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(pp. 259–262), she laments, “Today the viol is in a desperate situation, for it is not itself. Its musical condition is that of a derivative of the violoncello. . . . With depressing predictability player after player . . . keeps aspiring back to a totally un-viol-like sound of robust clarity with no accidental noise components, which is really that of the modern violin family. . . . Played with historical means, including flat bridges and an even tension of all the strings, the viols sounds completely different” (p. 259). Otterstedt is surely right in this respect, and her level of commitment is unquestionable.

Otterstedt’s quest for knowledge and her ability to communicate are commendable. Despite some of the book’s shortcomings, her efforts should serve as an inspiration for gambists. Thanks to Hans Reiners’s serviceable translation, those who seek to present a more meaningful and authentic performance of a vast body of solo and consort literature, as well as the more general reader who pursues a better understanding of the viola da gamba’s place in history, have a new and worthwhile source to consult.

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Michael Fleming. *Viol-Making in England c. 1580–1660 (VME CD-ROM)*. Ph.D. dissertation, Open University, Milton Keynes, U.K., 2001. Published in two volumes on one compact disk by the author (13 Upland Park Road, Oxford OX2 7RU, U.K.; e-mail: viols@flemingoxford.co.uk), 2002. 245, 261 pp.: 108 color illus., charts. £15.00 (includes postage in the U.K.).

In examining the art of the past, which in many cases comes down to us with little documentation of its creators’ methods or intentions beyond what can be gleaned from the objects themselves, it can be tempting to generalize theories about artistic intention. If we find the golden section in a musical instrument, does that mean the maker consciously used it? Old English viols have enjoyed an excellent reputation—they are favorite models or inspirations for modern makers of the instrument—yet the limited numbers that survive and the difficulties encountered in trying to establish their original condition and appearance make it very hard to make scientific generalizations about them. Theories may abound, but proof is difficult to provide. Michael Fleming, in his *Viol-Making in England c. 1580–1660*, assiduously avoids the temptation to

theorize far beyond what might be safely inferred from the surviving instruments and other documentation.

Fleming sets himself the goal of studying every possible trace of surviving evidence that documents the construction of viols in England between 1580 and 1660, from the instruments themselves, to public records regarding the lives of viol makers, to guild rules of related trades. His work is divided into two "volumes," presented as separate files on a single CD-ROM. The first is divided into five chapters on the form of the viol, extant viols, iconography, viol making, and the makers themselves. The second volume provides over one hundred pages of tables and appendices in addition to the illustrations. Fleming is thorough in his investigation, and in the process has created a wonderful trove of information which is unlikely to be surpassed soon as a reference for English viol making of this period. His medium of publication (which I will discuss later), the CD-ROM, has made it possible for him to include a vast number of high resolution images and copious appendices, while maintaining a modest cost to the reader.

For me, Fleming's most surprising finding is that viol makers in England in this period did not form a coherent group, and that many of them were probably not specialists in the way we might expect. There were no guilds for instrument makers in England at this time, nor was instrument making seen as a full-time specialty. This is in distinct contrast to violin making in Italy or, say, harpsichord making in Flanders.¹ Many, but not all, viols made in England at this time were built by joiners or other tradesmen who had basic woodworking skills but not necessarily extensive knowledge of or experience with musical instruments. There were no schools or associations of makers. It would have been possible for a noble or other wealthy amateur to commission a viol or chest of viols from a local cabinetmaker who may or may not have had prior experience making an instrument.

Fleming doubts whether English viol makers of this time would have relied on specific geometric principles of design for their instruments. He states that the "main branches of mathematics that might be of use to a viol maker are geometry and arithmetic, but neither of these were

1. See Grant O'Brien, *Ruckers: A Harpsichord and Virginal Building Tradition* (Cambridge: Cambridge University Press, 1990), 13–15, on harpsichord makers in the Guild of St. Luke in Antwerp. It is interesting to compare O'Brien's book with Fleming's work, since each author has focused narrowly on different aspects of instrument making at roughly the same time in history.

routine accomplishments for artificers any more than they were for their most elevated clients" (p. 155). To my mind, this view seems too closely tied to the modern concept of formal education, where mathematics is viewed as difficult, and few people learn or practice advanced artisanal skills. How can we actually be so sure that makers did not know how to draw or appreciate geometric constructions with a compass and a straight edge, just as medieval masons and joiners could? These geometric techniques, now learned as a part of formal education but forgotten by most adults because they have no reason to practice them, could have been passed along informally in the same way that children were taught to use other tools of their trades.² Even if makers did not consciously use mathematics to design their instruments, would this fact rule out the possibility that there might, for reasons not yet understood, be underlying points of mathematical similarity between instruments which would merit study?

Fleming has fascinating points to make on the measurement of instruments. He develops and explains his own Viol Data Protocol (VDP) for taking and recording data from instruments, which would be a good model for others to follow. One aspect of this protocol is that to make meaningful comparisons of measurements of different instruments, the measurements must all be taken by the same person. In his chapter 2 and Appendix 3a he shows that, even if great care is taken, when different people measure the same instrument they get different numbers. His discussion of why the current measurements of an old instrument cannot accurately reproduce the original dimensions of the instrument is enlightening. Any wooden object that is three to four hundred years old will have changed due to shrinkage (which is greater perpendicular to the grain than parallel to it), but it is impossible to know how much an individual instrument has altered. Moreover, even in the short term, dimensions fluctuate measurably with changes in temperature and humidity. Fleming takes particular issue (on pp. 23–24, and *passim*) with

2. Fleming (p. 155, note 740) cites Lon R. Shelby, "The Geometrical Knowledge of Mediaeval Master Masons," *Speculum* 47/3 (July 1972): 395–421, as evidence of how little formal education masons had, but then disregards Shelby's explanation of how they "would normally have acquired their geometrical knowledge in the same way that they acquired the rest of their knowledge and skill in building—by mastering the traditions of their craft" (p. 398). I was able to download Shelby's entire article, including illustrations, on a publicly accessible website, which proved convenient, since this journal is not necessarily available in a music library.

Kevin Coates, *Geometry, Proportion and the Art of Lutherie* (Oxford: Clarendon Press, 1985), bringing up very good points about some of the flawed logic in Coates's arguments. For example, he shows that Coates gives a false impression of symmetry in old instruments by using one side of the outline to generate the other rather than making a tracing all the way around the instrument. Further, Coates has a habit of rounding measurements in the most convenient way to give the impression of simple ratios between parts of an instrument.

The actual number of extant English viols built between 1580 and 1660 is very small—Fleming provides photographs and documentation on thirty-eight instruments here—so it is not surprising, but it is impressive, how much material he has been able to gather from sources other than the instruments themselves. Fleming seems to have left no stone unturned in searching out iconographical sources in all sorts of media, and he discusses them both in terms of what we can learn from contemporaneous depictions of viols and how imagery available to the makers might have influenced their work. Unfortunately, of the 108 items that appear in the list of illustrations, twenty-seven could not be included in the CD-ROM publication because of difficulties in obtaining reproduction rights (although these images were included in the complete copy of this work that was submitted as a dissertation). Enough information is provided so that a determined reader could track down the missing illustrations, though some of them might take time to find. In the final chapter of volume 1, Fleming has gone to great lengths to piece together and analyze the scarce, disparate bits of information about the obscure men who made viols in England.

Because of the newness of the technology and its unfamiliarity to many readers as a publication medium for scholarly work, I want to discuss the presentation on CD-ROM. The two volumes are presented as separate PDF (portable document format) files, viewable with the Adobe Acrobat Reader, software for which is also included on the CD-ROM in both IBM-PC and Macintosh versions. The author includes a brief, helpful "read me" file with instructions for those unfamiliar with this technology. Additionally, he provides various partial versions of each PDF file to make browsing easier on computers with limited memory. I found this helpful in making it more convenient to move between the bibliography, which is at the end of the long (60 megabyte), and therefore sluggish, second volume, and the main text in the first volume. These files are for-

matted as typical European-format A4 pages (i.e., slightly longer and narrower than American letter-size), which maintain the pagination of the original, complete thesis. It must also be pointed out that there is some discrepancy between the page numbers seen on the pages and those assigned for reference purposes by the Acrobat Reader, especially when viewing volume 2. It is possible to print any page or pages of the thesis to whatever printer the reader has available, though printing from the images is very slow due to their all being part of one very large file.

This method of publication has many advantages and holds much promise, yet some opportunities were missed. In book form the cost of this work, with its many illustrations, would have been prohibitively high. The photographs of instruments are not all uniformly lit and some have distracting items of furniture in the background, but as presented on CD-ROM the resolution is excellent, allowing one to zoom in and see more detail than would be possible if they were printed on paper. Further, the well-labelled “bookmarks” and the “find” feature of the Acrobat Reader make it very easy to move to different sections or search the text for a word or phrase. This becomes a particular advantage when one considers that most printed dissertations do not even have an index. On the other hand, Fleming did not take advantage of digital features such as Hypertext links, which would allow easy navigation between different pages dealing with the same maker or same instrument. This could have been especially helpful as a means of linking photographs of the instruments with descriptions of them and their makers. As it stands, the pictures of the instruments are labelled only with Fleming’s own “VME” numbers, so it can be cumbersome to link a picture with a description, or even to know who is thought to be the maker of a given instrument while viewing its picture. It would also be helpful if footnotes were hyperlinked to the main text. On my computer, with only a fifteen-inch monitor, it is not possible to view an entire page at once at full size, so that to read footnotes at the bottom of the page for text on the upper half of the page it is necessary to scroll back and forth between the two, which makes it hard to keep one’s place.

Overall, Fleming’s dissertation makes a very valuable contribution to the literature on the viol. It is well written and is chock full of information. I recommend it highly.

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