Institution Harmonique

(1615)

Salomon de Caus

The Chapters on Instruments

translated by

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Preface

Salomon de Caus (1576-1626) was an engineer, architect, and music theorist according to the article in Grove Dictionary. This scientific background no doubt accounts for his interest in the physical and acoustical principles of music. His Institution Harmonique (1615) is devoted to the acoustical nature of music, including a brief but very interesting discussion of musical instruments. What makes these short chapters so interesting is that they are a departure from the taxonomic tradition of Virdung (1511), who organizes the instruments according to sound production—String, Wind, Resonant (Percussion)—de Caus conceives of them according to acoustical nature—Fixed pitch, Partly fixed pitch, Variable pitch. He also includes an equally brief but interesting chapter on a major issue of the day, those instruments that could easily play together in ensemble. This was a major issue in his time because of the different temperament systems utilized by various types of instruments. The main problem lay in combinations of keyboard with fretted instrument.
Chapter 36: Concerning Musical Instruments of Fixed Pitch

When in music that is made with instruments of fixed pitch one cannot observe all the same passages as the voice produces them, the reason is that the said instruments have all their notes determined, each in one specific level. Organs, spinets and harps are of this genre, especially when they are in ensemble and when someone is going to play above, one cannot in any way vary the intervals of the whole steps or half-steps, especially when all the said pitches are all determined together in ensemble. This causes music that is plain and without great skill. Nevertheless, some know how to handle the said instruments so well in trilling the two pitches of a semitone that it presents a great refinement to the ear.

Chapter 37: Concerning Musical Instruments that are partly Fixed Pitch

There are other instruments like the viols, the lute, gittern, zither, and similar ones, whose intervals of the pitch are fixed with frets, which are partly fixed and partly variable. The reason is that in playing the said instruments one can make some trembling on the frets, rising or falling, so that it produces a great sweetness to the ear. But, nonetheless, the tirades and trills of the voice are much more perfect, that which is not stopped by any touch rather produces the consonance in its simple perfection. And especially, it is not possible to make the said frets be all placed according to the measure demonstrated on the monochord in the first part of the Institution.

Chapter 38: Instruments of Variable Pitch

A third kind of musical instruments is those that are variable, those that are not subject to any frets and are graduated by none: nonetheless, they can sound either higher or lower. For example, cornettos, flutes, and oboes are graduated by holes that give a certain precision to the sounds. Even so, those who know how to manage the said instruments well can raise or lower them at their pleasure by means of the fingers that stop the holes gradually according to the will of the player. But the violins surpass all the other instruments in this subject, so far as they are subject to no holes. One can raise or lower the sound according to the will of the player, not only from low to high or high to low, but the sounds are rendered louder or softer. Neither organs nor spinets can have the effects, thus it is necessary that their sounding pitches are equally strong. But, the others, such as cornettos and flutes, can be rendered louder or softer at pleasure, likewise the lute, viols and violins.

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1 That is, when they are going to accompany a higher instrument.
2 This sounds very much like vibrato, which some other authors call a “sweetening.”
3 He probably means an open string.
4 This appears in part 1 on page 6. Caus’s harmonic scheme seems to be influenced by Ptolemy, who had become quite influential in the Renaissance. See Mark Lindley, Lutes, Viols and Temperaments (Cambridge: Cambridge University, 1984).
Chapter 39: Musical Instruments that can be Accommodated together for a Musical Concert

All musical instruments in general, which are variable and not restricted by frets can combine together quite agreeably with the voice. But, those that are restricted by the said frets, like lutes and viols and other similar, cannot so exactly make their accord with the voice. The reason is that the frets, by which they are graduated, are separated by intervals that are exact semitones,\(^5\) which are not directly measured according to harmonic proportion, as can be seen in the system of the first part of this book. But, because the sound of these instruments passes so fast, and especially the lute, are not so perceptible. But, if the organ were to sound like the said lute,\(^6\) the defect would be recognized as great. As to the said organs, spinnets, and harps, they can accommodate better to the voice, though their pitches are fixed, for the steps and consonances in them are better divided. Of all the instruments there is not one of them that appears to be tuned more exactly than the organ. It is also the most perfect of all the others. If one desires it to accompany the voice, it is necessary that it be with registers called flutes and that the greatest pipe, called Ffaut, be stopped at three or six feet. The lower of the viols are also very good, and generally all the instruments that are not graduated by frets.

Chapter 40: The Manner of Augmenting the Keyboard of Organs and Spinnets in such a Way as One will have the Most Perfect Division of the Consonances

In the twentieth proposition of the first part was demonstrated how the intervals of Ptolemy’s monochord could not accord entirely with nature. In order to aid this defect, there are two cords adjoined in the space of the octave, namely one in D-lasolre and another in G-solreut, such that if one wants to have consonances of the organ and spinet quite exactly attuned, he will discover that there will be need of having two sharps on each D-lasolre, namely one that will represent the number 12960, which is precisely the diatessaron with A-re, and a diapente with A-lamire, and the other sharp will be ordinary; and also it will be necessary to do likewise on G-solreut, as can be clearly seen in the present monochord at the number 9720. So, in all the other keys sounding G-solreut. Then it will be possible to have the diatessarons and diapentes precisely for any key [i.e., physical key on the keyboard]. Otherwise there is a deficiency.

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\(^5\) Apparently by the late fifteenth century players of fretted instruments had worked out a method of fixing their frets in an empirically derived equal temperament. Lindley, *Lutes*, 93-94.

\(^6\) I am not really certain of the French here “*mais sy des orgues sonnoient directement comme ledit Lut,*” I believe he may mean that the lute’s plucked pitches delay too quickly to make running faults perceptible, whereas if like the organ, being capable of sustained sound, they would become obvious. In that case the difference in intonation would be very evident.