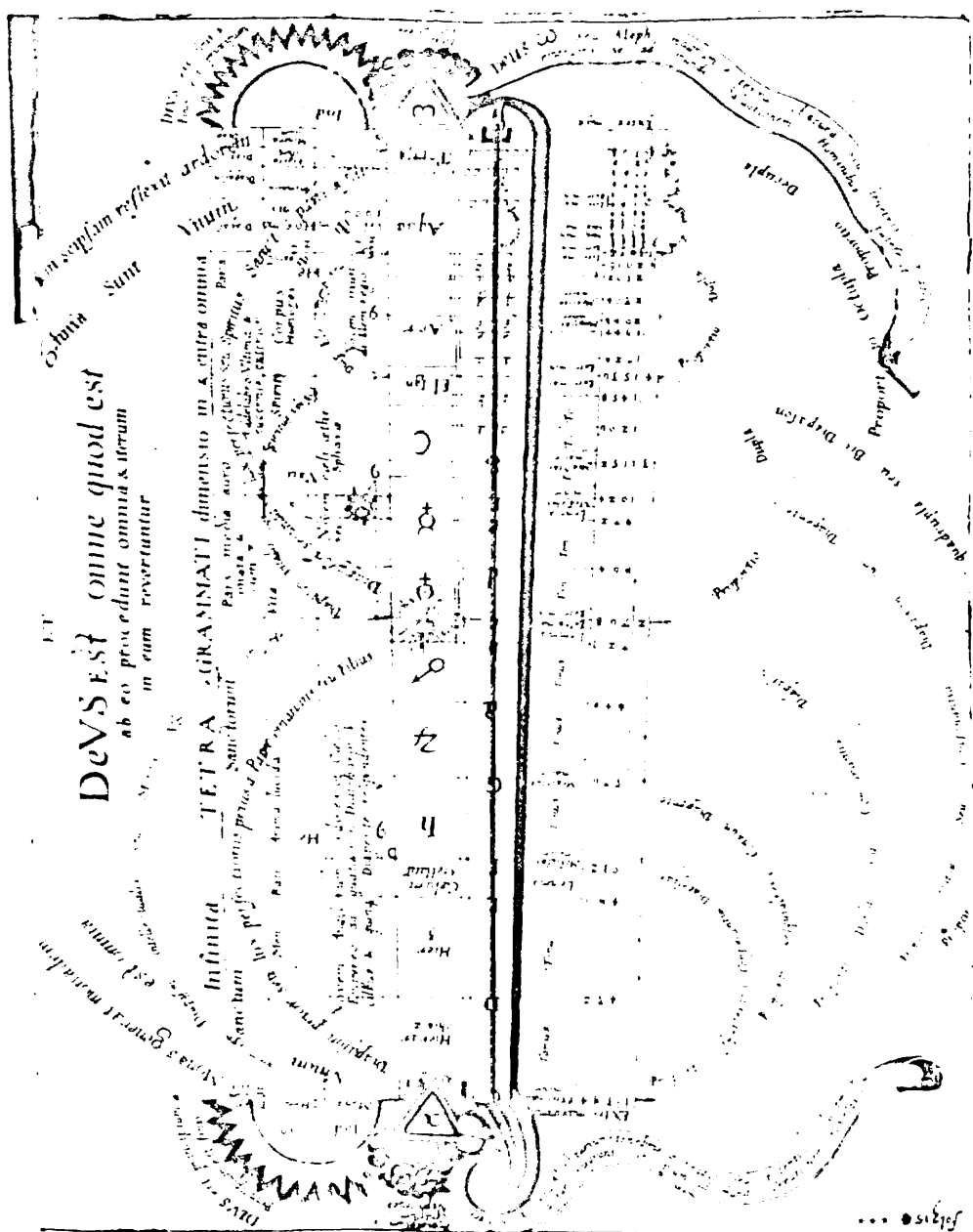


Plate 40. The monochord of Robert Fludd.

to God. To Fludd, Pythagoreanism was only a ladder that enabled him to approach more closely the marvels of the Divine Architect.<sup>64</sup>

Mersenne uses one of Fludd's monochord diagrams (Plate 33) in the Harmonie universelle. But instead of attempting to explain the implications of the illustration, he simply states that one should interpret it in the light of his own needs.<sup>65</sup> Mersenne, in spite of his reticence in explaining the symbolic monochord, was nevertheless well aware of the common practices of his day. One instance of his knowledge of the subject appears in his discussion of the monochord, in which he shows how the astrological conjunctions of the stars are supposed to be consonant to musical intervals.<sup>66</sup>

One of the last attempts in the seventeenth century to apply the symbolism of the monochord to a scientific end

64. Kepler's Harmonices mundi, written in 1619, is available in a modern English translation in Johannes Kepler, The Harmonies of the World, Bk. V, tr. by Charles G. Wallace (Chicago: Encyclopaedia Britannica, 1955), Vol. XVI of Great Books of the Western World, 1009-1035.

65. Marin Mersenne, Harmonie universelle: Traitez des instruments a cordes (Paris: Cramoisy, 1636-37), Bk. VIII, Prop. X, 48.

66. Ibid., Bk. I, Prop. XI, 27.

67. Samuel Hattenreiter, Monochord symbolico-biomechanicum (Ulmae: Nealthasani Mannen, 1640).
68. Ibid., 60.

...tude had become the rule. An example is clearly seen in even, by the third quarter of the century the reticent attitude in Lessner's presentation of the symbolic monochord. However, among these authors does one find the notice first seen symbolists would have on the lives of men. Very seldom detail exactly what effects the numbers portrayed in these writers of the first half of the century had explained in bolism of the monochord began to be less used. Many of the toward the end of the seventeenth century the sym-

on the health of the individual.

writes at length on the good and bad effects of the planets influenced by the astrological forces of the planets and pulse to musical rhythm.<sup>69</sup> Hattenreiter is also greatly latter, he asserts, is evidenced by the relation of the notes and the systolic by the higher notes). Further connection of the notes (the diastolic is represented by the lower diastolic and systolic pressures of the heart to the pitch is to represent the functions of the body. He relates the Hattenreiter.<sup>67</sup> Hattenreiter's main use of the monochord appears in the Monochord symbolico-biomechanicum of Samuel

Christopher Simpson's discussion of the relations of the astrological symbols and the musical consonances.<sup>69</sup> Simpson explains how they are related but says nothing about their effects. His own beliefs are seen in the use of the numbers three and seven, but, unlike Fludd and Haffnerreffer, he seems willing to let the reader make up his own mind. The following quotation gives Simpson's summarization of his explanation of the monochord (Plate 41).

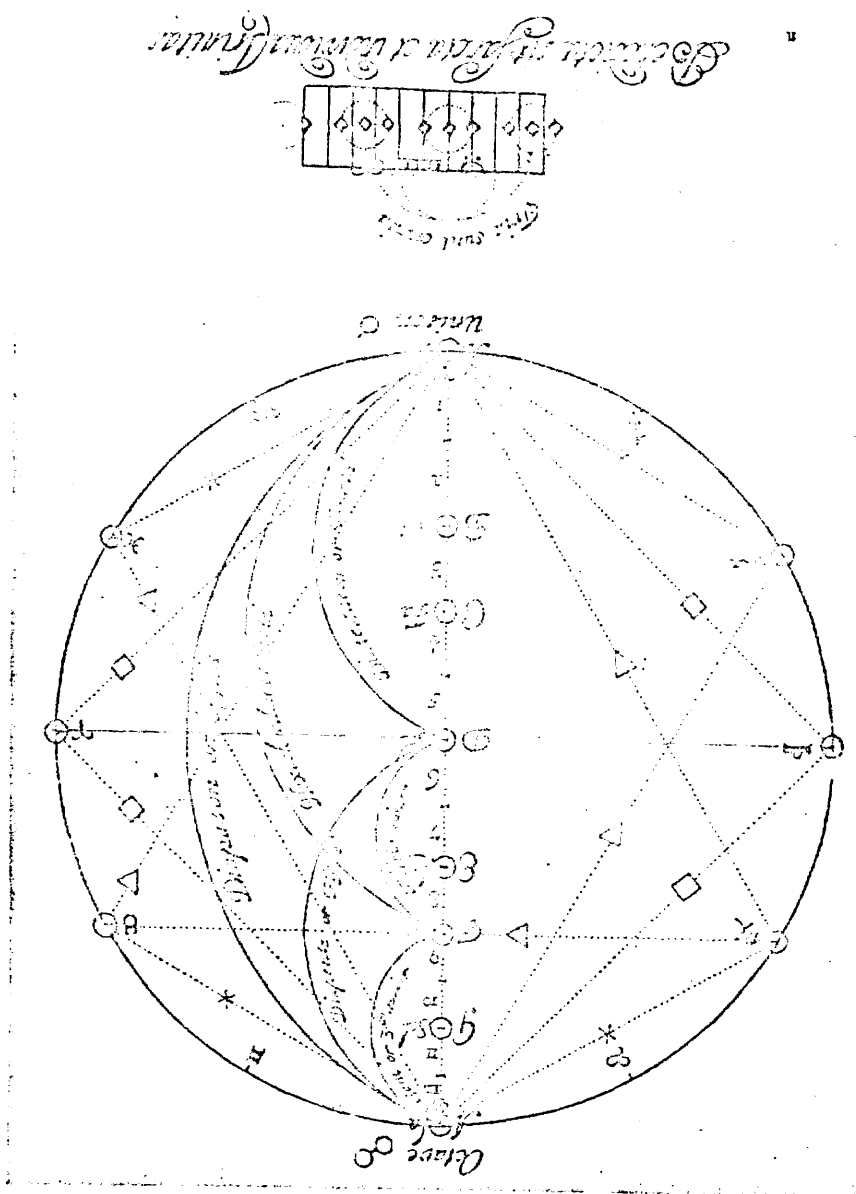
The Analogy of Musical Concords to the  
Aspects of the Planets, illustrated in  
the following scheme.

Where you have the seven Gradual sounds in their orderly progression represented on the Diameter-line. Upon which, is also described a diapasen with its included Consonents, according to the Arithmetical division thereof, as experimentally found upon a Monochord, or the String of any fretted Instrument, from the Nut to the middle thereof. The outmost Circle represents the Zodiack, and the Aspects of the Planets, to which you see the Diapasen with its Intersections exactly agreeing; as viz. The two Terms thereof, to a Conjunction and Opposition: The middle Section (which generates a Fifth on one side, and a Fourth on the other) to a  $\square$ . A Third and a Sixth completing also the Compass of an Octave, as a  $\Delta$  and a  $\star$  do a Semicircle or the two opposite points of an Orbe. To which may be added, that a Diapasen is divided into Twelve Semitones, as the Zodiack into Twelve Signes of Sections.

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69. Christopher Simpson, *The Division Viol*, 2nd ed. (London: W. Godbid, 1665).

Plate 41. Christopher Simpson's analogy between  
music and astrology.



The other Figure shows, that all the Sounds that can possibly be joyned together in Musical Concordance, are still but the reiterated Harmony of Three.<sup>70</sup>

Musical symbolism survived the seventeenth century to remain a moving force in the eighteenth century. Many of the users of the monochord in this latter era also dealt with musical symbolism, but not in relation to the monochord; by this time the monochord was used only as a practical instrument. Andreas Werckmeister, who compared incorrect temperament with false Christianity,<sup>71</sup> was one of the last to mention the symbolic value of the monochord. His remark that "the nearer a thing is to its origin, the nearer it is to perfection,"<sup>72</sup> perhaps sums up most of the reasons why the monochord was used as a symbolic entity -- and why this instrument remained a favored tool among so many musicians of his time and earlier eras.

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70. Ibid., 24.

71. Andreas Werckmeister, Musicalische Paradoxal-Discourse (Quedlinburg: Calvisii, 1697), 109.

72. Ibid., 13.