MUSICOLOGICAL STUDIES AND DOCUMENTS

8

RENÉ DESCARTES

COMPENDIUM OF MUSIC

(COMPENDIUM MUSICAE)

Translation by Walter Robert
Introduction and Notes by Charles Kent

AMERICAN INSTITUTE OF MUSICOLOGY
1961

AMERICAN INSTITUTE OF MUSICOLOGY
ARMEN CARAPETYAN, Ph. D., DIRECTOR

MUSICOLOGICAL STUDIES AND DOCUMENTS

8

RENÉ DESCARTES

COMPENDIUM OF MUSIC

© 1961 by Armen Carapetyan

RENATI

DES-CARTES

MUSICÆ

COMPENDIUM

AMSTELODAMI,
Apud JOANNEM JANSSONIUM Juniorem.
CIↃ IↃ C LVI.

TRANSLATOR'S NOTE

The initial suggestion to translate this treatise came from my colleague Dr. Roy T. Will, then Professor of Music Theory at Indiana University. He also contributed materially to the progress of the work; two of his annotations were taken over without change, and are so marked with the initials R.T.W.

I am furthermore indebted to my teacher and colleague Dr. Fred Householder of the Department of Classical Languages at Indiana University for advice and corrections, and to Dr. Willi Apel for his many pertinent and valuable suggestions.

The responsibility for the English rendering is entirely mine.

W. R.

INTRODUCTION

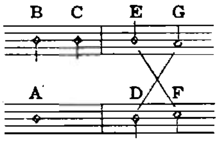
In May, 1617, at the age of twenty-one, René Descartes joined the army of Prince Maurice of Nassau (1557-1625), one of the most important leaders of the rebellion against Spain. At that time his troops were stationed near Breda, in the province of Brabant. Since peace at least temporarily prevailed, and since Descartes preferred to avoid the company of mercenaries (he belonged to the privileged class of *gentilhommes)*, he found ample time for reflection and writing. Descartes also found pleasure, however, in making the acquaintance of the civilian mathematicians and engineers who frequently visited the army camp in order to confer with those military personnel who were working in their fields. It was at this time, in particular, that he met and became the friend (except for one short rift) of Isaac Beeckman (1588-1637), a well-known mathematician and the Principal of the College of Dort.

In December of 1618 Descartes presented the *Compendium Musicae*, which he had written that same year[1], to Beeckman as a New Year's gift. Since he realized its deficiencies, Descartes requested Beeckman to keep secret the existence of the work; a defective copy, however, found its way into circulation and was widely read by other mathematicians and scientists, among them Marin Mersenne (1588-1648), one of Descartes' oldest and most valued friends. Between 1629 and the publication of Mersenne's *Questions Harmoniques* in 1634 Descartes wrote several letters to Mersenne explaining and elaborating on points presented in the *Compendium*, as well as introducing new and related material (such as how a string divides itself in order to produce overtones). There can be no doubt that Descartes was responsible for much of the material presented by Mersenne in his *Questions Harmoniques, De la Na-*

---

[1] So stated in his letter to Mersenne of October or November, 1631.

1/10 or 1/16 or finally 1/25, except the intervals which produce other consonances. Consequently, all steps consist of intervals of which the first two are called the major and minor whole-tones, the last two the major and minor semitones. Now it remains to be proved that the steps considered in this way are produced by the differences of the consonances. I do this as follows: whenever one moves from one consonance to another, one or both tones [of the first consonance] must move, and the transition cannot be effected except by intervals which show the difference existing between the consonances; thus the first part of the minor proposition can be proved as follows:



Let A to B be a fifth and A to C a minor sixth; then B to C must be the difference between a fifth and a minor sixth, which is 16[35]. To prove the second part of the minor [proposition] it must be observed that one must consider not only the relation between pitches which are produced simultaneously, but also the relation when they are produced successively, so that as far as possible the pitch of one voice must be consonant with the immediately preceding pitch of another voice, which can never be the case unless the steps have their origin in the difference between the intervals.

Let, for instance, DE be a fifth, and let each tone of the interval be moved in contrary motion, so that a minor third results. If the interval DF were not the result of the difference between the

---

1/25 represents the minor semitone, the difference between a major and a minor third:

$$5/6 - 4/5 = 1/30, \quad 1/30 \text{ of } 5/6 = 1/25$$

Subtracting each of the above fractions from unity produces 9/10, 15/16, and 24/25, the more usually found ratios for the minor whole-tone, major semitone, and minor semitone.

[35] This should read 1/16, not 16, for

$$2/3 - 5/8 = 1/24, \quad 1/24 \text{ of } 2/3 = 1/16$$

5. At the end of a composition the ear must be satisfied; it must expect nothing more and must realize that the composition is complete. This is best achieved by certain sequences of tones leading to a perfect consonance; [these patterns] the composers call cadences. Zarlino enumerates at length all the possibilities of these cadences. He has also comprehensive tables in which he charts which consonances can be used after which, anywhere in a composition. He offers a number of reasons for all of these, but I believe that more and better rules can be derived from our basic principles.

6. The composition as a whole and each voice individually must be kept within certain limits, called modes, about which we shall speak shortly.

All this must be observed strictly in contrapuntal writing for two or more voices, but not in music with diminution or other special features. In compositions with much diminution and figuration, as it is called, many of the preceding rules are disregarded. In order to give succinct reasons for this, I must deal first with the four parts or voices which are customarily employed in composition. For although one may often find fewer voices and sometimes more, four-part writing seems to be the most perfect and the most frequently practiced.

The first and lowest of these voices is the so-called Bass. It is the most important and must satisfy the ear completely, since, as we have explained before, all other voices must bear a strict relation to it. The bass often moves not only by step but also by leap. The reason for this is as follows: the steps were invented to remove the awkwardness which would result from the inequality of the pitches of a single consonance. If one pitch were produced immediately after the other, the higher pitch would strike the ear much more forcibly than the lower. But this awkwardness is less noticeable in the bass than in the other parts; since it is the lowest voice, it must strike the ear more forcibly in order to be heard distinctly. This is achieved better by the use of leaps, that is, by moving immediately through small consonant intervals than by stepwise motion.

The voice next to the bass, called Tenor, is also important in its