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## BOOK REVIEWS

**Nancy Groce. *Musical Instrument Makers of New York: A Directory of Eighteenth- and Nineteenth-Century Urban Craftsmen. Annotated Reference Tools in Music, no. 4.* Stuyvesant, N.Y.: Pendragon Press, 1991. xxi, 200 pp.; 8 black-and-white illustrations. ISBN: 0-918728-97-5. \$64.00.**

Volume 2, the directory portion, of Nancy Groce's dissertation, "Musical Instrument Making in New York City during the Eighteenth and Nineteenth Centuries" (Ph.D. in American Culture, University of Michigan, 1982), long ago proved its value; it serves, for example, as the authority for many entries in the forthcoming Langwill index of woodwind makers. The directory's publication now greatly extends its availability and presents its contents in a convenient, durable format. Basically an alphabetical listing of makers, the directory includes, incidentally, many importers and dealers, parts suppliers, and others involved with the instrument trade. It begins with the late seventeenth-century luthier and murderer Geoffrey Stafford and ends in 1890, when about 130 manufacturers were in business in Manhattan and the industry was approaching its zenith.

Groce summarizes each entrant's activity where possible and lists street addresses and dates of operation culled chiefly from street and trade directories; church and legal documents; census reports; advertisements, commercial, exhibition, and collection catalogues; diaries and other personal manuscripts; interviews with makers' descendants; and the recent research of others working in this rich field. Frequent changes of address and occupation reflect the growing city's social instability, partly the result of rapid real estate and technological development and commercial ferment. The range of activities documented here shows that instrument making in New York City was anything but a monolithic profession, though after mid-century it became a major source of employment. Groce associates about 500 names with keyboard-instrument production alone, not counting organ builders, and piano and organ factories and satellite workshops involved innumerable laborers.<sup>1</sup>

1. The deliberate exclusion of organ builders from Groce's book is compensated by David H. Fox's *A Guide to North American Organ Builders* (Richmond, Virginia: Organ

Necessarily but regrettably, some reliance is placed on unreliable sources such as Daniel Spillane's anecdotal *History of the American Piano-forte, Its Technical Development, and the Trade* (New York: D. Spillane, 1890). Not every lode has been mined; from Thomas J. Wenberg's *The Violin Makers of the United States* (Mt. Hood, Oregon: Mt. Hood Publishing Company, 1986), Elwin Giles and Gustav Hulskamp might have been extracted. Only occasionally are the whereabouts of representative instruments told. The eight black-and-white illustrations depict workshops, period advertisements, and pianos. The lid of John Bornhoeft's piano (p. 19) recedes to infinity due to the inexpensive printing process. At least one map of the city would have been useful in locating and illustrating the close proximity of many shops.

Within its limits, Groce's dictionary of makers—or directory of craftsmen; the running heads are inconsistent—can claim reasonable comprehensiveness; few professional mastercraftsmen (the gender is valid unless Emma Young actually built pianos herself) of any importance can have escaped her net, though of course hundreds of apprentices, amateurs, and other noncommercial or itinerant instrument makers must have existed of whom no record remains. One can speculate that independent luthiers are underrepresented here because many doubtless worked in one-person shops, had a small output and clientele, did not advertise, avoided the census-taker no less than the tax-collector, and may have been illiterate in English—but the great wave of Italian and East European immigration that swelled the ranks of New York's luthiers occurred after 1890. Instrument makers, especially successful ones, who used machine tools are more likely to have been recorded.

After using Groce's dissertation very often for nearly a decade, I am able to supply few additions. I have heard of a piano inscribed "Wilke Bogardus & Metcalf," which conflates names Groce lists separately. A piano labeled "Firth Hall & Browning" was offered by the New York antique dealers Hirschl & Adler in 1990. Perhaps Groce omitted the colonial silversmiths Nicholas Roosevelt and Richard van Dyck because their musical production seems to have been limited to baby whistles and rattles. Thomas Western is said elsewhere to have worked in Charleston, South Carolina, in 1805 and may also have carried on business in Alexandria, Virginia, during years he was absent from New York directories.

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Historical Society, 1991), which supplements John Ogasapian's *Organ Building in New York City, 1700–1900* (Braintree, Massachusetts: Organ Literature Foundation, 1977).

John Jacob Astor, admittedly a dealer not a maker, perhaps deserves notice, as might Johann Clemm, who made keyboard instruments other than Trinity Church's organ, although perhaps not in New York.

Some corrections are in order, many of them necessitated by sloppy desktop production; typographical errors mar even the title page and cover. Among other technical flaws, the words "emigrating," "emigrated," and their siblings regularly follow spatial hiccups surely caused by swallowing "im-"s. Transposition of words yields "eighteenth-shop century" (p. xiii); of number and symbol, "4£-10s" (p. 74). Intermittent use of lower case l for the number 1 (e.g., p. 3) is annoying, as are misplaced words and lines (pp. 8, 71). Bad hyphenation yields "boardingh" (p. 109; abbreviation for "boardinghouse"), which is at least evocative. More startling is the ungrammatical assertion that James Pirsson's house was an early member of the New York Philharmonic (p. 125). The term "brothers-in-laws" rather overstates its plurality (e.g., p. 70). On the other hand, Groce's description of Lindemann's Cycloid piano as "liver-shaped" (whose?) is not without a certain charm (p. 98).

The list of abbreviations is incomplete: c. stands for corner as well as circa, r. means residence. More significant are errors that alter names and facts. James F. Beame (p. 10) should be Beames. The suspect spellings "Berndardt" and "Bernhad" (p. 14) may be wrong in the sources. Charles G.1 (*sic*) Christman is said to have exhibited saxe-horns (p. 30). Christian Claus never spelled his name "Clause" so far as I am aware (p. 31 and elsewhere). Berh should be Behr (p. 122), Everdon is Evendon (p. 100), and the first name of Jenkins is Jean not Hean (p. 197). John Geib, Sr., lived on Tottenham Court Road, not Tottengham, in London. (Was Geib's grandson William Howe Geib named for the important music dealer and publisher William Howe [q.v.], as Samuel Neilson Whaites was named for Samuel Neilson?) Edward and Franz Lauter are said to have shared several addresses but show only 431 Broome in common. Thomas Loud's 1802 piano patent (p. 100) involved oblique stringing not overstringing. Was Albert Smith a tuner or a turner or both (p. 144)?

Often, Groce allows her sources to speak for themselves, sometimes confusingly: did Thomas Richardson live at Reason near Herring, or near Raisen and Herring along with the Sellecks, or at Herring near Raisin, neighboring Thaddeus Munroe? Economic data in census reports should not be accepted uncritically: were the men and boys employed by Nunns & Clark each paid the same monthly wage of \$40 (p. 118)?



If Bacon & Raven's (not Raven & Bacon's) workmen received annual wages of \$28,000 to produce \$15,000 worth of pianos, it's surprising the firm lasted as long as it did (p. 129). Groce presents no evidence to support her assertion (p. ix) that viols were "popular" in eighteenth-century New York, and the so-called Twelve Apostles brought piano making to England well before the close of the eighteenth century (p. 151), if indeed they were the first to do so. But Volume 1 of Groce's dissertation, a history of the industry, remains to be published and may address some of these matters.

The implications of Groce's study remain to be explored, but it is clear that the author has mapped in useful detail a vast area for further exploration. That the Metropolitan Museum of Art rented its first premises from the prominent musician, music publisher, and instrument dealer Allen Dodworth reflects the past stature of New York's music industry, which greatly enriched the city's—and the nation's—cultural and commercial life. In conclusion, I hope that my institution's support of Nancy Groce's research and my personal debt to her scholarship have not colored my opinion that this compendium will answer many vexing questions, promote future research, and amply repay its purchase price.

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THE METROPOLITAN MUSEUM OF ART

**Clifford Bevan, editor. *Musical Instrument Collections in the British Isles*. Winchester, England (10 Clifton Terrace, S022 5BJ): Piccolo Press, 1990. 126 pp., 43 black-and-white illustrations, 1 map. ISBN: 1-872203-10-8. £7.95; US \$17.00 by mail.**

Clifford Bevan, a music publisher and former orchestra manager and tuba player for the Royal Liverpool Philharmonic Orchestra, has published articles in *The New Grove* and *The Galpin Society Journal*, and is the author of *The Tuba Family* (1978). The latter was reviewed in these pages (this *Journal* 5–6 [1979–80]: 205–207) by André P. Larson, who commented, among other things, "There is no apparent reason for the particular selection of collections of musical instruments which are included in Appendix E."

Bevan is listed on the front cover and title page of this conveniently sized (5¾" × 8¼") paperback, *Musical Instrument Collections in the British Isles*, as its editor, but he apparently should be credited as its compiler as

well. In his Acknowledgments he expresses appreciation to Arnold Myers of Edinburgh and Dr. Bara Boydell of Dublin for their "suggestions and assistance," but does not elaborate on the extent of their contributions. Bevan apparently has been interested in musical instrument collections for some time, as witnessed by his inclusion of a list in his earlier book *The Tuba Family*, as noted above. There is no information given here, however, of the time frame involved in the collection of his data, when the cut-off point was, and how up-to-date his information is about each collection that he lists. More surprising is the following opening statement in Bevan's Preface: "In view of the large number of musical instrument collections in the British Isles it is astonishing that no previous attempt to list and describe them seems to have been made."

Attempts to survey collections of musical instruments go back at least to 1927, when Canon Francis W. Galpin provided a list in the third edition of *Grove's Dictionary of Music and Musicians*, which he revised for the fourth edition in 1940. Lyndesay G. Langwill updated this in his article on "Instruments, collections of" in the fifth edition of *Grove's* in 1960 and also in his *An Index of Musical Wind Instrument Makers*, which appeared in six editions: 1960, 1962, 1972, 1974, 1977, and 1980. A listing of major international collections is also included in Laurence Libin's article on "Instruments, collections of" in *The New Grove* (1980).

In 1959 I rather foolhardily started to survey musical instrument collections in the United States, sending questionnaires to numerous institutions and individuals who I thought might have collections. Some of the former answered that they didn't know what instruments were among their holdings and didn't have staff available to find out, and some of the latter didn't respond at all. Realizing that I had undertaken far too big a project for an individual, I was fortunate in eventually enlisting the support of the Music Library Association and especially the interest of the indefatigable William Lichtenwanger, under whose chairmanship *A Survey of Musical Instrument Collections in the United States and Canada* was finally published in 1974. I first learned in 1961 that an international survey was planned, but the manuscript of the *International Directory of Musical Instrument Collections* was not completed until 1972 and not published until fully five years later in 1977, edited by Jean Jenkins (Frits Knuf).

The same issue of this Journal that includes the review of Bevan's book *The Tuba Family* has a review that I wrote of the *International Directory* (this *Journal* 5-6 [1979-80]: 213-15). It is a pity that Mr. Bevan

apparently did not read it because I listed by country (including the UK), and then by city, a considerable number of instrument collections that I found mentioned in a series of Music Guides by Elaine Brody and Claire Brook published by Dodd, Meade & Company, New York, including *The Music Guide to Great Britain* (1975), which has fully eighteen collections in the UK not listed by Jenkins. Both Jenkins and Brody made an effort to provide descriptions of collections, with information about phone numbers, hours open to the public, services, and publications. In fact, in some cases they provide more information than does Bevan.

In his Table of Contents, as well as at the back of his book where he lists "Collections by country and county," Bevan lists ninety-three collections in the British Isles (under which he includes Eire, which Jenkins lists separately from the UK), but in fact he gives data on ninety-four, including Bolling Hall in Bradford. Jenkins gave data on ninety-eight collections, forty-seven of which are listed in Bevan's book, plus twenty-two public collections and twenty-nine private collections not listed by Bevan, some of which are now in public collections, such as the Bate at Oxford. Brody included fifty-three collections, ten of them in Bevan but not in Jenkins, and seven in neither Bevan nor Jenkins.

A basic problem with all these data is that we do not know the dates at which they were collected and whether or not they are accurate now. A project like this is something like trying to shoot at a hundred moving targets at the same time. Both the *Survey of Musical Instrument Collections in the United States and Canada* and the *International Directory of Musical Instrument Collections* are currently in the process of being revised by committees who may not have fully realized the problems they were getting into when they agreed to undertake the projects.

Bevan reports that while many curators were helpful, others were "surprisingly coy," and several, whom he names, declined to cooperate but he included them anyway. "Since these are all institutions maintained out of public funds there has been no hesitation in obtaining information by other methods and including it here." He adds, "Sadly a planned appendix of collections owned by private individuals and housed in their own homes had to be abandoned as the result of anxiety about security." I recall some years ago after the MLA *Survey* finally appeared in print that one person described it to me as "a burglar's handbook." And with the thefts reported from major institutional collections, this is not just a concern for individuals.

Bevan's book is a handy size for the traveler who wants to explore collections in the UK. It is nicely printed, has some interesting black-and-white illustrations, and includes a useful map, so one can tell at a glance what collections are where. I would encourage anyone interested in the subject to buy it, but it is a real pity that Bevan apparently failed to search the relevant literature before he began the project or failed to keep his eyes and ears open to what others were doing on the subject once he had started. The committee working on the revision of the *International Directory* will want to study it carefully.

One final caveat: before you set out to visit some museum collection in the UK or elsewhere, if you have a special interest be sure to write and/or telephone beforehand to be sure that the museum is open and that what you want to see is on display. In 1982 I went on a tour with George Lucktenberg visiting musical instrument collections in Europe and we stopped off for a few hours in Chester. Being a recorder player and the proud owner of a Bressan recorder (now in The Shrine to Music Museum, Vermillion, S.D.) in a splendid state of preservation, I naturally rushed to the Grosvenor Museum. The only thing I knew about Chester was that the famous set of four recorders, plus two other trebles, all by Bressan, were at the Grosvenor Museum, and I assumed that they would be prominently displayed. Alas, the Bressan recorders were not only not on display, but I was unable to get permission to see them, even after making a special plea and returning a second time to the museum. I did get to see many historic recorders, including a considerable number by Bressan, on that tour, and again on a similar tour in 1984, but I hope that you, dear reader, do not face such a disappointment.

DALE HIGBEE  
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**Grant O'Brien. *Ruckers: A Harpsichord and Virginal Building Tradition.* Cambridge Musical Texts and Monographs. Cambridge, England: Cambridge University Press, 1990. xxii, 346 pp.; 157 black-and-white plates, 29 figures, 22 tables, 6 graphs, 1 musical example. ISBN: 0-521-36565-1. \$125.00.**

"More scholarly effort has been devoted to the study of the group of harpsichord makers which gathered in Antwerp during the sixteenth

century than to any other branch of the craft. In view of the immense influence of the Flemish style which was exerted in every part of Europe except Italy until harpsichords ceased to be made, this study has not been misplaced." So begins the chapter "Flanders" in Frank Hubbard's pathbreaking *Three Centuries of Harpsichord Making*.<sup>1</sup> Undoubtedly, little of this research would have occurred were it not for the achievements of members of the Ruckers family, who are almost universally regarded as standing at the pinnacle of musical instrument making along with only one or two makers of other types of instruments. Thus, any examination of the Ruckers' work is potentially important not only to the history of keyboard instruments but also to organology more generally. Long before this book appeared, there was every reason to believe that Grant O'Brien, Curator of the Russell Collection of Early Keyboard Instruments at the University of Edinburgh, would be fully equal to the daunting task of producing the first comprehensive study of the Ruckers family and their work. It must be said at the outset that in this magnificent book the author has altogether justified one's expectations: his years of work, well organized and handsomely presented within two covers, have resulted in a masterpiece thoroughly worthy of its subject, a triumph of modern organological method.

Although before Hubbard's time much was published about the Ruckers family and their colleagues, the bulk of that material, documents culled from archives,<sup>2</sup> lists of extant instruments largely compiled from secondary sources,<sup>3</sup> and an occasional iconographical study,<sup>4</sup> now appears to a great extent to have been the result of misplaced effort. Only rarely does an old document or painting tell us much that is certain or is of importance about how these instruments were conceived, made, or used,<sup>5</sup> and mere lists compiled uncritically are bound to include many

1. Cambridge, Mass.: Harvard University Press, 1965, p. 43.

2. See, for example, J. A. Stellfeld, "Bronnen tot de geschiedenis der Antwerpsche clavecimbel- en orgelbouwers in de XVI<sup>e</sup> en XVII<sup>e</sup> eeuwen," *Vlaamsch jaarboek voor muziekgeschiedenis* 4 (1942): 3–110.

3. See, for example, the list in *Grove's Dictionary of Music and Musicians*, 2nd ed. (New York: MacMillan, 1908), 4:180–89.

4. See, for example, the chapter "Iconographie der Ruckers" in Andre M. Pols, *De Ruckers en de klavierbouw in Vlaanderen* (Antwerp: Nederlandsche Boekhandel, 1942), 51–54. Of Ruckers-like instruments seen in Dutch and Flemish paintings, O'Brien concludes that "most often it is clear that the instrument is *not* by one of the Ruckers" (p. 191).

5. Needless to say, occasionally there are important exceptions, for example, the correspondence of 1648 among G. F. Duarte, Constantijn Huygens, and Ioannes Couchet, an

misattributions and outright fakes.<sup>6</sup> O'Brien's approach, present embryonically in the work of A. J. Hipkins<sup>7</sup> and more fully in that of such scholars as Hubbard, John Barnes (together with his wife Sheila, the book's dedicatee),<sup>8</sup> and John Henry van der Meer,<sup>9</sup> is stated in the first sentence of his Introduction: "I have always tried to get as much information as possible from the instruments themselves." The author applies this method with admirable breadth to consider instruments from many aspects (e.g., design, construction, epigraphy, decoration, physics, and acoustics).<sup>10</sup> Moreover, the implications of his observations, supplemented by critical reexamination of information from other sources (e.g., documents, iconography, and conventional musicology), are masterfully integrated into a convincing overall picture of the Ruckers family's work (including that of the closely related Couchet family; as the author explains on p. 15, "the contribution of the Couchets is always implied when I speak of the 'Ruckers tradition' and 'Ruckers instruments' ") and its place in history.

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English translation of which is included by O'Brien, pp. 305–306. A painting by Gerard Dou or of his school (formerly in the collection of W. E. Duits, London, reproduced as "Woman at the clavichord" [sic; clearly, an octave virginal is depicted] in Lucas van Dijck and Ton Koopman, *Het klavecimbel in de Nederlandse kunst tot 1800* [Zutphen: De Walburg Pers, 1987], pl. 129), not mentioned by O'Brien, could be used to show that the child part of a double virginal was sometimes played solo.

6. Of 92 "Ruckers" instruments listed in the second edition of *Grove* (see note 3, above), O'Brien has authenticated only about 40.

7. The discussion of Ruckers transposing two-manual harpsichords in the first edition of Hipkins, *A Description and History of the Pianoforte and of the Older Keyboard Stringed Instruments* (London and New York: Novello, Ewer and Co., 1896), 81–82, was based on Edmond vander Straeten's French translation of Quirinus van Blankenburg's account, published in Dutch in 1739. This was greatly improved in later editions (for example, the third, published in 1929; facs. reprint with an introduction by Edwin M. Ripin, *Detroit Reprints in Music* [Detroit: Information Coordinators, 1975], 87–88) by the inclusion of a brief description and drawing of the unaltered Ioannes Ruckers harpsichord of 1638 (now in the Russell Collection, Edinburgh), which the writer had seen after completing his original text.

8. See his "The Flemish Instruments of the Russell Collection, Edinburgh," *Colloquium: Restauratieproblemen van Antwerpse klavecimbels* (Antwerp: Ruckers Genootschap, 1971), 35–39.

9. See, for example, his "Beiträge zum Cembalo-Bau der Familie Ruckers," *Jahrbuch des Staatlichen Instituts für Musikforschung Preussischer Kulturbesitz* (1971): 100–53.

10. One eagerly awaits publication of O'Brien's further work on the acoustics of soundboards and strings, intriguing glimpses of which are given in the present book.

Two introductory chapters present biographies of the Ruckers family (mostly derived from such collections of archival material as those published by Jeanine Lambrechts-Douillez and her colleague M.-J. Bosschaerts-Eykens<sup>11</sup>) and a brief history of pre-Ruckers harpsichord making. Although the latter chapter, as a précis, does not always state with sufficient detail the bases for some of the author's conclusions,<sup>12</sup> it does include descriptions of several important sixteenth-century Flemish instruments, two of which have never previously been published in significant detail.<sup>13</sup> Succeeding chapters cataloguing the many different models of Ruckers instruments, discussing the makers' stringing and scaling practice, and explaining the author's methods of determining the original dispositions of instruments that were later altered will be a revelation to those unfamiliar with Dr. O'Brien's previous publications.<sup>14</sup>

11. See vols. 1, 3, 4, and 5 of *Mededelingen van het Ruckers-Genootschap* (Antwerp: Ruckers Genootschap, 1982–1986).

12. For example, assertions (pp. 19–20) that long-scaled Italian harpsichords were strung in iron and therefore sounded at a normal 8' pitch (rather than strung in brass and sounding at a pitch considerably below normal) ignore evidence that some early Italian harpsichords were tuned a fourth lower. See, e.g., a document of about 1630 (cited on p. 103 of Friedemann Hellwig, "Strings and Stringing: Contemporary Documents," *Galpin Society Journal* 29 [1976]: 91–104) that mentions a harpsichord "alla quarta bassa" made in 1570 by Vito Trasuntino. One assumes that the author's argument will be stated more fully in publication of his cited "work in progress" on the subject. Likewise, his promised future paper about the anonymous early Flemish three-register transposing harpsichord in the Brussels Conservatorium collection (described on pp. 29–32) will presumably include a fuller presentation of the evidence which suggests that the middle register originally had dogleg jacks, thus affording an 8' and 4' disposition on each keyboard. From what is said in the present work, it is not altogether clear why the upper manual, at normal pitch, might not have had only one 8' stop. If so, the 4' only on the lower manual might be regarded as a foil to its fourth-lower pitch. Further, this arrangement could be seen as analogous to an alternative interpretation of the situation in Italy: the use both of harpsichords a fourth lower in pitch with a 4' stop and of short-scaled single-register harpsichords at normal pitch. This latter group of early Italian instruments is barely mentioned by O'Brien; several examples are described in Friedemann Hellwig, "The Single-strung Italian Harpsichord," in Edwin M. Ripin, ed., *Keyboard Instruments: Studies in Keyboard Organology* (Edinburgh: Edinburgh University Press, 1971), 27–36.

13. These are a polygonal virginal by Ioes Karest, Antwerp, 1550 (in the *Raccolta Statale degli Antichi Strumenti Musicali*, Rome) and the three-register transposing harpsichord mentioned in note 12, above.

14. Especially "The Determination of the Original Compass and Disposition of Ruckers Harpsichords" and "The Stringing and Pitches of Ruckers Instruments," both in J. Lambrechts-Douillez, ed., *Colloquium: Ruckers klavecimbels en copien: Universele instrumenten voor de interpretatie van de muziek uit Rubens tijd* (Antwerp: Ruckers Genootschap, 1977; also issued as *The Brussels Museum of Musical Instruments Bulletin* 7), 36–47 and 48–71; and

His treatment might be regarded by some as confoundingly technical,<sup>15</sup> but it is necessarily so. In any case, the overall conclusions are clear: harpsichords (all, except for a few late ones by the Couchets, strung with only a single set of 8' strings and a 4' set) and virginals (of two types, *muselar* and *spinett*) were made at several distinct pitch levels; and there is no evidence that the Ruckers family made harpsichords with two keyboards at the same pitch.<sup>16</sup> Further, the author demonstrates by example a general organological lesson that, with sufficient attention to detail, a great deal of information about an instrument's original state can be determined even if it has been altered almost beyond recognition and, further, that the various different models within a maker's oeuvre

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"Ioannes and Andreas Ruckers: A Quatercentenary Celebration," *Early Music* 7 (October 1979): 453–66.

15. The author explains in his "Introduction" that he expects the "reader to have had some basic knowledge about the construction and history of keyboard instruments" and refers the novice to the books of Raymond Russell (*The Harpsichord and Clavichord: An Introductory Study* [London: Faber and Faber, 1959]) and Hubbard.

16. That is, all extant Ruckers harpsichords that originally had two manuals were transposing harpsichords, i.e., with the keyboards a fourth apart in pitch (or a tone apart, as they seem to have been in one exceptional example). Still, the reviewer must note that the possibility remains that Ioannes Couchet might have made a few two-manual harpsichords with keyboards at the same pitch, i.e., so-called "expressive" or "contrasting" doubles. The only evidence for this is a passage in a letter written by Constantijn Huygens shortly after Couchet's death in April 1655: "Je suis bien aysé d'en avoir une des dernières de sa façon à deux Claviers, comme estoit celle de M. de Chamboniere . . ." (the original text is given in W. J. A. Jonckbloet and J. P. N. Land, *Musique et musiciens au XVII<sup>e</sup> siècle: Correspondance et oeuvres musicales de Constantin Huygens* [Leyden: E. J. Brill, 1882], pp. 24–25). A straightforward translation, "I am well comforted by having one of the last [instruments] of his making[,] with two keyboards, like that of M. de Chamboniere," leaves little room for doubt that Huygens and Jacques Champion de Chambonnières each owned a Couchet two-manual harpsichord that (if one assumes that a French musician of the period would not be likely to have used a transposing harpsichord) was of the contrasting type. O'Brien creatively translates the passage as "It is a comfort to me that I own one of the last of his invention with two keyboards and made by him, like that of M(onsieur) de Chamboniere" (p. 307) and suggests further that by *Claviers* "Huygens surely means two registers here!" because only a two-register harpsichord is mentioned in the 1648 correspondence regarding Huygens's purchase of a Couchet. One might, however, question whether the musically knowledgeable Huygens would have made such a mistake, whether a harpsichord made in 1648 would have been called one of Couchet's last, and whether Chambonnières, whose works imply that he used an instrument with a GG/BB short octave (as noted by O'Brien on p. 231), would have had an instrument, like that made by Couchet for Huygens in 1648, with a chromatic bass octave. It is not inconceivable that (as suggested by Hubbard, op. cit., p. 63) Huygens owned two Couchet harpsichords, a single made in 1648 and a double—presumably non-transposing—made six or seven years later and similar to one owned by Chambonnières.



can and should form a pattern that is logically consistent (even if ultimately “unprovable”) both internally and externally, i.e., in relation to other viewpoints, such as those of physics and music history.

One of O’Brien’s more radical conclusions, for which the little available evidence seems to be persuasive,<sup>17</sup> is that Ruckers *clavecimbels* (the author has adopted this useful old Netherlandish term that encompasses both harpsichords and virginals) were strung quite heavily, i.e., with wire in the treble of instruments at 8’ pitch almost as thick, the late Hubert Bédard observed, as that used in some eighteenth-century pianos. Another revelatory deduction, based on the numbers written on instrument parts in the Ruckers workshops, is that their output was astonishingly high: the author estimates (p. 59) that Andreas Ruckers the Elder made as many as thirty-five to forty instruments a year.<sup>18</sup> Obviously these were

17. In a footnote to his discussion of thick stringing, the author notes (p. 64) that twisted strings (consisting of two relatively thin intertwined strands instead of a single thick wire), of which some apparently quite old examples existed until recently on the Hans Ruckers double virginal of 1581 (in the Metropolitan Museum of Art in New York; these strings can be seen in figs. 5–7 of James J. Rorimer, “A Double Virginal, Dated 1581, by Hans Ruckers,” *Metropolitan Museum Studies* 2 [1929–1930], pp. 176–86, and in Emanuel Winternitz, *Keyboard Instruments in the Metropolitan Museum of Art: A Picture Book* [New York: The Metropolitan Museum of Art, 1961], p. 14), would be a “valid alternative” for stringing the lowest notes. The reviewer would point out that, since the hitch pins of the mother virginal have been moved, the strings that were attached to them were unlikely to have been original. Nevertheless, since the twisted strings were placed in accordance with the short octave (about which any modern restorer likely to have worked on the instrument between its discovery in Peru and its acquisition by the Museum is unlikely to have known), it seems probable that the twisted strings were put on the instrument sometime in the seventeenth century, perhaps reflecting Hans Ruckers’s original stringing. Further, Claas Douwes, whose stringing lists are shown by O’Brien to be applicable to Ruckers instruments, recommended “annealed potter’s wire” for very low notes (*Grondig ondersoek van de toonen der musijk* [Franeker, 1699; facs. Amsterdam: Frits Knuf, 1970], p. 124; see also O’Brien’s translation of this passage on p. 295). This might refer to the twisted wire used like saw blades by ceramists to cut moist clay.

18. While near the beginning of his discussion of Ruckers instrument numbers the author cautions that “many of the conclusions drawn are at best only tentative” (p. 46), further along he indulges in what the reviewer regards as overly optimistic specificity, e.g., that the makers were “producing about twenty-six harpsichords per year” (p. 53). While the overall output of the Ruckers workshops might be plausibly estimated in very general terms, numbered instruments are so few that some of the author’s individual interpretations (which often rely on arbitrary assumptions—for example, that Andreas Ruckers numbered two series of 4-voet virginals) are questionable. With so little data available, false patterns can easily appear (as the author admits, on p. 46, was the case in his earlier publication on the subject, “The Numbering System of Ruckers Instruments,” *The Brussels Museum of Musical Instruments Bulletin* 4 [1974], pp. 75–89). Some of the curves on his graphs (p. 47) are, especially for harpsichords, based on a single datum (e.g., that based on

large, well organized workshops,<sup>19</sup> and, in separate chapters for virginals and harpsichords, the construction of the instruments that were made in them is described. By observation of myriad details, the author has succeeded in reconstructing many of the workshop procedures. Scorch marks, for example, indicate that bentsides were formed by exposing the wood to a fire. For the first time (according to this reviewer's recollection) in any literature about keyboard instruments, there are full technical descriptions of action cloths. A substantial chapter given to the decoration of the instruments includes a catalogue of the thirty decorative papers that were used,<sup>20</sup> analyses of the several styles of soundboard decoration (attributed to several different painters), and discussion of sources of some of the designs. Further chapters describe the details that

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an Andreas Ruckers harpsichord of 1637) or even none at all (e.g., that for Andreas Ruckers starting at 0 in 1623), while, for no apparent reason, he fails to draw a line based on Ioannes Ruckers 5-voet virginals of 1640 (no. 46) and 1642 (no. 78), which would seem to indicate a high rate of production of this model. The graph indicates that the author would estimate that Ioannes Ruckers made about 90 6-voet virginals during his career as compared with several hundred two-manual harpsichords, a ratio of about 1:4. Since virginals were increasingly obsolescent in the eighteenth century while harpsichords remained prized, it would seem that harpsichords should have survived at a higher rate. Thus, one might expect the ratio of extant 6-voet virginals to extant two-manual harpsichords to be, say, on the order of 1:8. The actual ratio is 7:16. Such considerations (along with the very high proportion of virginals depicted in seventeenth-century Dutch and Flemish paintings: see van Dijk and Koopman, *op. cit.*), might well lead one to conclude that O'Brien has underestimated the Ruckers family's production rate of virginals.

19. The author's remarkable observations (pp. 120 and 126) that the separate workshops of the brothers Ioannes and Andreas seem to have used sharps and jacks from common suppliers suggest that there was an almost modern-industrial division of labor.

20. To O'Brien's lists of the occurrences of various patterns, the reviewer can add one: the earliest known use of type 12 (p. 139) is on the 1595 child virginal by Hans Ruckers now at the Cincinnati Art Museum. A small fragment of the paper, upside-down from the pattern's usual orientation, remains visible on the original exterior of the case, now hidden in the interior of supplementary case walls added much later. The author, one might note, attributes the Cincinnati instrument and another with a rose initialed *HR*, a *spinett* virginal of 1598 (at the Paris Conservatoire), to Hans's son Ioannes. (Hans died in 1598.) This may be so, but one might note that on these instruments and on the 1591 double virginal (at Yale) the maker's Christian name is written *IOHANNES*, not *IOANNES*, as the instruments made after 1598 are signed. "Iohannes" might be regarded as the Latin equivalent of "Hans" (itself a contraction of the Germanic "Johannes") and "Ioannes" as the equivalent of "Jan," as the younger maker was usually known in the vernacular: see the documents transcribed in J. Lambrechts-Douillez and M.-J. Bosschaerts-Eykens, "Joannes Ruckers (II) en Maria Waelrant," *Mededelingen van het Ruckers-Genootschap* 3 (1983): 15-30.

distinguish authentic Ruckers instruments, their musical uses,<sup>21</sup> the influence of the Ruckers family on later makers, and the ways in which the instruments were altered to keep them musically useful in later periods. The main text of the book is completed by a descriptive catalogue of all authentic Ruckers *clavecimbel*s known to be extant. This is followed by a catalogue of unauthentic instruments, nineteen appendices, and a “select” but quite extensive bibliography.

In any such monumental work, compiled from countless details, a few errors will be found. In addition to a few minor lapses of proofreading (e.g., the scale of Plate 5.2, p. 75, is 1:10 not 1:1) there are some less obvious oversights that might confuse the reader. Plate 7.40 (p. 167) is printed upside down.<sup>22</sup> There is no caption for the diagram on p. 92, and the text that refers to it is on p. 117. The Hans Ruckers double virginal of 1591 is not in Cambridge, Massachusetts (as stated on p. 159) but (as correctly stated on p. 238) in New Haven, Connecticut (Yale, not Harvard!). In the sources cited in footnote 1, p. 34, it is the *duim* that is divided into eight (or, rarely, eleven) parts called “lines,” not the *voet*. The harpsichord by Gommarus van Everbroeck (not “Eversbroeck,” as twice misspelled on p. 153), is no longer in Paris but has been at The Shrine to Music Museum in Vermillion, South Dakota, since 1986. Table 4.8 (of Claas Douwes’s stringing lists rearranged according to sounding pitch), to which the reader is directed on p. 291, is nowhere in the book, and the related discussion is not to be found in footnote 7, p. 57, to which the reader is referred on p. 289.<sup>23</sup> The proper botanical name for the species of soundboard wood used by the Ruckers family is indeed *Picea abies*, not “more properly *Picea excelsa*,” as stated on pp. 73 and 100.<sup>24</sup> The reference on p. 268 to “Plate XXXV of Hubbard’s book”

21. The author, eschewing the contorted reasoning of some other writers (see, for example, R. T. Shann, “Flemish Transposing Harpsichords—An Explanation,” *Galpin Society Journal* 37 [1984]: 62–71), concludes that what we now call “transposing” two-manual harpsichords were indeed used for transposition.

22. The correct orientation (in which the stripes between the painted imitation marble and the outer grey bands are dark above and light below) is shown in a photograph of the same instrument (a Ioannes Ruckers two-manual harpsichord of 1637 in the Rome collection) in John Henry van der Meer, “Flämische Cembali in italienischem Betsitz,” *Analecta Musicologica* 3 (1966): 114–21, fig. 1.

23. Both the table and the discussion are found in O’Brien’s 1977 paper “The Stringing and Pitches . . .,” cited in note 14, above.

24. See F. W. Jane, *The Structure of Wood*, second ed. (London: Adam & Charles Black, 1970), p. 5. To be perfectly proper, the names (often abbreviated) of the botanists who originally described and named the species (Linnaeus in this case) and who, if any, revised

might better have been made to the original eighteenth-century engraving<sup>25</sup> that Hubbard reproduced.

Overall, the choice and quality of the illustrations, both photographs (many of them by the author) and line drawings (by Darryl Martin), are excellent, but it is unfortunate that, in so expensive a book, no color plates (especially of painted decoration) were included. The decision to reproduce all of the plan-view photographs at the same 1:10 scale was astute: this greatly facilitates comparison between the various instruments. Although these plan views of exterior and interior layout convey, along with the descriptive text and detailed illustrations, a nearly complete impression of how the instruments were designed and constructed, it seems regrettable that no plan drawings (such as those in Hubbard, Plates I, VI, etc.) were included. Instead, it is "assumed that the serious student would have one or more of [the full-scale plans of Ruckers instruments that have been published by some museums] available to use in conjunction with this book" (p. 2). If so, a list of these plans and their sources should have been included as a supplement to the bibliography, and references to them should have been included in the catalogue entries of the instruments for which they are available. In any case, the two elevation drawings of harpsichord keywells that are included in the book (pp. 94 and 95) refute the author's excuse that small-scale diagrams of an entire instrument would inherently "be neither accurate enough nor detailed enough to be of any real use" (p. 2). The plan photograph of the interior of a *muselar* virginal (Plate 5.2, p. 75) does, for example, of course convey some details that a small plan drawing might not be able to show. Nevertheless, a drawing could demonstrate the relationship between the bridges and the soundboard ribbing (these can be shown only in separate photographs) and would reveal the carefully placed end of the cutoff bar, which in the photograph is hidden by the lower guide.

In a few instances the appropriateness of the specific instrument chosen for photographic illustration of a typical overall design or detail is questionable. The *moeder* of the 1581 Hans Ruckers double virginal (now at the Metropolitan Museum of Art in New York) is shown in exterior

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the taxonomy and nomenclature (here Karsten) should be included: thus, *Picea abies* (L.) Karst. This is a synonym of *Picea excelsa* (Lam.) Link, but Lamarck and Link's works do not have priority.

25. Denis Diderot and Jean leRond d'Alembert, eds., *Encyclopédie ou Dictionnaire raisonné des sciences, des arts, et des métiers*, set of plates "Lutherie," Seconde suite, pl. xv.

plan view (Plate 3.1, p. 36), but this earliest of extant *muselars* is atypically long and has other differences from later examples (there are, for example, two roses instead of the usual one).<sup>26</sup> While the inclusion of a photograph (Plate 5.3, p. 75) of the author's copy in lieu of an unobtainable photograph of a well-preserved original *spinett* virginal interior seems justifiable and likewise, perhaps, the use of photographs (Plates 7.1 and 7.2, pp. 128–29) of his copies of a virginal and a two-manual harpsichord as examples of typical Ruckers-style decoration (no original examples have survived that include all typical decorative details extant within one instrument), the illustrations of his copies of a stand (Plate 6.18, p. 127) and hinges (Plate 7.42, p. 170), which must have been copied from accessible originals, might appear to suggest a touch of hubris inconsistent with traditions of scholarly publication.

This reviewer would question a few of the author's observations about specific instruments. The Ioannes Ruckers *muselar* of 1620 (now on loan to the Museum of Fine Arts in Boston) is described (p. 247) as having had a section added to the bass of its right-hand bridge. In fact, the entire straight bass section of this bridge has clearly been replaced. In the same maker's *muselar* of 1622 (now at the Metropolitan Museum of Art in New York) it seems obvious to the reviewer not only that both bridges are later replacements but also that the right-hand bridge is not

26. Data in the author's catalogue of Ruckers instruments show his observation (p. 69) that "mother virginals are one to three *duimen* longer than 6 *voeten*" (6 *voeten* = 66 large *duimen* = 1708 mm., according to his credible interpretation of Ruckers standards of length) to be true only of the 1581 instrument (1786 mm. long) and an Andreas Ruckers of 1644 (1734 mm.; it is in the Leipzig collection). All other Ruckers 6-*voet muselars*, including three mother virginals, are from 1706 to 1712 mm. long (except for one, which is 1668 mm.). Although the reviewer has no explanation (if one is needed) for the slightly greater than normal length of the 1644 instrument, the significantly greater length (3 *duimen* longer) of the 1581 double virginal would seem to be related to its longer-than-normal scaling (this is especially noticeable in the child, in which, for example, *c*<sup>'''</sup> is 100 mm. long, equivalent to 400 mm. at pitch *c*<sup>''</sup>, which is usually about 355 mm. in Ruckers instruments). Longer case lengths and scalings than Ruckers norms are also to be found in instruments by other sixteenth-century Flemish makers. The case length of the mother of a double virginal made by Martin van der Biest in 1580 (at the Germanisches Nationalmuseum in Nuremberg), for example, is 1804 mm., and the length of its *c*<sup>''</sup> string was originally 390 mm. It seems likely, in the reviewer's opinion, that these early Flemish instruments were tuned to a lower standard of pitch than that used later by the Ruckers family. The 1581 double virginal in size, scaling, and other aspects of design (e.g., soundboard ribbing) is a link between earlier and later practice, the full implications of which are the subject of a forthcoming study by the reviewer.

even in the original position; the author's lack of comment (and inclusion of comment about replaced bridges in similar instances) suggests that he overlooked this.<sup>27</sup> The nuts of the Ioannes Ruckers harpsichord of 1642 (now in the collection of Hugh Gough in New York) were not both "extend[ed] . . . in the treble" (as stated on p. 254): the 8' nut was replaced entirely when the compass was extended.<sup>28</sup> Such lapses are, needless to say, minor, and one assumes that they are largely absent in Dr. O'Brien's descriptions of the mainstream Ruckers instruments, made between about 1600 and 1650. At the outer fringes of Ruckers-family activity, however, mistaken or missed observations are perhaps slightly more frequent. For example, the bridges of the child of the Hans Ruckers double virginal of 1581 have curved sides, not flat (as stated on p. 76). While it is mentioned (p. 238) that the 1591 Han Ruckers double virginal was apparently decorated by the maker's usual soundboard painter, the exceptional nature of the soundboard of this instrument is not remarked upon: instead of the usual colorful fruits, flowers, and insects surrounded by blue borders and arabesques, there are only borders and arabesques executed in gold-colored paint.<sup>29</sup> That such gold-only soundboard decoration is not discussed in the chapter about decoration is surprising, since, at the other outer fringe of Ruckers-family activity, it seems to have been frequently applied by one or more of the Couchets in the second half of the seventeenth century.

27. We all make mistakes. The author rightly chides the reviewer for having failed to notice that three of the jack slots in the mother virginal made in 1600 by LODVVICVS GROVVELVS (as it is inscribed, not LODOVVICVS as in O'Brien's transcription) are later additions. In reexamining the instrument, the reviewer has recently observed that we both apparently also failed to notice that the left bridge is not in its original position.

28. Further, the reviewer does not recall observing that the bridges were extended in the treble, as stated by the author. Inquiries to those close to this harpsichord would seem to establish that the author has never examined it himself. Some of his statements about it that cannot have been based on the previously published literature that he cites must therefore have been derived from information or photographs supplied to him. Although this reviewer has in principle no objection to authentications (especially in regard to this superb example of Ioannes Ruckers's work) and descriptions based on such secondary sources as photographs, it would have been helpful to future researchers had the author noted the fact in this instance and, one might well surmise, one or two others.

29. In writing about other instruments with such soundboard decoration, the author refers to it as having been executed in "bronze powder" (e.g., pp. 274–75). In the opinion of Scott Odell of the Smithsonian Institution, who has closely examined the Couchet of 1679 there, shell gold, i.e., paint with real gold as the pigment, was used, although the decoration might later have been retouched with bronze paint.

While the harpsichords built by the four craftsmen surnamed “Ruckers” were made according to a few standard models, the author notes that “every single Couchet harpsichord is individual in some way” (p. 230). Thus each Couchet instrument is uniquely significant in a sense that each earlier Ruckers is not. O’Brien’s description and analyses of several of the relatively few extant Couchet harpsichords are to be welcomed as careful and thorough. The author’s grounds for suggesting (pp. 273–74) that a Ioannes Couchet harpsichord of 1652 originally had a machine stop to control the registers are persuasive, and there is every reason to accept his authentication of the remarkably long and wide-compassed undated Couchet harpsichord at the Nydahl Collection in Stockholm.<sup>30</sup> In some other instances, however, he has uncharacteristically faltered, especially with the 1680 Couchet at the Museum of Fine Arts in Boston. The author, who mentions “a curious lack of any of the usual construction marks on the soundboard” (p. 177), seems not to have been aware that some of these marks (e.g., scratched line segments indicating the position of the 4’ hitchpin rail) were obliterated during a clumsy restoration in the 1940s (they are clearly visible in a pre-restoration photograph freely available for consultation in the Museum’s files)<sup>31</sup> and that others (e.g., the bridge positioning pin holes) are obscured by a dark varnish. Clearly visible on the underside of the soundboard, these holes and the associated bridge reinforcement nails are shown in this reviewer’s full-scale plan of the instrument, available from the Museum’s Collection of Musical Instruments, which published it in 1983.<sup>32</sup> Further, the author’s ingenious rule of locating the pitch *c*’ 8’ bridge pin by measuring 49 cm. behind the nameboard has been erroneously applied: this pin would have been about the twentieth from the top, not the fifteenth indicated by O’Brien’s analysis (pp. 177 and 275).<sup>33</sup> By applying some of the methods described by O’Brien (principally his observation that bridge positioning pins are found at C and F-sharp in

30. The authenticity of this splendid harpsichord had been rejected in Donald H. Boalch, *Makers of the Harpsichord and Clavichord, 1440–1840*, second ed. (Oxford: Oxford University Press, 1974), p. 28.

31. The reviewer was present during the author’s examination of this instrument and informed him about the unfortunate restoration and the availability of the photograph.

32. A copy of this drawing was sent to the Russell Collection several years before the publication of O’Brien’s book.

33. Further, because the author has concluded (p. 276) that his 49-cm. rule does not apply in the usual manner to the Stockholm Couchet of about the same date, he might have questioned whether it should have been applied at all to the Boston instrument.

each octave) along with a consideration of the plucking points implied by various supposed scalings, this reviewer's tentative reconstruction of the original state of this much-rebuilt instrument is that it was made with the compass GG/BB to  $g'''$  (without  $\sharp'''$ ), sounding a semitone above the usual Ruckers reference pitch.<sup>34</sup> (O'Brien's conclusion, admittedly somewhat tentative, is that it originally had an FF to  $d'''$  compass sounding at reference pitch.<sup>35</sup>)

The date of circa 1650 traditionally assigned to the Couchet harpsichord at the Metropolitan Museum of Art in New York and its consequent attribution to Ioannes Couchet the Elder is unquestioningly accepted by the author. This reviewer believes that, because of various details of decoration (e.g., the gold soundboard painting, typical of Couchet harpsichords dated in the 1670s) and construction, it might just as well have been made about twenty-five years later by Ioseph Ioannes Couchet. Two of these features, the placement of the front bottom brace parallel to the lower belly rail and the lack of a tool compartment with an opening in the spine, are also found in the I. I. Couchet of 1679 (at the Smithsonian Institution) and the Boston Couchet of 1680. Further, these instruments contradict the author's statement that if "there is no sign of the former existence of a toolbox flap on the spine, or if the toolbox braces are parallel instead of being slightly angled, the instrument displaying these features is almost certainly not by one of the Ruckers or Couchets" (p.190).

Just as one might question a small fact here and there, one might question some of the author's secondary conclusions. This reviewer does not understand why a harpsichord inscription reading (in translation of the author's highly plausible interpretation of the slightly abbreviated

34. A complete discussion of the reviewer's analysis of this instrument is included in his forthcoming *Catalogue of Keyboard Instruments* at the Museum of Fine Arts in Boston.

35. Given the layout of the instrument, O'Brien's conclusion is, essentially, impossible: at  $c''$ , for example, the 8' nut would have been only about 7 cm. behind the nameboard, not the usual 12 to 14 cm. One should also mention that the author's discussions (pp. 211 and 233) about the instrument's stringing and scaling in its state as rebuilt by Pascal Taskin in 1781 probably do not take into account subsequent alterations by misguided restorers. Because the bridges were reglued in wrong positions, the scalings were lengthened in the extreme treble; and the moving of the 8' wrest pins about a semitone to the right could cause one easily to misread the pitches intended for Taskin's string-gauge markings, which, according to the author, imply that Taskin rebuilt the instrument to sound a semitone above his usual pitch.



Latin original<sup>36</sup>) “Andreas Ruckers, son of Andreas, made me in Antwerp” should imply that “Andreas I was still actively building instruments” (p. 9) at the time, i.e., that Andreas the Younger so signed the instrument in order to distinguish it from his father’s work. Might not Andreas the Younger have been proud to point out his distinguished heritage even after his father’s retirement?

There is a tendency for the author to see direct Ruckers influence almost everywhere in the work of later builders without consideration of alternative explanations. Thus, for example, the long Stockholm Couchet is seen as “the prototype for the later eighteenth-century instruments made by Dulcken” (p. 199). But might not Dulcken have derived his long design from the pre-Ruckers 16’ transposing double<sup>37</sup> or even himself have developed it from first principles? Two of the “several sources” cited by the author (p. 199) to show that the influential early eighteenth-century London maker Hermann Tabel had “worked with the successors of the Ruckers in Antwerp, i.e. with the Couchets,” are derived from the third source, which consists of hearsay published in 1862.<sup>38</sup> Various legends that Handel owned a Ruckers (as stated on p. 201) are hardly credible.<sup>39</sup>

In some places the author suspends scholarly cautions expressed elsewhere in the book. For example, while in his main discussions about the unusual Ioannes Ruckers two-manual harpsichord of 1612 (now at Fenton House, Hampstead) words such as “possibility” (p. 179) and “probably” (p. 243) are used in reference to its surmised original state, in the discussion of its possible musical uses no such reservation is expressed: “This harpsichord had . . .” (p. 229). The reader who chooses to read only this relatively non-technical part of the book might be misled.

36. The inscription is twice transcribed (pp. 9 and 170) with small errors. It is *ANDREAS RVCKERS AND:F:ME FECIT ANTVERPIAE* according to Sheridan Germann (personal communication).

37. This instrument, in the Brussels Conservatorium, is described by the reviewer in “A Remarkable Early Flemish Transposing Harpsichord,” *Galpin Society Journal* 35 (1982): 45–53, and by O’Brien, pp. 32–33.

38. The same sentence in *Some Notes Made by J. S. Broadwood, 1838, with Observations & Elucidations by H. F. Broadwood, 1862* (London, 1862), p. 4, that mentions Tabel’s connection with the Ruckers family also states that he “was, it is believed, the first person who made Harpsichords in London, where he resided between 1680 and 1720.” There were, needless to say, harpsichord makers in London before Tabel, who lived there until his death in 1738 (see Boalch, op. cit., s.v. “Tabel, Hermann”). Because of these errors, no fact about Tabel from this source should be regarded as reliable.

39. See Raymond Russell, op. cit., Appendix 12.

Although Dr. O'Brien's suggestion (pp. 43 and 229) that Ruckers single-manual harpsichords with chromatic bass octaves were made for use in England is supported by some documentary evidence,<sup>40</sup> his supposition that their chromatic-bass two-manual transposing harpsichords were made for export to France seems much less well founded. That the four extant examples of these large doubles "are found in France and appear to have been there for a very long time" (p. 180), i.e., since the eighteenth century, is hardly compelling evidence that they were there a hundred years earlier, and, as the author admits (p. 230), seventeenth-century French keyboard music does not require the extended bass compass. Further, had these fine instruments been present in France since they were made in the first half of the seventeenth century, one might expect that the Ruckers style of making harpsichords would have influenced native makers. There is, however, no evidence that this occurred before the end of the century. These large harpsichords do seem to have been known to Claas Douwes in Friesland in 1699,<sup>41</sup> and he likens their extended bass keyboards to those of large organs. Organ keyboards starting on F (like the upper keyboard of these harpsichords) or on FF (like the lower keyboard, if one assumes that the apparent keys GG and GG# were tuned to FF and GG: this might explain Douwes's vagueness in writing that their lowest note is "G or F") were common in the

40. Or, at least, these instruments were made with English practice in mind. See the contracts of 1656 and 1657 between Ioannes Couchet's widow and Simon Hagaerts, transcribed as nos. 22 and 23 in M.-J. Bosschaerts-Eykens, "Documenten betreffende de familie Couchet," *Mededelingen van het Ruckers-Genootschap* 5 (1986): 7-41. These mention harpsichords "op sijn engels" ("in the English fashion") with "de bassen recht vuyt" ("basses straight on," i.e., chromatic). Although, as O'Brien suggests (p. 43), the presence in England since the eighteenth century of most of the extant Ruckers chromatic-bass single-manual harpsichords might imply that they were specifically made for export there in the seventeenth century, it remains possible that the instruments were made for use in the low countries, where English music was very influential (see Alan Curtis, *Sweelinck's Keyboard Music: A Study of English Elements in Seventeenth-Century Dutch Composition* [Leiden and Oxford University Presses, 1969]). N.B.: none of the chromatic-bass Couchet harpsichords have an English provenance, and in 1660, "Virginals" (i.e., virginals and harpsichords) were not listed among goods frequently imported into England but among those frequently exported (see Guy F. Oldham, "Import and Export Duties on Musical Instruments in 1660," *Galpin Society Journal* 9 [1956]: 97-98).

41. This is suggested by O'Brien, p. 180. It is, however, possible that the reference by Douwes to harpsichords "acht voeten lang" ("eight feet long") and with keyboards down to GG or FF (op. cit., pp. 105 and 107) is to large single-manual instruments, such as those made by the Couchets. The 8-voet harpsichords mentioned in the contracts of 1656 and 1657 (cited in note 40, above) appear from the context to have been singles.

Netherlands in the sixteenth and seventeenth centuries.<sup>42</sup> Further, there is at least some Dutch keyboard music of the period (many of the works of J. P. Sweelinck) suited to a compass starting on F. This repertoire might well, upon occasion, have been played an octave lower in order to make full use of keyboards starting on FF. If so, these harpsichords could be regarded as related to the sixteenth-century 16' transposing double now in the Brussels collection.<sup>43</sup> Although this argument that the Ruckers family made chromatic-bass transposing doubles for Dutch organists is pure speculation on the part of the reviewer, that an alternative explanation for their existence can be proposed suggests that it is unfortunate that O'Brien has, perhaps indelibly, marked these doubles as "French."

The reviewer should stress to his readers the peripheral nature of the few reservations that he has expressed. This is *the* book about the Ruckers family, and it is difficult to imagine that it will ever be surpassed. The dust cover blurb that this "book will be essential for all harpsichord builders and indispensable for players, collectors and scholars"—and, for that matter, for all music libraries—is, for once, no exaggeration. Especially if the author's urgent plea for the conservation (not restoration) of Ruckers *clavecimbels* is observed by those to whose care they are entrusted, there will remain, as he writes (p. 234), "doubtless much more information still to be recovered from Ruckers instruments." Nevertheless, it is unlikely that whatever will be found in the future will be anything more than a footnote to Grant O'Brien's great work.

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***Five Lectures on the Acoustics of the Piano*, ed. by Anders Askenfelt. Stockholm: Kungl. Musikalska Akademi; Long Island City, N. Y.: Steinway and Sons, 1990. 105 pp.; 19 line drawings, 37 black-and-white photographs, 71 charts and tables, 14 musical examples; compact disk. ISBN: 91-85428-62-0. \$23.00**

In 1988, from the 25th to the 27th of May, a group of engineers and scientists from both academe and piano manufacturing met at the Royal

42. See Maarten A. Vente, *Die Brabanter Orgel* (Amsterdam: H. J. Paris, 1963).

43. See note 37, above.

Institute of Technology in Stockholm, Sweden, to discuss the past, present, and future of the piano. On the last day five public lectures were presented by six of the attending specialists. The texts of their talks constitute this slender volume, and are arranged in a sequence roughly corresponding to the order of events that produce piano tone: the action, string vibration, and the behavior of the soundboard. Also on the last day a concert was presented illustrating the development of the piano from the harpsichord to the modern concert grand. A compact disk with excerpts from this concert, along with sound examples used by the lecturers during the course of their papers, is included with the book.

Harold A. Conklin Jr. writes on "Piano Design Factors: Their Influence on Tone and Acoustical Performance," in which design problems for hammers, striking points, soundboard, case, iron plate, strings, and tuning pins are discussed. Conklin explains that hammers are graduated in size and weight in order to effect the best balance between tone, volume, and playability. The hardness of hammers is also important: too soft produces a tone lacking brightness; too hard, a tone overly harsh. Although for over a century conventional wisdom has held that the best position for striking points is at  $\frac{1}{7}$  or  $\frac{1}{9}$  of the string's sounding length, Conklin points out that in the modern piano striking points range from between  $\frac{1}{8}$  to  $\frac{1}{17}$ .<sup>1</sup>

Conklin goes on to describe the modal behavior of the soundboard—the way in which it vibrates in response to frequencies transmitted to it from the strings via the bridge. He demonstrates a method for showing the soundboard's modes (Chladni patterns), and illustrates the discussion with pictures of the first, second, third, and eighth modes. He also describes modal analysis, a newer technique of identifying soundboard modes. Throughout, he notes that compromise is the order of the day: for example, a thicker soundboard produces a louder tone, but one of shorter duration.

The piano has a cast iron plate whose purpose is to maintain the integrity of the shape of the instrument, thereby allowing the use of heavy strings. Conklin recalls the astounding fact that the string tension

1. See Robert S. Winter, "Striking it Rich: The Significance of Striking Points in the Evolution of the Romantic Piano," *The Journal of Musicology* 6:3 (Summer, 1988): 267–292. Winter shows that right from the beginning pianos never conformed to this abstract ideal.

on Cristofori's piano was about 190 pounds per foot, while on the modern piano it is about 47,000 pounds per foot. He points out that in order that it not vibrate easily the plate needs to be rather massive. It is. A cast iron plate weighs between 350 and 400 pounds.

The article by Anders Askenfelt and Erik Jansson, "From Touch to String Vibrations," is perhaps the one most useful to pianists. The authors present a detailed account of the action, the mechanism that transforms the motion of the pianist's finger to a blow of the hammer. They stress the importance of proper regulation, going so far as to give the proper distance between the resting hammer and the string (45–47 mm) and the "let-off," the distance between the hammer at its highest point and the string (1–3 mm, depending on the string diameter and the preferences of the pianist). To help understand the relationship between all the parts they present a diagram giving the time history of each element of the action plus the vibrating string for the production of a staccato note, middle C, played forte. The duration of the tone is about  $\frac{1}{10}$  of a second, but the contact between hammer and string is only about  $\frac{1}{5}$  of this, or  $\frac{1}{500}$  of a second!

The authors explain that the relationship between dynamic level, the onset of the tone, and the bottoming of the key provides important feedback to the performer. They note that when the key is struck from some distance above—a staccato touch—the force of the blow creates a resonance in the hammer head which is transferred back to the key via the flexible hammer shank. But in legato playing, with the finger close to the key, this "hammer mode" is either suppressed or absent, and the key motion is smooth. Hence, the feel of the key motion varies with the touch, a sensation easily perceived by the pianist.

Hammer motion is complex. For years, particularly since the publication of Otto Ortmann's book, *The Physical Basis of Piano Touch and Tone*,<sup>2</sup> scientists have held that piano tone is dependent solely on the velocity imparted to the hammer head. But Askenfelt and Jansson present data indicating that even with a note of the same dynamic level, different tone qualities can be produced by the type of touch used. They attribute this to admixtures of two of the vibrational modes developed by the hammer. Interestingly, they found that performers were much more aware of these tonal distinctions than listeners. The authors caution that

2. New York: Dutton, 1925; Dutton paperback, 1962.

these data must be interpreted with the utmost care. Undoubtedly, this phenomenon will prove to be a rich field of investigation.

A struck string exhibits a rather intricate motion. The striking hammer puts a "hump" into the string which then travels down the string as a pulse in both directions. String vibration is transferred to the soundboard by the impact of this pulse with the bridge. The situation becomes complicated when things such as hammer mass, string length, and string stiffness are taken into account. For example, the spectra of bass notes are dramatically different from those of treble notes, in part because of the properties of the hammers in these registers. Askenfelt and Jansson show that simply striking middle C with a bass hammer and a less massive treble hammer can produce drastically different spectra. The stiffness of the hammer is also important to the spectral content of the string; the authors report that softening a hard hammer with needles (a process of voicing, carried on regularly by technicians) reduces the higher limits of the string spectrum from 8,000 Hz (8,000 cycles per second) to 4,000 Hz.

Because a hammer consists of a wooden core covered by a layer of hard, then soft felt, the *relative* hardness of any given hammer depends on the velocity with which it strikes the string. In quiet playing only the soft outer layer of felt is utilized, producing a spectrum in which higher partials are absent. Loud playing, on the other hand, feels "hard" to the string, since the inertia of the hammer blow forces the string to bury itself in the soft outer layer of felt and, in effect, to contact the compressed inner layer. The resulting spectrum fairly crackles with the energy of higher partials. Accordingly, a large part of what we call piano tone is the performer's ability to manipulate the partial content of the tone through touch.

A naive image of the relationship between the hammer and string would expect the striking hammer to bounce off the string before the resulting pulse returns from its trip to the bridge. Just how unsophisticated this view would be is the subject of Donald E. Hall's essay, "The Hammer and the String." As Hall puts it (p. 61),

. . . we can only come to a correct understanding [of the relationship between hammer and string] by admitting that the hammer remains in contact with the string for a finite time, during which the force exerted by the hammer upon the string may change in a complex way.

Just how long this contact lasts depends on the relationship of the mass of the string to the mass of the hammer, the relative hardness of the hammer, and the striking point on the string. It is also dependent on the length of the string (or, putting it another way, the amount of time it takes for the pulse of the fundamental to make its trip to the bridge). But the inertia of the hammer assures that it will remain in contact with the string for more than one round trip of the pulse. Traveling in both directions, the wave propagated by the hump is reflected from the string terminations (the agraffe and the bridge) back toward the hammer. The interaction between wave and hammer generates a new wave. This new wave is reflected and, passing the hammer, generates yet another new wave (Hall calls these children and grandchildren). The shape these generations of waves take depends on the hardness of the hammer. A soft hammer exerts a rather steady force on the string; a hard hammer gives the string a series of sharp pulses. It is this complex restoring force of the string, acting like a bow to the hammer's arrow, that finally forces the hammer off the string. Complicating all this is the nonlinearity of the event—any given hammer is relatively soft on the outside, under soft playing, and harder on the inside, with louder playing.

Hall attempts to present what we know about the theory of the interaction between hammer and string, and to modify it with practical information gained through experimentation. He hopes to set up a mathematical model that will enable us to predict string and hammer behavior with far greater accuracy than we now possess. His article is an important one, although the information it contains may be of less interest to the non-scientist. Nevertheless, for a detailed account of the fascinating *pas de deux* danced by hammer and string, Hall's article should be read with care.

In "The Coupled Motion of Strings," Gabriel Weinreich describes the nonlinear element of piano tone as "miraculous." He begins by supposing that an engineer inventing the piano would quickly have to decide how to deal with the energy of the vibrating string. If transferred to the soundboard with great efficiency the result would be a loud sound, but one that decayed quickly. On the other hand, a less efficient coupling would produce a sound with longer decay but less volume. But, says the author, a phenomenon of hearing provides the means for getting around that limitation, because sounds that start loud are perceived as loud, even if that volume decays quickly; and sounds can be perceived as sustained even if part of that sound is rather weak. This, says Weinreich,

is "the miracle of the piano tone." The rest of the article clarifies these statements.

Weinreich explains that for every mode the string has two possible directions of vibration, vertical and horizontal. The vertical component is the first to be excited, so it vibrates with an amplitude much in excess of the horizontal, although with rapid decay. The horizontal mode is also vibrating, but with less rapid decay, and transmitting less sound to the board. After a while the horizontal component becomes the dominant one, and the overall effect is one of a tone that starts loud with a rapid decay, but soon changes to a more sustained sound. Thus the tone of a single piano string decays in two portions. The first is the exponential decay to be expected from the linear system of string and soundboard. But soon the first part of the tone (called "prompt sound"), a loud sound with rapid decay, is superseded by a second part ("after sound"), at less than one-fourth the rate of the first.

Weinreich next explains that this effect is intensified when a note is double or triple strung. No piano tuner is so good that two, no less three strings can be set absolutely dead on. That the strings of a triplet are slightly mistuned means that they cannot vibrate in an absolutely united fashion. That these "mistuned" strings do not beat is explained in terms of the effect each string has on the impedance of the bridge, or the rate at which the bridge admits vibration from the string to the soundboard. The relationship is a complex one, with each string affecting the impedance with which the bridge meets the other strings. The change in the rate of the decay here is due to the slightly different rates at which the disturbances in the strings impact the bridge. The closer together they are (and at the outset of the tone they are practically in unison), the quicker the decay and the louder the tone; but the farther apart they become, the more the decay slows down.

In the final article, "The Strings and the Soundboard," Klaus Wogram describes how the blow of the hammer sets up a spectrum of string vibrations whose energy is transferred to the soundboard via the bridge. The paper then deals with the behavior of the soundboard, whose function is to change string vibrations into radiated sound. At low frequencies the soundboard acts somewhat like a diaphragm, but at higher frequencies it tends to vibrate in discrete areas, which become smaller as the frequency rises. There are limits, as Wogram points out. At low frequencies acoustic short-circuiting occurs, as air flows between the top and bottom of the soundboard. At high frequencies adjacent areas will be out



of phase with each other and will thus spill air back and forth, rather than radiate sound. Hence, the frequency band at which piano sound is most efficiently radiated is between 100 Hz and 2,000 Hz.

The author describes some interesting experiments on the ribs of a soundboard. Ribs serve to carry the vibrations *across* the grain of the board at a speed approximating the velocity of sound *with* the grain (with no ribs or bridges the difference between the stiffness of the wood with and across the grain is about twenty to one). But they also increase the general stiffness of the board. Without this effect the transfer of energy from string to board would be too efficient, with the concomitant loud but quickly decaying sound. Wogram found that as the ribs were reduced in height about 50% the resonance frequencies of the board were shifted downward, the resonance peaks became narrower, and sound radiation was reduced. It was also discovered that reducing the number of ribs by 50% was equivalent to reducing the height of the ribs by 25%. What this all boils down to, of course, is a confirmation of the design of the modern piano, arrived at by *a priori* methods rather than by laboratory experiments.

In another experiment Wogram mounted a single string on an assembly consisting of frame, soundboard, and plate. Impedance matching was tested by tuning the string to a variety of frequencies at and near a resonance peak on the soundboard. The string was then plucked and decay times noted. As predicted, the decay time was longest when the frequency of the string was furthest from the frequency of the soundboard resonance. This means that in a good soundboard there will be a consistently high impedance between strings and board, assuring good reflection of the energy from the vibrating string at the bridge, and providing the comparatively long decay times deemed desirable in the piano.

The final section of Wogram's paper deals with a modal analysis of the soundboard, a computer-dependent technique that gives information on the frequency, amplitude, phase, and damping of each of the board's modes.<sup>3</sup> The data are digitized and can be displayed in any form. In his article Wogram presents "snapshots" of the first eight modes, but in his verbal presentation he showed a video tape of the actual movement of the soundboard.

3. This technique has also been applied to the harpsichord and is described in an article entitled, "Air and Structural Modes of a Harpsichord," by William Savage, Edward Kottick, Thomas Hendrickson, and Kenneth Marshall, and accepted for publication in *The Journal of the Acoustical Society of America*.

The five articles are preceded by a well-written ten-page introduction to the acoustics of the piano. The book contains solid information on the acoustics of the piano, and there is nothing else quite like it. All the articles are written in an interesting fashion and should be comprehensible to any educated musician, although some readers may well need to go through the material several times before comprehension takes hold. The book should be on the shelf of every mature and thoughtful pianist, and required reading for anyone interested in musical acoustics.

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**Martha Maas and Jane McIntosh Snyder. *Stringed Instruments of Ancient Greece*. New Haven, Conn.: Yale University Press, 1989. xx, 261 pp.; 165 black-and-white illustrations. ISBN 0-300-03686-8. \$45.00.**

A 1991 winner of the American Musical Instrument Society's prestigious Nicolas Bessaraboff Prize for the most distinguished book-length work which best furthers the Society's goal "to promote study of the history, design, and use of musical instruments in all cultures and from all periods," *Stringed Instruments of Ancient Greece* is a monumental scholarly study, the comprehensiveness of which is approached by no other published work in its field. An amalgam of the highest quality of musicological, iconographical, and literary research, this outstanding book provides the best-informed insight currently available into the musical life and the musical instruments of the ancient Greeks.

Authors Maas and Snyder, both distinguished scholars in their fields, are on the faculty of Ohio State University, in the departments of music and the classics, respectively. In the preparation for this, their first collaborative effort, they studied nearly 2,000 artistic representations (vase paintings and sculpture) and the more than 700 literary references (in surviving epic and lyric poetry and drama) to plucked stringed instruments in ancient Greece, dating from about 2700 B.C. to the deaths of Alexander the Great and Aristotle in 323–322 B.C. The dependence upon iconographic and literary source material was necessitated by the scarcity of archaeological evidence for the existence and use of the three types of stringed instruments popular in Greece during that time period—the lyre, the harp, and the lute.

As in all studies based primarily upon iconographical and literary sources, the authors had to deal with a myriad of potential problems and

pitfalls which, once entered into the data base, can strongly influence interpretations and hypotheses. These include the difficulty of accurately dating sources; artistic license; historic and cultural artistic conventions; the perceived abundance, or lack thereof, of literary and artistic references to certain instruments in various eras; and the difficulty (or even the inability) of linking names of instruments found in literature with unnamed artistic depictions, to mention just a few. Bearing such problems in mind, Maas and Snyder nevertheless sensitively present their own informed interpretations of, and hypotheses concerning the structure, playing technique, history, musical and cultural use of the plucked stringed instruments of ancient Greece. In addition, as a result of combining the authors' iconographic and philologic expertise, some new interpretations of previously misunderstood references to musical instruments in Greek literature are proposed.

Although the three principal plucked stringed instruments of ancient Greece are all scrutinized, it is entirely appropriate that the greatest attention is focused upon the various forms of the lyre, one of the most important stringed instrument types in the Classical Greek world. These include the *kithara* (a highly developed lyre which was the chief instrument associated with the god Apollo); the *chelys-lyra* (often represented in association with the Muses); the *barbitos* (an elongated tenor lyre associated with the cults of Dionysos and Eros); and the *phorminx* (a lyre with a round base, the function of which changed greatly over the centuries). The harp and lute, of less importance to ancient Greek culture, receive much less, although certainly adequate coverage.

The book is technically well produced, with 165 clear, black-and-white illustrations, helpful lists detailing the sources of all the iconographical objects mentioned, accessible endnotes, a comprehensive bibliography of materials published before 1984, and an index.

Well deserving of its Nicolas Bessaraboff Award, *Stringed Instruments of Ancient Greece* will undoubtedly remain the primary resource in its field for some time.

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