

refsn, 7/20/94

## REFERENCES

## A Partially Annotated Bibliography

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- Abraham, Gerald (1980), *The Concise Oxford History of Music*, Oxford University Press. A massively non-concise (990 pp.) account of music from Ancient Egypt to Stravinsky.
- Auer, Leopold (1921), *Violin Playing as I Teach it*, F. A. Stokes Co., New York; reprinted by J. B. Lippincott Co., Philadelphia (1960), and by Dover Publications, Inc., New York (1980).
- Austin, Wm. W. (1987), "Susanna," "Jennie," and "The Old Folks at Home"; *The Songs of Stephen C. Foster from His Time to Ours*, Univ. of Illinois Press, Urbana.
- Bach, Carl Philipp Emanuel (1753), *Versuch über die wahre Art das Clavier zu spielen*, Berlin. Written while Bach was at the court of Frederick the Great at Potsdam, this is the work that, as recalled by Carl Czerny, Beethoven told his pupils to read as their first assignment.
- Baines, Anthony (1963), *Woodwind Instruments and their History*, Norton, New York. Paperback reprint by Dover Publications, Inc. (1992).
- Baines, Anthony (1992), *The Oxford Companion to Musical Instruments*, Oxford University Press. Lavishly illustrated, concise descriptions of many instruments from all over the world, with pitch, playing techniques, and orchestral use.
- Barclay, Robert (1992), *The Art of the Trumpet-Maker*, Oxford University Press (Early Music Series 14). The materials, tools and techniques of the 17'th and 18'th Century in Nuremberg.
- Bartholomew, W. T. (1942), *Acoustics of Music*, Prentice-Hall, New York.
- Barzun, Jacques, editor (1956), *Hector Berlioz: Evenings with the Orchestra*, New York
- Bate, Philip (1956), *The Oboe: An Outline of its History, Development and Construction*, Ernest Benn, London.
- Bate, Philip (1978), *The Trumpet and Trombone; an Outline of Their History, Development, and Construction*, Ernest Benn, London.
- Bate, Philip (1979), *The Flute: A study of its History, Development and Construction*, Ernest Benn, London.
- Békésy, Georg von (1960), *Experiments in Hearing*, McGraw-Hill Book Company, Inc., New York. The author spent some 34 years in microscopic dissection of human ears and in acoustical experiments with live persons. Everyone should read, at the very least, his Chapter 1 concerning the historical background of the subject, full of informative illustrations and amusing anecdotes.
- Benade, Arthur H. (1976) *Fundamentals of Musical Acoustics*, Oxford University Press, Inc., New York. Second revised edition, Dover Publications, Inc., 1990. The fundamental, authoritative source of technical information on wind instruments.
- Beranek, L. L. (1962) *Music, Acoustics, & Architecture*, J. Wiley & Sons, Inc., New York. Valuable first of all for its photographs, plans, and dimensions of 54 of the most famous concert halls all over the world, with comments of musicians on their acoustical merits or demerits and measured reverberation times. Secondly, it is a now famous case history of the steps and the thinking that prepared the way for the greatest acoustical disaster of all time: the Philharmonic Hall in Lincoln Center, New York. Leo Beranek was the acoustical consultant on its design, and he goes into great detail concerning all the measurements and adjustments that were made on it. In the end, it was so intolerable acoustically that it was torn down and rebuilt only 14 years after its opening in 1961. The story was repeated in 1987 when the Detroit Symphony Orchestra abandoned the modern Ford Auditorium with its intolerable acoustics, and returned to the old

- Orchestra Hall, built in 1919. Evidently, the masses of acoustical measurements and calculations made by modern acousticians were irrelevant to the real problem of musical quality. It seems to us that the simple factors that *were* relevant, were also obvious at a glance without any acoustic measurements at all – but they were ignored in the design of modern auditoriums. As Leopold Stokowski had pointed out long before, the slight asymmetries and fancy rococo decorations of old halls were not only pleasing to the eye; they performed the essential acoustical function of *diffusing* the sound uniformly without absorbing it. In contrast, the flat surfaces of modern auditoriums reflect concentrated beams of sound, producing an acoustical mess; the sound of any one instrument will miss some locations in the hall, while coming on far too loud in others. (These things come rather close to home, because the writer's older brother, Vernon H. Jaynes, was a college classmate and lifelong friend of Leo Beranek).
- Berlioz, Hector (1975), *The Memoirs of Hector Berlioz*, David Cairns, editor, W. W. Norton & Co, Inc., New York.
- Böhm, Theobald, *The Flute and Flute-Playing*, Dover reprint (1992).
- Brockway, Wallace & Weinstock, Herbert (1939), *Men of Music*, Simon & Schuster, New York. Biographical sketches of some 30 composers from Palestrina to Stravinsky. Comparable to Schonberg (1970) but relatively heavier on German and lighter on French composers. For example, Berlioz and Bizet are mentioned in passing but do not rate separate Chapters. With a larger book but fewer subjects, the sketches here give more information than do those of Schonberg.
- Burney, Charles (1773), *The Present State of Music in Germany, the Netherlands and United Provinces*, London. Dr. Burney travelled to many places, meeting musicians and writing this interesting account of their activities. In particular, he spent a day in the home of Carl Philipp Emanuel Bach in Hamburg, and reported on his lifestyle and musicianship.
- Chase, Gilbert (1987), *America's Music: From the Pilgrims to the Present*, 3rd edition, Univ. Illinois Press, Urbana
- Clinkscale, Martha N. (1993), *Makers of the Piano 1700 – 1820*, Oxford University Press. Details of nearly all extant pianos built in its earliest years.
- Coates, Kevin (1985), *Geometry, Proportion, and the Art of Lutherie*, Oxford University Press. A study of the use of geometry and numerical proportion in the design of European bowed and plucked string instruments of the 16'th - 18'th Centuries. Lavishly illustrated. "Finally dispels the idea that musical instruments of the classical period were developed arbitrarily."
- Cooper, Barry (1990), *Beethoven and the Creative Process*, Oxford University Press. An attempt to understand Beethoven's underlying creative motivation, the relationships between his different works, and the influence of external factors in his life on his output. See also Frohlich (1992).
- Debussy, Claude (1977), *Debussy on Music*, translated and annotated by Richard Langham Smith, Alfred A. Knopf, New York. Claude Debussy was, like Hector Berlioz, an on-and-off music critic whose writings show a high literary quality and a genial wit. Like the criticisms of Hanslick and Schumann, those of Debussy give us a very different picture of their author than we get from other writers. Debussy, contrary to the impression given by others, was not a radical, sour, misanthrope contemptuous of all music except his own. He appreciated other works fully, was as inclined to praise as to criticize, and commented in a way more interesting and succinct than Hanslick and more sensible and to the point than Schumann. For example, he appraises Wagner's music as "A beautiful sunset which has been mistaken for a sunrise", saying in ten words what Hanslick had said in thousands. The only thing we deplore is that, for reasons we cannot comprehend, he did not like Beethoven. But we think that reading this work will give you much useful information and a higher opinion of Claude Debussy as a person.
- Dolge, Alfred (1911), *Pianos and Their Makers*, Covina Pub. Co., Covina, Calif. Reprinted by Dover Publications, Inc., New York, 1972.

- Ehrlich, Cyril (1990), *The Piano; A History*, Oxford University Press.
- Fay, Amy (1880), *Music-Study in Germany*, A. C. McClurg & Co., Chicago; innumerable later reprints, including Dover Publications, Inc. (1965).
- Fay, Amy (1986), *More Letters of Amy Fay; the American Years 1897-1916*, M. W. McCarthy, editor, Information Coordinators, Detroit.
- Fischer, J. C. (1907), *Piano Tuning*, Theo. Presser, Philadelphia; Second edition by Dover Publications, Inc., New York (1975). An appalling documentation of the state of knowledge of piano technicians of the time; he has no conception even of overtones generated by a vibrating string, much less their inharmonicity in a piano string. This results in his giving very wrong statements about the beat periods of slightly detuned intervals, particularly the octave and fifth. In some respects, Fischer's understanding of these 'combination tones' is inferior to that of Tartini and Rameau in the 18'th Century, although by 1907 the facts had been explained thoroughly and correctly decades before, by the scientists Helmholtz and Rayleigh. White (1946) finally was aware of overtones, but not yet of inharmonicity.
- Forkel, Johann Nikolaus, (1802) *Ueber J. S. Bachs Leben, Kunst und Kunstwerke*, Hoffmeister & Kuhnel, Leipzig. English translation by C. S. Terry, *Johann Sebastian Bach: His Life, Art, and Work*, Constable & Co. Ltd., London 1920. First Bach biography, with details of his interactions with Frederick the Great.
- Frohlich, Martha (1992), *Beethoven's 'Appassionata' Sonata*, Oxford University Press (Studies in Musical Genesis and Structure). A detailed case history of Beethoven's method of composition, with analysis of all the sketches and revisions, with their transcriptions and facsimile reproductions. See also Cooper (1990).
- Galilei, Vincenzo (1589), *Discorso intorno alle opere di Gioseffo Zarlino*, Venice; facsimile reprint Milan, 1933.
- Gibian, Gary (1977) *Cochlear Microphonic Studies: Propagation of Cochlear Distortion Products*, Ph.D. Thesis, Washington University, St. Louis.
- Gold, T. (1987), "The Theory of Hearing", in *Highlights in Science*, H. Messel, Editor, Pergamon Press, New York. Suggests a partial return to the original theory of Helmholtz.
- Haimo, Ethan (1990), *Schoenberg's Serial Odyssey*, Oxford University Press. Traces the evolution of dodecaphony from its beginnings in 1914.
- Hallé, Charles (1896), *The Life and Letters of Sir Charles Hallé*, (edited by his son and daughter), London. Valuable eyewitness accounts of Paganini, Mendelssohn, Berlioz, Cherubini, Chopin, Liszt, and their contemporaries. Karl Hallé (1819-1895) was a German pianist who studied and taught in France for several years, during which he met the aforementioned musicians. The revolution of 1848 induced him to flee to England, where he introduced the Beethoven piano works to the British, performing the first full sonata heard there (Op. 31 #3). His early success led him to settle permanently in England, where he organized the Hallé Orchestra of Manchester and was knighted Sir Charles Hallé for his musical accomplishments.
- Hammond, L. (1939), *Science*, **89**, p. 6; *Electronics*, **12**, p. 16. Technical aspects of the Hammond organ of the 1930's and 1940's.
- Hanslick, Eduard (1988), *Hanslick's Music Criticisms*, translated by H. Pleasants, Dover Publications, Inc., New York. A selection of 39 articles on contemporary music composition and performance, from Wagner's *Tannhäuser* (1846) to Johann Strauss (1899). We are accustomed to reading of Hanslick as a doddering old fool, who unfairly attacked Wagner because he could not comprehend Wagner's "Music of the Future." Then it is a shock to read his actual words and realize that this was only Wagnerite propaganda; the facts are that Hanslick (1825-1904) was twelve years younger than Wagner but far better educated than Wagner, very well informed about music, much more inclined to praise than condemn, and he fully recognized the quality of

- Wagner's work. But he also saw – as did Claude Debussy – that this was leading pure music in a direction that had no future. It is like profanity; going in that direction, you quickly reach the limits of possibility, beyond which there is nowhere left to go. Both Hanslick and Debussy predicted correctly that Wagner's works, far from being the beginning of the "music of the future", would be the end of the "music of the past." Our conclusion is that, far from Hanslick attacking Wagner unfairly, Wagner and his friends attacked Hanslick unfairly. Reading this book greatly increases our respect for Hanslick; just the opposite of the effect that Schumann's criticisms have.
- Helmholtz, Hermann L. F. von (1885), *Sensations of Tone*, English translation of fourth (1877) German edition. Reprinted by Dover Publications, Inc. (1954). This is still the greatest, and most useful, monumental work on the scientific basis of music, including acoustics, origin of scales, operation of instruments, mechanism of hearing, and musical aesthetics. Helmholtz was the greatest German scientist of the 19'th Century, a master of all existing knowledge of physics and physiology (to both of which he made important contributions); and also an accomplished pianist, who performed the Beethoven works with professional competence and was personally acquainted with contemporary musicians like Joachim. There are probably not a dozen persons alive today who have all the factual knowledge he had, and nobody should attempt to write on these subjects without first checking what he had to say about them. Everything he wrote is still valid and important today, with the exception of the material on physiology and functioning of the ear (practically nothing was known about this in his time, and he made speculations that seemed very plausible then, but which modern research has found to be in need of revision). The situation here is still far from understood; more recent discussions are given by Wever (1949), Békésy (1960), Gibian (1977), Gold (1987).
- Hofmann, Josef (1909), *Piano Playing, With Piano Questions Answered*, Doubleday, Page & Co. Reprinted (1920) by Theodore Presser Company and (1965) by Dover Publications, Inc. Josef Hofmann (1876–1957) was one of the great pianists active at the turn of the Century, and later Director of the Curtis Institute of Music in Philadelphia. Here he offers many short pieces of good advice; some nearly obvious, some showing deeper understanding than one can find in any of the works on piano 'methods'. In particular, he stresses the legato touch; and not only for musical reasons. Points out that legato is not only desirable musically, but mechanically *necessary* in order to play rapid passages. He sees facts like this correctly, and thus debunks a great deal of the superstitious nonsense then current; not only a superior musician, but also a superior mind.
- Holoman, D. K. (1989), *Berlioz*, Harvard University Press. A massive (736 pp.) biography, with more information than we really wanted to know.
- Hotteterre, Jacques–Martin, *Principles of the Flute, Recorder and Oboe*, English translation, Dover Publishing Co. (1992).
- Hubbard, Frank (1965), *Three Centuries of Harpsichord Making*, Harvard University Press. The surviving evidence concerning the harpsichord in the 16'th – 18'th Centuries as it was made in Italy, Flanders, France, England, and Germany.
- Kircher, Athanase (1650), *Musurgia Universalis*. Reprinted by Hildesheim, New York, 1970. A short work on instruments of the time, but with details not given in others. Father Kircher (1602–1680) was a Jesuit mathematician and linguist who dabbled in all the knowledge of his time. He taught at Würzburg and later at Rome. His collection of musical instruments and other antiquities became the beginning of the Kircherian Museum in Rome. But not all of his many activities commend themselves to us today. He was an observer in the affair of Galileo (1564–1642) and afterward, Kircher was so indiscreet as to reveal that the Jesuit scholars were aware that Galileo was in the right; but kept their silence and allowed him to be persecuted (only in 1992 did the Catholic Church officially admit this). We must add that Kircher was also a weird occultist, and wrote a huge volume of nearly 500 pages, *Ars Magna Sciendi sive Combinatoria*, (Amsterdam, 1669) full of magic diagrams; and another of 250 pages giving every detail of the construction

of Noah's ark! As we are obliged to note constantly, scholars of that time lived in a dreamlike state, with little conception of the difference between external reality and inner fantasy. For every factual relation which they perceived correctly, they believed with equal force in a dozen supernatural ones. Fortunately, musical instruments, unlike Noah's Ark and magic spells, are things which one can see with his own eyes and hold in his own hands, leaving relatively little room for superstition.

Kirnberger, J. P. (1757), *Der allerzeit fertige Polonaisen und Menuettencomponist*, G. L. Winter, Berlin. First known example of a recipe for production of "aleatory" or "random" music, some 200 years before the days of the computer. The idea of automatic composition by machine occurs even earlier; Kircher (1650) gives plans for such a machine somewhat like a slide rule, but it does not seem proper to call this 'random.'

Köchel, L. von (1937), *Chronologisch-theoretisches Verzeichnis Sämtlicher Tonwerke W. A. Mozarts*, 3rd edition, edited by Alfred Einstein, Breitkopf & Härtel, Leipzig.

Krummel, D. W., Jean Geil, Doris Dyen, & Deane Root, (1981), *Resources of American Music History*, Univ. Illinois Press, Urbana. A guide to hundreds of thousands of manuscripts from Colonial times to World War II.

Krummel, D. W. (1987), *Bibliographical Handbook of American Music*, Univ. Illinois Press, Urbana. Examines over 750 bibliographies of books, periodicals, and other writings about American music, as well as lists of compositions, titles, scores, and recordings, from 1698 – 1988.

Lark in the Morning, Musical Catalog (1993). It is not our usual policy to take note of commercial advertising; but in this case an exception must be made. Lark in the Morning (P. O. Box 1176, Mendocino CA 95460, U.S.A.; Fax 707-964-1979) is a mail order musician's service that specializes in hard-to-find instruments, music, and instructional material. Its catalog is an education in itself; in it one can find for sale illustrated hammer dulcimers, baroque flutes, Renaissance lutes, some 25 kinds of bagpipes, medieval fiddles, a dozen kinds of harps and lyres, Swiss alphorns, Turkish ouds, Indian sitars, Chinese shengs, Buddhist gongs, Roumanian panpipes, one-of-a-kind old instruments of every description, plus rare music for them and books about them.

Larousse Encyclopedia of Music (1974), The Hamlyn Publishing Group, Ltd., London. This is an English version of a work published in France in 1965, expounding the history of music and musical instruments. Its virtue is in about 1,000 interesting illustrations, several in color and suitable for framing. Unfortunately, the connecting text fails to meet the scholarly standards of accuracy that we require in historical work. As we note in Chapters 3 and 6, this work gives us imaginative versions of some events concerning, Beethoven, Pleyel, and Schumann, that are totally at variance with all other sources. Worse, the author of any section is nowhere identified, and so one cannot trust any section give the details correctly. The Introduction by Antony Hopkins starts, prophetically, with a declaration that " - - - facts are overrated and often irrelevant - - - ." But even if that were true, it would justify only silence; not publication of false statements.

Loesser, Arthur (1954), *Men, Women, and Pianos: A Social History*, Simon & Schuster, New York. Paperback reprint by Dover Publications, Inc. A weird book, in which many interesting and useful facts about the history of the making and use of pianos alternate with interludes of social commentary, much of which appears downright silly today. Here is the ideologue of the 20'th Century, passing absolute moral judgment on the 18'th Century – without ever considering the alternatives or the resources available to them. He has a morbid preoccupation with the subject of money, and takes a stance of high moral indignation over every financial transaction, however beneficial to the parties concerned and to society as a whole. Put in modern terms, he views every economic process as a zero-sum game in which, if anybody makes a single penny, then someone else is necessarily swindled (a view which the present writer had also, at the age of 19). Loesser is, to the best of our knowledge, the inventor of the term "politically correct" (p. 169), decades before it was picked up by others. But after all this criticism, we must acknowledge

that his historical scholarship is surprisingly thorough; he digs up many significant old references unknown to other 20'th Century writers. Do not miss the Bibliography (pp. 614–624) with some 400 references where one can find vastly more historical material than we can include here. In the long run, this Bibliography may be seen as the most valuable part of the book; in it there is something “new” for everyone interested in the history of music.

Mach, Ernst (1988), *Die Mechanik in ihrer Entwicklung*, R. Wahsner & H. v. Borzeszkowski, Editors, Akademie-Verlag Berlin. Ernst Mach (1838–1916), a Professor at the University of Vienna, was a remarkable combination of scientist, philosopher, and historian. His great work on mechanics went through seven editions in 1883–1912. It is particularly famous today because it greatly influenced Albert Einstein in his youth. This book contains a reprint of the 1912 edition, plus a long appendix which contains an autobiographical sketch by Mach, the letters between Mach and Einstein, Einstein's obituary of Mach, and a survey of Mach's theoretical ideas by Max Planck. The work is very much worth reading today, not only because of the depth of Mach's thought and his careful historical scholarship, but because many will find it easier to read than a modern physics textbook. It is easy to understand why he influenced Einstein so much, because he still influences us in the same way today. On the other hand, some of his positivistic philosophical notions – in particular his refusal to accept the reality of atoms, which he considered unsupported by sufficient evidence – are now obsolete because that sufficient evidence was found at about the time of his death, by Einstein and others.

Maconie, Robert (1990), *The Works of Karlheinz Stockhausen*, 2nd. Edition, Oxford University Press. Descriptions of his works and his aesthetic/philosophical positions on many topics.

Manniche, Lise (1991), *Music and Musicians in Ancient Egypt*, British Museum Press, London. Dr. Manniche is a professional Egyptologist, and we learn from her some details, not given by others, of the rise and fall of musical tradition over the very long period (some 2000 years) represented. However, it is apparent to the reader that her knowledge of Egyptology greatly exceeds her knowledge of music. She is most meticulous in identifying each of the hundreds of different tombs from which musical information has been obtained. Yet on p. 7 she tries to present a table defining the musical intervals, which just does not make sense to anyone familiar with what the musical intervals really are in terms of whole tones and semitones. Elsewhere, in speculating on the tuning of ancient harps, she calls a ratio of 2:3 an ‘augmented fifth’. She purports to distinguish between clarinets, oboes, and flutes from tomb drawings in which no visible difference exists. But such anomalies cannot deceive anyone with musical training, and in other respects this book contains much interesting information; in particular one realizes the widespread presence of highly developed musical instruments of many different kinds, whose existence implies an equally highly developed musical tradition. Contains an extensive bibliography of other books and articles on Egyptian musical instruments.

Manning, Peter (1993), *Electronic and Computer Music*, 2nd Edition, Oxford University Press. Discography, technical developments such as MIDI, and philosophical aspects.

Matthay, Tobias (1947), *The Visible and Invisible in Pianoforte Technique*, Oxford University Press. 2nd. edition, 1960. Tobias Matthay (1858–1945) was an English piano teacher who became well known because he published innumerable books about piano technique starting in 1903. This is his final attempt to digest it all in one book. Matthay may have played reasonably well himself, and inspired others to do their best (his best known pupil was Myra Hess); but he is utterly ignorant of the principles of physics and physiology that necessarily control the situation. He has no comprehension of the distinction between the reality of what is actually happening in hand and piano, and his own subjective feelings while playing it; we note some outstanding examples of this in Chapter 6. He tells us that no more energy is required to play a note *ff* than *pp*, for we simply carry out the same motion at a faster speed! The fact is that, since the energy required is proportional to the square of that speed, it requires over 100 times as much energy to play

- a note *ff*. We do not see how the resulting greater muscular fatigue could escape the notice of the most unperceptive piano player; that is why most of us have to change fingers constantly on rapidly repeated notes. Fortunately, he could not lead others very far astray because he lacked the command of language to convey any clear ideas to readers. He is demolished effectively and almost correctly, by Lawrence Schauffler (1937). Harold Schonberg (1963, p. 277) states that “... most modern theoreticians ridicule the ideas of Matthay.”
- Meissner, B. F. (1936), *Proc. I. R. E.*, **24**, p. 1427. A review of the early state of the art in electronic musical instruments, before the introduction of the transistor.
- Mersenne, Marin *Harmonie Universelle* (Paris, 1636–37). Reprint by Fayard, Paris (1985). Father Mersenne (1588–1648) was a Jesuit scholar who lived mostly in Nevers and Paris. He was a good friend of Descartes and had all the learning of his day in both mathematics and music. The relation of pitch to string length was well known from the time of Pythagorus. Galileo had started finding the relation of pitch to vibration frequency and the laws of vibrating strings; Mersenne finished the job. He also translated the works of Galileo into French (Paris, 1634).
- Mozart, Leopold (1985), *A Treatise on the Fundamental Principles of Violin Playing*, Oxford University Press (Early Music Series 6). First published in Augsburg in 1756 (the year of birth of his son Wolfgang Amadeus Mozart), this was the major work of its time.
- Noss, Luther (1989), *Paul Hindemith in the United States*, Univ. Illinois Press, Urbana.
- O’Beirne, T. H. (1971), “From Mozart to the Bagpipe with a Small Computer”, *Bull. Inst. Mathematics and its Applic.*, **7**, pp. 3–8.
- Ortmann, Otto (1929), *The Physiological Mechanics of Piano Technique*, E. P. Dutton & Co., New York. Reprinted, with an Introduction by Arnold Schultz (1962).
- Pallottino, M. (1956), *Tarquinius: Wandmalereien aus Etruskischen Gräbern*, R. Piper Verlag, München. Beautiful paintings in full color, many of which show musical instruments in use; most commonly, the two-tube oboe discussed in Chapter 2, in better detail than is given in the Egyptian tomb wall sketches. See also the companion volume, Schefold (1956) with very similar paintings from Pompeii. These paintings tell the story so well that one does not need to read German in order to understand them, although the German text gives details of exactly where the various tombs were found.
- Praetorius, Michael (1619), *De Organographia*. A large treatise on instruments of the time, at least as they were known in Germany. English translation by David Z. Crookes, *Syntagma Musicum II*, Oxford University Press (Early Music Series 7), 1986.
- Rameau, Jean Phillippe (1722), *Traité de L’Harmonie, Reduite à ses Principes Naturels*, Ballard, Paris. English translation with introduction and notes by Philip Gossett, *Treatise on Harmony*, Dover Publications, Inc., New York (1971). In five later books, dated 1726, 1737, 1750, 1754, and 1760 Rameau shows a gradually improving understanding of the physical principles, but no major change in his perception of the musical principles.
- Rayleigh, Lord (1877), *Theory of Sound*, 2 vols., Macmillan, London; 2nd revised and enlarged edition (1894); reprint of second edition, two volumes bound as one, Dover Publications, Inc., (1945). Possibly the most massive scholarly work ever produced by a scientist, and the most influential for the subsequent development of science; today, the mathematics of quantum theory is still based mostly on the methods introduced by Rayleigh. In §137 he gives the simple explanation and calculation of inharmonicity of piano strings due to stiffness, which results in stretched octaves. But 70 years later, this information had not yet reached the piano tuners who had the most need to know about it (White, 1946).
- Rendall, F. G. (1971), *The Clarinet: Some Notes upon its History and Construction*, Ernest Benn, London.

- Rice, Albert R. (1992), *The Baroque Clarinet*, Oxford University Press (Early Music Series 13). The early history from shortly before 1700 to about 1760.
- Rowland-Entwhistle, Theodore (1967), *Teach Yourself the Violin*, English Universities Press, Ltd. This work purports to get an absolute beginner started on the violin; so we chose it as indicating the level of present beginning violin pedagogy. Indeed, he does not get around to putting the bow on the string until page 66!
- Sabine, W. C. (1922), *Collected Papers on Acoustics*, Harvard University Press; reprinted by Dover Publications, Inc., New York (1964). Wallace Clement Sabine (1868–1919) was Hollis Professor of Mathematics and Natural Philosophy at Harvard University. What makes him unique is that he was nearly the first scientific student of musical acoustics; and he remains to this day the most successful practitioner of that art. He was the acoustical consultant in the design of Boston's Symphony Hall, which after more than 90 years remains one of the three or four best auditoriums in the world for symphonic music. His methods are explained in this book. Later attempts at acoustical design of concert halls, with infinitely more *appearance* of scientific erudition, ignored elementary common sense and produced ever worse results, leading finally to disaster; see Beranek (1962).
- Saint-Saëns, Camille (1921), *Musical Memories*, London.
- Schaeffner, André (1936), *Origine des instruments de musique*, Payot, Paris. Later edition, 1968.
- Schauffler, Lawrence (1937), *Piano Technique: Myth or Science*, Gamble Hinged Music Co., Chicago. This professional musician and piano teacher finally took the trouble to listen to what scientists like Dayton C. Miller and Otto Ortmann were trying to tell musicians about the mechanics of piano action. He is far from appreciating all of the physics involved here; he fails to see the distinction between the terms “energy” and “force”, and nowhere does he recognize that the force applied to a key determines the *acceleration* of the hammer (Newton's law). Of course, this means that has no way of seeing the notion of effective mass of a key. Therefore he does not have even the concepts needed to perceive the greater mechanical efficiency of the nonpercussive, steady force touch, and makes the same error as Schonberg in thinking that a percussive touch enables one to play louder. Nevertheless the first part of the book is a big advance over authors who paid no attention whatsoever to the physical facts; or even angrily rejected them. Unfortunately, his treatment of the physiology of piano playing in the second part is even less successful. He includes Amy Fay in the list of references, but makes no mention of her in the text. A major problem is caused by an incredible misunderstanding of the technical meaning of the word “weight.” For him this word implies *motion* – a meaning that it has never had for any other person, scientist or musician, before or since. This reduces his discussion of “weight” methods to incoherent nonsense. The book includes a bibliography of 54 works on piano technique dated 1889 – 1935.
- Schauffler, Robert Haven (1929), “Beethoven, The Man Who Freed Music”. Reprinted 1944 by Tudor Publishing Co., New York. A biography well worth reading, and a useful list of Beethoven's published works by Opus numbers, marred only by a weird theory that Beethoven used a fixed ‘germ motive’ in all his music; we cannot find it even after he has told us what to look for.
- Schauffler, Robert Haven (1945), *Florestan: The Life and Work of Robert Schumann*, Henry Holt & Co., New York. Paperback reprint by Dover Publications, Inc., New York (1963). Provides, in a footnote, the only good clue to the truth of Schumann's crippled finger. In the Appendix the author lists 18 other biographies of Schumann, dated 1865–1931.
- Schefold, Karl (1956), *Pompeji: Zeugnisse Griechischer Malerei*, R. Piper Verlag, München. A companion volume to Pallottino (1956). Here the two-tube oboe and Lyres or Harps appear in very well preserved paintings, found in homes rather than tombs.
- Schindler, Anton F. (1860), *Biographie von Ludwig van Beethoven*, Aschendorff, Münster. English translation by C. S. Jolly, *Beethoven as I Knew Him*, University of North Carolina Press (1966);



- reprinted by W. W. Norton & Co., New York, (1972). Anton Schindler knew Beethoven well for a number of years, and one should read this for his general impressions of Beethoven. Unfortunately, his recollections were written down when he was an old man many years later, and he is demonstrably wrong on many documented facts. The editor tries his best to correct these, but there is no way of knowing how many errors remain undetected.
- Schnabel, Artur, editor (1935), *Ludwig van Beethoven, 32 Sonatas for the Pianoforte*, Memorial edition, Simon & Schuster, Inc., New York. A highly edited version, with instructions that we ignore, for reasons explained in Chapter 7.
- Schonberg, Harold C. (1963), *The Great Pianists*, Simon & Schuster, New York. Second enlarged edition (1987). Every serious musician – certainly every pianist – should be familiar with the background information in this work for its general cultural value. There are also some attempts to discover the technique of the great pianists of the past, which if successful would have been useful to piano students today. But as noted in Chapter 6, that requires additional factual knowledge of piano mechanism, physics, and physiology that Schonberg did not have.
- Schonberg, Harold C. (1970), *The Lives of the Great Composers*. W. W. Norton & Co., Inc., New York; revised Edition (1981). Short biographies of about 50 composers, from Bach to Webern. The approximate equivalent of Brockway & Weinstock (1939), which starts before Bach and ends with Stravinsky; but Schonberg has far more on 19'th and 20'th Century French composers.
- Schultz, Arnold (1936), *The Riddle of the Pianist's Finger*, Carl Fischer, Inc., New York. Very important insight, unfortunately obscured as described in Chapter 6.
- Schumann, Robert (1988), *Schumann on Music: A Selection from the Writings*, translated by H. Pleasants, Dover Publications, Inc., New York. A collection of his music criticisms dated 1831–1853. Unfortunately, reading his actual words discloses to us a very different Schumann than the civilized, urbane person, the kindly helper of talented young people, portrayed by his sympathetic biographers. Brockway & Weinstock (1939) perceived this also: “*Schumann has been called a great music critic so often that it is annoying to discover that he was nothing of the sort.*” We are appalled at the gross factual inaccuracies (wrong names, dates, places, *etc.*) and criticisms that seem not only harsh and unfair, but irrelevant to the subject. We can see a wandering of the mind, the music ostensibly under review sometimes receiving almost no mention. Perhaps this records the beginnings of his mental breakdown, which led to his death in an insane asylum three years after publication of the last article reprinted here. One puts this book down sorry for having read it.
- Sitwell, Sacheverell (1955), *Liszt*, Constable & Co., London. Paperback reprint by Dover Publications, Inc., New York (1967).
- Slobin, Mark (1982), *Tenement Songs: The Popular Music of the Jewish Immigrants*, Univ. Illinois Press, Urbana.
- Slobin, Mark (1989) *Chosen Voices: The Story of the American Cantorate*, Univ. Illinois Press, Urbana.
- Smith, Bradley (1966), *Spain: A History in Art*, Simon & Schuster, New York. Numerous color photographs of Spanish art from prehistoric cave paintings up to 1931, covering particularly the period of Arab occupation, roughly 711–1400. Shows a number of early musical instruments in great detail.
- Solum, John (1993), *The Early Flute*, Oxford University Press (Early Music Series 15). The transverse flute from 1500 to the early 19'th Century.
- Spaeth, Sigmund (1933), *The Art of Enjoying Music*, McGraw–Hill Book Co., New York. Reprinted by Garden City Publishing Co., Inc. (1942).
- Stevin, Simon (1605), *Hypomnemata Mathematica*, Leiden. The title page has the elaborate design reproduced here on p. \*\*\*, with the very concise and cryptic motto: “Wonder en is gheen wonder”.

Its meaning for him requires many more words to explain: ‘What seems wonderful to us, is no more wonderful than other things that we know instinctively and consider obvious’. Although Galileo is much better known today, Simon Stevin (1548–1620) in many ways anticipated and complemented the discoveries of Galileo (1564–1643), as explained in Mach (1988). Both were deeply interested in the operation of musical instruments and contributed fundamentally to knowledge about them.

Sumner, Wm. L. (1952), *The Organ: Its Evolution, Principles of Construction and Use*, Mac Donald, London. Later editions, 1955, 1962.

Thayer, Alexander Wheelock (1921), *The Life of Ludwig von Beethoven*, 3 Vols. Edited by H. E. Krehbiel. Translated from the 5 volume German edition of 1908.

Theophilus (1963), *On Divers Arts*, Translated from 12<sup>th</sup> Century manuscripts and edited by J. G. Harthorne & C. S. Smith, Constable & Co., Ltd., London. Paperback reprint by Dover Publications, Inc., New York (1979). Detailed descriptions of how masterpieces of metalworking – including portable organs and tuned sets of bells – were created in the early 12<sup>th</sup> Century.

Toff, Nancy E. (1979), *The Development of the Modern Flute*, Taplinger Publishing Co., New York.

Tovey, Donald Francis (undated), Commentaries in *Beethoven’s Pianoforte Sonatas*, 3 Vols., The Associated Board of The Royal Schools of Music, London. The individual sonatas with Tovey’s recommendations on performance are available also in sheet music form from the same publisher.

Tovey, Donald Francis (1976), *A Companion to Beethoven’s Pianoforte Sonatas: A Complete Book of Analysis*, The Associated Board of The Royal Schools of Music, London. Gives “complete bar-to-bar analyses of the sonatas” – an undertaking which seems to us like counting the notes.

Vail, Mark (1994), *Vintage Synthesizers*, Miller Freeman Books, Gilroy CA 95020. The first 30 years (1962–1992) with emphasis on particular ground-breaking instruments, with many photos.

van Bergeijk, W. A., Pierce, J. R. & David, E. E. (1960), *Waves and the Ear*, Doubleday Anchor Books, Garden City, N. Y. An account of experiments, largely conducted at the Bell Telephone Laboratories, in the psychology of hearing. Undoubtedly, there are some correct and important results here, but also some blatant nonsense, and we do not know how to separate them. In our view, they mix subjective and objective factors so badly that many of their procedures and conclusions just do not make sense. What does it mean to say that one sound is “twice as loud” as another; or one pitch is “twice as high” as another? The subjects of these experiments – whatever their educational level – could not possibly have understood what they were supposed to do; therefore no meaningful conclusions can be drawn from what they actually did.

Wainwright, David (1984), *Broadwood — by Appointment*, Quiller Press, England. A history of the Broadwood piano company [we understand that it may be obtained also from: John Broadwood & Sons Ltd., 6–18 Northampton Street, Essex Road, London N1 2JB, England].

West, M. L. (1992), *Ancient Greek Music*, Oxford University Press. After being accustomed to a common belief that all of this music is lost, it came as a shock to see here thirty surviving examples of it, with analysis and accounts of the place of music in Greek life.

Wever, E. G. (1949), *Theory of Hearing*, John Wiley & Sons, Inc. Paperback reprint by Dover Publications, Inc., 1970. Ernest Glen Wever (1903–1991) was Professor of Psychology at Princeton University. Here he gives the history of attempts since Helmholtz to understand the mechanism of hearing, and presents his own researches and his “volley” theory as almost the diametric opposite to the Helmholtz theory. However, his criticisms of Helmholtz reveal that he lacked Helmholtz’s understanding of basic physics; in particular (pp. 35–39) the response of resonators. He thought that every discernible pitch requires its own separate resonator, although Helmholtz already gave the cogent explanation of why this is not true. Also, adding loss to a resonator broadens its frequency response curve, but Wever draws erroneous conclusions about this because he fails (p. 194) to comprehend that it does not do this by increasing the response off resonance;

rather, it decreases the response on resonance. Apparently, he never examined the solution of the simple differential equation that governs the behavior of a resonator; today, every physicist and electrical engineer understands these things perfectly well because he has worked it all out in an undergraduate homework problem. To the best of our knowledge, we have at present no really satisfactory single theory of hearing; it seems to be rather a hodge-podge of random evolutionary development with several different mechanisms and principles, each doing part of the job. Like most evolutionary developments, it is more like something built over many years by a sequence of workmen – each forbidden to modify what the previous ones had done – instead of the design of a single comprehending intelligence.

Wheatstone, C. (1806), *Mozart's Musical Game*, London. Rules for composition of “random” music by tossing dice.

White, W. B. (1946), *Piano Tuning and Allied Arts*, 5'th edition, Tuners Supply Co., Boston. A notable advance in technical understanding over Fischer (1907), but he still does not comprehend the ‘stretched octaves’ phenomenon, although the explanation by Rayleigh had been available in the English language for some 70 years; White supposes it to be a mysterious property of the human ear, instead of a simple mechanical property of piano strings due to their stiffness against bending. Finally, 100 years after Rayleigh, Benade (1976) gave the correct explanation and calculation of the effect again.

Wier, Albert E. (1940), *The Piano: Its History, Makers, Players, and Music*, Longmans, Green & Co., London. Contrary to what the title suggests, this contains a very extensive discussion of the earliest keyboard instruments; but only a rather sketchy account of the piano, with far less information than Dolge or Loesser.

Zarlino, Gioseffo *Harmonic Institutions*; Venice (1558); translated by V. Cohen, Yale Univ. Press, New Haven, (1983).

Zarlino, Gioseffo, *Sopplementi musicali*, Venice (1588); Facsimile reprint by Broude Bros., New York (1979).