

The Rise and Fall of the Bass Clarinet in A

Keith Bowen

The bass clarinet in A was introduced by Wagner in *Lohengrin* in 1848. It was used up to 1990 in about sixty works by over twenty composers, including the *Ring* cycle, five Mahler symphonies and *Rosenkavalier*. But it last appeared in Messiaen's *Turangalila-Symphonie* (1948, revised 1990), and the instrument is generally regarded as obsolete.¹

Several publications discuss the bass clarinet, notably Rice (2009). However, only Leeson² and Joppig³ seriously discuss the 'A' instrument. Leeson suggests possibilities for its popularity: compatibility with the tonality of the soprano clarinets, the extra semitone at the bottom of the range and the sonority of the instrument. For its disappearance he posits the extension of range of the B[♭] bass, and the convenience of having only one instrument. He suggests that its history is more likely to be found in the German than in the French bass clarinet tradition. Joppig examines one aspect of this tradition: Mahler's use of the clarinet family.

The first successful⁴ bass clarinet was the bassoon form, invented by Grenser in 1793 and made in quantity for almost a century. These instruments descended to at least C and had sufficient range for all parts for the bass clarinet in A.⁵ They were made in B[♭] and C, but no examples in A are known so far. Their main use was in wind bands to provide a more powerful bass than the bassoon.⁶ For orchestral music, they were perceived to be only partially successful as bass for the clarinet family because of their different principle of construction.⁷

The modern form was invented by Desfontenelles in 1807 and improved by Buffet (1833) and Adolphe Sax (1838). It was soon favored for orchestral work, beginning with

¹ Grove (1880, 1904, 1927, 1954); Grove Music Online; Kroll (1968); Hoeprich 2008, etc.

² Leeson 1993

³ Joppig 2005

⁴ The early 'plank' forms, the 'sickle' type of Mayrhofer and the 'serpent' types of Papalini did not lead to models made in quantity by other makers, and I regard them as unsuccessful trials.

⁵ Helmholtz notation is used in this paper, with actual pitches italicized and pitch classes upright.

⁶ Rice 2009, 268 and 378

⁷ Fetis 1833 and 1834

Mercadante's *Emma d'Antiocha* [1834] for bass in C, played by Catterini on his own bassoon-type instrument and using its low C. However, Meyerbeer's solo in *Les Huguenots* [1836] for bass in B $\flat$ descending to its lowest note, written *E*, was played by Dacosta on Buffet's modern-type instrument. Notes below written *E* do not reappear until Strauss' *Tod und Verklärung* in 1889. I know only two modern-type nineteenth-century (B $\flat$) instruments with notes below *E*.⁸

To determine the tonality of an instrument, one must know both its pitch and the contemporary pitch context. Few museums allow playing of historic instruments, and measurement of the tube length is inadequate to determine the pitch, because of the uncertain effects of the bell. An improved method of calculating pitch from measurement of tone-hole positions, bore diameter and wall thickness was developed, using tone holes excluding the lowest hole and applying end corrections for the tube length.⁹ This was used to eliminate one museum instrument labeled 'Bass Clarinet in A', which turned out to be pitched in C.¹⁰

Pitch varied greatly in the nineteenth century with time and place. During the mid-1860s, a B $\flat$ clarinet in Paris would have been an A clarinet in Vienna! Sources such as Haynes (2009) and Helmholtz (1863) must be consulted to discover the local pitch convention.

A catalogue of bass clarinets in A was compiled. Just seven instruments¹¹ dating between 1880 and pre-1959¹² were found in European museums and private collections, and none elsewhere. There is historical evidence¹³ for four instruments in Germany dating between the 1850s and 1886. Seven modern 'working' instruments were found, mostly Selmers. Doubtless these lists are incomplete, but the instrument is now extremely rare.

⁸ Nechwalsky of Vienna, 1853 (US-Smithsonian 65.0613), to *D* and Kruspe of Erfurt (Leipzig Musical Instrument Museum 4479), 1870s, to *E* "

⁹ Theory from Benade (1990). The advice of Stephen Fox is gratefully acknowledged.

¹⁰ Prague CZ-CMM Ludwig and Martinka, E.135

¹¹ Plus one plank-type prototype from c. 1750, which is a dubious candidate for a bass in A.

¹² The latest of these, by Fritz Wurlitzer, would certainly still be a working instrument had it not been purchased by a museum hours ahead of a member of the Wurlitzer family!

¹³ Liszt letters to Wagner, (Wagner, Liszt and Hueffer 1897); Anton Nechwalsky Austrian patent of 22 July 1853 quoted in Dullat (2001); Franz Lachner Bavarian Court inspection entry on 30 August 1867 quoted in Tremmel (1993, 214)

The most significant document is a letter from Wagner to Esser of June 15 1861, concerning a forthcoming performance of *Tristan* in Vienna:¹⁴

Now, I should like to remind you that a bass clarinet in A must be obtained ... I know that in many places, particularly in Dresden, this instrument was used in *Lohengrin* in addition to the bass clarinet in B-flat, and what the player there could accomplish must be possible in Vienna too. They wrote to me at the time from Dresden that they had obtained this A clarinet from an instrument-maker somewhere on the Rhine¹⁵ ... Have the goodness to find out about this!

Therefore, Wagner considered that something beyond mere range was important; there would be no point in his statement if he would allow the concert *D*'' to be played on a B'' instrument.

Orchestration manuals of the nineteenth century emphasized two features of writing for clarinets. One is that it is difficult to play them fluently in 'extreme' keys; a composer should choose the clarinet according to the main key of the work. The other is that the A, B'' and C clarinets have different sound character, and composers were instructed to bear in mind the tone implications of their choice.¹⁶ For bass clarinets, composers were instructed to write as they do for the soprano clarinet but an octave lower. It would be difficult for a student to read these manuals without concluding that there is a similar difference between A and B'' bass instruments as there is between the corresponding soprano clarinets.

I have found and examined fifty-nine scores that contain the bass in A. Until roughly the 1930s, it was normal to select the bass in A when indicated by the tonality and also for its lowest note. But there are some contrary cases, showing that composers also selected on the basis of sound or key character. The most important are Liszt's *Dante Symphony*, Mahler *Symphony 4*, Dvořák's *The Water Sprite*, and the Strauss *Invalid Workshop*.

Therefore, composers would have been aware of the sound when composing. I was able to play and record one bass in A.¹⁷ My impression, and that of a musical audience on hearing short recordings of basses in B'' and A was that there was indeed a difference in sonority. Joppig (2009) draws similar conclusions.

¹⁴ Holde, Mendel and Wagner, 1941

¹⁵ The instrument-maker in question was none other than Johann Adam Heckel of Biebrich am Rhein.

¹⁶ Similar arguments have been made for soprano clarinets by Lawson 1983, Longyear 1983, and Leeson 1991

¹⁷ Shackleton Collection at the University of Edinburgh No. 5122, This recording, from the finale of Mahler 4 and the first movement of Straus' *Invalid Workshop* will be played at the presentation if selected.

Why, then, did the instrument fade from use? It was not from the availability of B'' instruments with extended range, nor from expense, nor from lack of music, though probably these all contributed. I propose that commercial reasons have played the largest part. Examination of manufacturers' catalogues dating from 1896 showed that the instrument was available from over a dozen manufacturers until the 1930s. By 1960 these had **all** either disappeared or had discontinued the bass in A. Jérôme Selmer commented:¹⁸

We never decide[d] to go [into] production in series because the investment is not valuable compared to the quantities required by our customers.

The bass clarinet has enjoyed great popularity since the mid-twentieth century, thanks largely to the rise of college music and its emphasis on wind bands.¹⁹ This led to high-volume manufacturing methods for basses in B''. Even partial mass production involves expensive tooling, with keywork made in sets of hundreds. In contrast, Buffet and Selmer have sold a bass in A but once every few years since WWII. Custom instruments have negligible effect on the profitability of a large company, and the future of the bass in A lies again with small, custom makers such as Fox and Seggelke.

Should orchestras revive this instrument? It is hard to make the case for thickly-scored ensembles, but the case for solo passages is strong. As Lawson suggests, for historically-informed performance:²⁰

In tackling the complex problem of clarinet sonorities, I believe we should follow the composer's instructions as closely as possible, even where they appear conservative or eccentric ...

Thus we approach more closely to the sound that the composer imagined.

¹⁸ email of 14 September 2009

¹⁹ Kalina 1972, 214 ff.

²⁰ Lawson (1983)

BIBLIOGRAPHY

Primary Sources (documents, articles and contemporary books)

Berlioz, Hector (1843, 1856). *De l'instrumentation*. Paris: Schonenberger. English tr. Mary Cowden Clarke. London: Novello.

Berlioz, Hector and Richard Strauss (1904). *Treatise on Instrumentation* (English tr. Theodore Front). New York: Kalmus. (1991) New York: Dover reprint.

Corder, Frederick (1896). *The orchestra and how to write for it*. London: Robert Cocks.

Evans, Edwin (1926). *Method of instrumentation: How to write for the orchestra and arrange an orchestral or band score. Vol. II: How to write for wood, brass and drums*. London: W. Reeves .

Fétis, François-Joseph (1833). Instrumens (sic) nouveau. Clarinette-Basse. *Revue musicale* 7, 18 May.

Fétis, François-Joseph (1834). Exposition des produits de l'industrie. Instrumens (sic) a vent. *Revue musicale* 8, 1 June.

Fidler, Florence G. (1921). *A handbook of orchestration*. London: K. Paul, Trench, Trubner.

Forsyth, Cecil (1914). *Orchestration*. London: Macmillan.

Gassner, F.S. (1849). *Universal-Lexicon der Tonkunst*. Stuttgart: Röhler.

Gevaert, F.A. (1863). *Traité Générale d'instrumentation*. Gand: Gevaert.

Heckel, Wilhelm (1902). *Clarinet*. US patent No. 706557, August 12 1902. Cited in Kalina (1972, 186).

Holde, Artur, Arthur Mendel and Richard Wagner (1941). Four Unknown Letters of Richard Wagner: Presented with Comment. *The Musical Quarterly*, Vol. 27, No. 2 (Apr., 1941), pp. 220-234

Jadasson, Salomon(1907). *Lehrbuch der instrumentation*. Leipzig: Breitkopf und Härtel.

Kelly's (1896, 1900, 1902, 1904, 1912). *Wolverhampton: Musical Instrument Dealers in Directory of Staffordshire*. London: Kelly's Directories.

Kling, Henri (1883). *Populäre Instrumentationslehre*. Hannover: Louis Oertel. Tr. from German by Gustav Saenger as *Modern orchestration and instrumentation*. (1905). New York: C. Fischer.

Kling, Henri (1885). *Praktische Anweisung zum Transponieren*. Hannover: Louis Oertel.

Larigot (various dates): *Bulletin de l'Association des Collectionneurs d'Instruments à Vent (Larigot, a monthly newsletter for collectors, which reprints catalogues from instrument makers and distributors)*.

Lobe, Johann Christian (1844). *Compositions-Lehre, oder umfassenden Theorie von der thematischen Arbeit und den modern instrumentation*. Weimar (reprint by Georg Olms Verlag, 1988).

Mahler, Gustav, Richard Strauss and Herta Blaukopf (1980). *Correspondence 1888-1911*. Munich: R. Piper. (1980). Trans. by Edmund Jephcott (1984). London: Faber & Faber.

Müller, Iwan (1825). *Méthode pour la nouvelle clarinette et clarinette-Alto, etc.* (First edition) Paris: Gambaro. GB-LBL R.M.16.e.6

Porteous, Richard (1854). *The Composer's Musical Atlas ... of every instrument employed in Orchestral Bands.* London 1854. GB:LBL I.592.(2.)

Prout, Ebenezer (pre 1909). *Instrumentation.* London: Novello, Ewer.

Prout, Ebenezer (1899). *The Orchestra.* London: Augener.

Ricci (1920). *L'Orchestrazione.* Milan.

Rimsky-Korsakov, Nikolay (1891). *Principles of Orchestration.* Translated by Edward Agate (1922), edited by Maximilian Steinberg, Edition Russe de Musique. (1964) New York: Dover reprint.

Wagner, Wilhelm Richard, Franz Liszt and Francis Hueffer (1897/1). *Correspondence of Wagner and Liszt.* Volume 1 1841 – 1853 (page references to Teddington: Echo Library reprint (2006)).

Wagner, Wilhelm Richard, Franz Liszt and Francis Hueffer (1897/2). *Correspondence of Wagner and Liszt.* Volume 2 1854 – 1861 (page references to original edition, New York: Charles Scribner's Sons).

Widor, Charles Marie (1906). *The technique of the modern orchestra.* Tr. from French original of 1904 by Edward Suddard. London: Joseph Williams.

Primary Sources (Scores)

The 59 scores cited are all those found that use the bass clarinet in A. The dates given after the composer are those of first publication, while the dates given after the publication details are those of the editions consulted.

Bartók, Béla (1905). *Suite No. 1, Opus 3*. Budapest: Rozsavölgyi es Tarsa (1912).
<[http://imslp.org/wiki/Suite_No.1,_Op.3_\(Bartók,_Béla\)](http://imslp.org/wiki/Suite_No.1,_Op.3_(Bartók,_Béla))> [accessed 6 September 2009].

Bartók, Béla (1907). *Suite No. 2, Opus 4*. Vienna: Universal (1920).
<[http://imslp.org/wiki/Suite_No.2,_Op.4_\(Bartók,_Béla\)](http://imslp.org/wiki/Suite_No.2,_Op.4_(Bartók,_Béla))> [accessed 5 September 2009].

Bartók, Béla (1924). *The Miraculous Mandarin*. Vienna: Universal. Critical Edition (2000).

Bax, Arnold (1913) *Spring Fire*. London: Chappell.

Bax, Arnold (1922). *Symphony No.1*. London: Murdoch, Murdoch.

Bax, Arnold (1926). *Symphony No. 2*. London: Murdoch Murdoch.

Bax, Arnold (1931). *Symphony No. 4*. London: Murdoch Murdoch.

Bax, Arnold (1932). *Symphony No. 5*. London: Murdoch Murdoch.

Bax, Arnold (1934). *Symphony No. 6*. London: Murdoch Murdoch.

Berg, Alban (1928). *Sieben Früher Lieder*. Vienna: Universal (critical edition, 1997).

Bülow, Hans von (1870). *Nirwana*. München: Jos. Aibl.

Copland, Aaron (1929). *Dance symphony for large orchestra*. New York: Cos Cob (1931).

Delius, Frederick (1899). *Paris: a Nocturne (The Song of a Great City)*. London: Universal (critical edition 1985).

Dvořák, Antonin (1896). *Der Wasserman (The Water Sprite)*. London: Eulenberg (n.d.).

Dvořák, Antonin (1896). *Scherzo Capriccioso, Opus 66*. Prague: Státní nakladatelství krásné literatury, hudby á umění (Critical Edition, 1955).

Dvořák, Antonin (1896). *The Noon Witch*. Berlin: N. Simrock.
<[http://imslp.org/wiki/The_Noon_Witch,_Op.108_\(Dvořák,_Antonin\)](http://imslp.org/wiki/The_Noon_Witch,_Op.108_(Dvořák,_Antonin))> [accessed September 6 2009].

Dvořák, Antonin (1896). *The Wild Dove*. Berlin: N. Simrock.
<[http://imslp.org/wiki/The_Wild_Dove,_Op.110_\(Dvořák,_Antonin\)](http://imslp.org/wiki/The_Wild_Dove,_Op.110_(Dvořák,_Antonin))> [accessed 6 September 2009].

Elgar, Edward (1901). *Pomp and Circumstance Marches Nos. 1 & 2*. London: Eulenberg (Critical Edition, 2008).

Ireland, John (1933). *Symphonic Rhapsody Mai-Dun*. London: Augener.

Liszt, Franz (1859). *Eine Symphonie zu Dante's Divina Commedia*. Leipzig: Breitkopf und Härtel.

Mahler, Gustav (1892). *Symphony no. 4*. Vienna: Universal. Dover reprint of 1st edition of 1902, 1989.

Mahler, Gustav (1902). *Symphony no. 5*. Leipzig: C.F. Peters, 1904 (1st edition).
<[http://imslp.org/wiki/Symphony_No.5_\(Mahler,_Gustav\)](http://imslp.org/wiki/Symphony_No.5_(Mahler,_Gustav))> [accessed 20 January 2009].

Mahler, Gustav (1904). *Symphony no. 6*. Leipzig: C.F. Kahnt Nachfolger (1906 - 1st edition).
<[http://imslp.org/wiki/Symphony_No.6_\(Mahler,_Gustav\)](http://imslp.org/wiki/Symphony_No.6_(Mahler,_Gustav))> [accessed 6 March 2009].

Mahler, Gustav (1905). *Symphony no. 7*. London: Eulenberg (1962) (1st edition was 1904).

Mahler, Gustav (1907). *Symphony no. 8*. Vienna: Universal Edition (1911 - 1st edition).
<[http://imslp.org/wiki/Symphony_No.8_\(Mahler,_Gustav\)](http://imslp.org/wiki/Symphony_No.8_(Mahler,_Gustav))> [accessed 6 March 2009].

Mahler, Gustav (1909). *Das Lied von der Erde*. Vienna: Universal Edition, (1912). Dover reprint of 1st edition, 1988.

Messiaen, Olivier (1948 rev. 1990). *Turangalîla-Symphony*. Paris: Durand.

Puccini, Giacomo (1893). *Manon Lescaut*. Milan: Ricordi (1915). Ricordi reprint (n.d.).

Puccini, Giacomo (1896). *La Bohème*. Milan: Ricordi (edition of 1920).
<[http://imslp.org/wiki/La_Bohème_\(Puccini,_Giacomo\)](http://imslp.org/wiki/La_Bohème_(Puccini,_Giacomo))> [accessed 6 September 2009].

Puccini, Giacomo (1900). *Tosca*. Autograph facsimile, GB-Ob Mus. 22 a. 2.

Rachmaninoff, Sergei (1907). *Symphony No. 2 Opus 27*. Moscow: Muzgiz (1960).
<[http://imslp.org/wiki/Symphony_No.2,_Op.27_\(Rachmaninoff,_Sergei\)](http://imslp.org/wiki/Symphony_No.2,_Op.27_(Rachmaninoff,_Sergei))> [accessed 6 March 2009];
also London: Boosey & Hawkes (1947).

Rachmaninoff, Sergei (1936 rev. 1938). *Symphony No. 3 Opus 44*. New York: Belwin-Mills (1972).

Rachmaninoff, Sergei (1940). *Symphonic Dances Op. 45*. New York: Charles Foley (1941). edition of Belwin-Mills (1970).

Ravel, Maurice (1920). *La Valse*. Paris: Durand (1921).
<[http://imslp.org/wiki/La_valse_\(Ravel,_Maurice\)](http://imslp.org/wiki/La_valse_(Ravel,_Maurice))> [accessed 20 January 2009].

Ravel, Maurice (1930). *Piano Concerto for the left hand*. Paris: Durand (1931).

Ravel, Maurice (1925). *L'enfant et les sortilèges*. Paris: Durand.

Ravel, Maurice – Mussorgsky, Modest (1922). *Pictures at an exhibition*. London: Eulenberg (critical edition 1994).

Respighi, Ottorino (1916). *Fontane di Roma*. Milan: Ricordi (1918).

Rimsky-Korsakov (1872). *The Maid of Pskov (Overture)*. St. Petersburg: Bessel & Cie., n.d. (ca.1897). <[http://imslp.org/wiki/The_Maid_of_Pskov_\(Rimsky-Korsakov,_Nikolai\)](http://imslp.org/wiki/The_Maid_of_Pskov_(Rimsky-Korsakov,_Nikolai))> [accessed 19 September 2009].

Rimsky-Korsakov (1872). *Mlada (suite)*. St. Petersburg: Bessel & Cie., n.d.(ca.1897). <[http://imslp.org/wiki/Mlada_\(suite\)_\(Rimsky-Korsakov,_Nikolai\)](http://imslp.org/wiki/Mlada_(suite)_(Rimsky-Korsakov,_Nikolai))> [accessed 18 September 2009]

Rimsky-Korsakov (1901). *The legend of Tsar Saltan*. Petrograd: Bessel. Cited in Rimsky-Korsakov (1891, 115)

Rimsky-Korsakov (1903). *The legend of the invisible city of Kitesh and the maiden Fevroniya*. Leipzig: Belaëff (1905). Cited in Rimsky-Korsakov (1891, 47).

Rimsky-Korsakov (1907). *The Golden Cockerel*. Moscow: P. Jurgenson, n.d.(c. 1908). Reprint — New York: Edwin F. Kalmus, n.d. (after 1933). <[http://imslp.org/wiki/The_Golden_Cockerel_\(Rimsky-Korsakov,_Nikolai\)](http://imslp.org/wiki/The_Golden_Cockerel_(Rimsky-Korsakov,_Nikolai))> [accessed 18 September 2009].

Schoenberg, Arnold (1911). *Pelleas und Melisande*. Vienna: Universal.

Schoenberg, Arnold (1912). *Gurre-Lieder*. Vienna: Universal.

Schoenberg, Arnold (1912). *Kammersymphonie*. Vienna: Universal.

Strauss, Richard (1916). *Rosenkavalier*. Berlin: Adolph Fürstner.

Strauss, Richard (1942). *Sonatine für Bläser*. London: Boosey and Hawkes.

Stravinsky, Igor (1913). *Le sacré du printemps*. Berlin: Edition Russe (1921).

Sullivan, Arthur (1886). *The Golden Legend*. London: Novello, Ewer & Co.

Tchaikovsky, Petr Illyich (1892). *Nutcracker Ballet*. New York: Broude (1951).

Tchaikovsky, Petr Illyich (1885). *Manfred*. Moscow: Muzgiz (1949). <[http://imslp.org/wiki/Manfred_Symphony,_Op.58_\(Tchaikovsky,_Pyotr_Ilyich\)](http://imslp.org/wiki/Manfred_Symphony,_Op.58_(Tchaikovsky,_Pyotr_Ilyich))> [accessed 19 September 2009]

Tchaikovsky, Petr Illyich (1868). *The Voyevoda (symphonic ballad)*. Leipzig: M.P. Belaieff No.378, n.d.(1897). <[http://imslp.org/wiki/The_Voyevoda_\(symphonic_ballad\),_Op.78_\(Tchaikovsky,_Pyotr_Ilyich\)](http://imslp.org/wiki/The_Voyevoda_(symphonic_ballad),_Op.78_(Tchaikovsky,_Pyotr_Ilyich))> [accessed 19 September 2009].

Verdi, Guiseppe (1887). *Otello*. Milan: Ricordi (1913).

Wagner, Richard (1848). *Lohengrin*. Leipzig: Breitkopf & Härtel, n.d. (1887). Dover reprint (n.d.). <[http://imslp.org/wiki/Lohengrin,_WWV75_\(Wagner,_Richard\)](http://imslp.org/wiki/Lohengrin,_WWV75_(Wagner,_Richard))> [accessed 20 January 2009].

Wagner, Richard (1856), *Die Walküre*. London: Eulenberg (n.d.).

Wagner, Richard (1859), *Tristan und Isolde*. Leipzig: C.F. Peters, (ca.1912). Reprint — New York: Broude Brothers, n.d. (ca.1950).
<[http://imslp.org/wiki/Tristan_und_Isolde,_WWV90_\(Wagner,_Richard\)](http://imslp.org/wiki/Tristan_und_Isolde,_WWV90_(Wagner,_Richard))> [accessed 5 September 2009]. Also Wiesbaden: Breitkopf und Härtel (n.d.).

Wagner, Richard (1862). *Das Rheingold*. Mainz: B. Schott's Söhne, n.d.(1873). Dover reprint (1985).
<[http://imslp.org/wiki/Das_Rheingold,_WWV86A_\(Wagner,_Richard\)](http://imslp.org/wiki/Das_Rheingold,_WWV86A_(Wagner,_Richard))> [accessed 5 September 2009].

Wagner, Richard (1869). *Siegfried*. London: Eulenberg (n.d.).

Wagner, Richard (1874). *Gotterdammerung*. Mainz: Schott's Söhne (1877). Dover reprint (1982).

Wagner, Richard (1881). *Parsifal*. Leipzig: Edition Peters, n.d.(ca.1920). Reprint - New York: Broude Brothers. <[http://imslp.org/wiki/Parsifal,_WWV111_\(Wagner,_Richard\)](http://imslp.org/wiki/Parsifal,_WWV111_(Wagner,_Richard))> [accessed 9 September 2009]. Also London: Eulenberg (n.d.).

Secondary Sources

- Aber, Thomas Carr (1990). *A history of the bass clarinet as an orchestral and solo instrument in the nineteenth and early twentieth centuries and an annotated, chronological list of solo repertoire for the bass clarinet from before 1945*. Kansas City: University of Missouri D.M.A. Thesis.
- Adams, Peter H (2009). *Music and Musical Research from Peter H. Adams*. <<http://peterhadams.com>> [accessed 21 July 2009].
- Anonymous (1985). *Opera in Prague*. Official trilingual Czechoslovak State publication. Prague: Panton.
- Baily, Leslie (1952). *The Gilbert and Sullivan Book*. London.
- Baines, Anthony (1967). *Woodwind Instruments and their History*. Toronto: General Publishing. New York: Dover reprint (1991).
- Bär, Frank P. (2003). *Verzeichnis der Europäischen Musikinstrumente in Germanischen Nationalmuseum Nürnberg. Band 4: Klarinetten normaler and höherer Stimmlage mit 2 bis 9 Klappen*. Wilhelmshaven: Florian Noetzel Verlag.
- Bär, Frank P. (2004). *Verzeichnis der Europäischen Musikinstrumente in Germanischen Nationalmuseum Nürnberg. Band 5: Klarinetten normaler and höherer Stimmlage mit 10 und mehr Klappen*. Wilhelmshaven: Florian Noetzel Verlag.
- Bär, Frank P. (2006). *Verzeichnis der Europäischen Musikinstrumente in Germanischen Nationalmuseum Nürnberg. Band 6: Liebesklarinetten, Bassethörner, Bassklarinetten, Metallklarinetten*. Wilhelmshaven: Florian Noetzel Verlag.
- Benade, Arthur H. (1990). *Fundamentals of Musical Acoustics*. New York: Dover. Corrected reprint of 1976 edition, New York: Oxford University Press.
- Blume, Friedrich (1955). *Die Musik in Geschichte und Gegenwart*. Kassel: Bärenreiter
- Brymer, Jack (1976). *Clarinet*. London: MacDonald and Jane's.
- Carson, Adam (1925). *History of Orchestration*. London: Kegan Paul, Trench Tubner. New York: Dover reprint (1964).
- Düllat, Günter (2001). *Klarinetten: Grundzüge ihrer Entwicklung : Systeme, Modelle, Patente : verwandte Instrumente : biographische Skizzen ausgewählter Klarinettenbauer (Fachbuchreihe Das Musikinstrument)*. E. Bochinsky
- Eliason, Robert E. (1977). Oboe, Bassoons, and Bass Clarinets, Made by Hartford Connecticut, Makers before 1815. *The Galpin Society Journal*, Vol. 30 (May), pp. 43-51
- Finscher, Ludwig (1996). *Die Musik in Geschichte und Gegenwart*. Kassel: Bärenreiter
- Fox, Stephen (2009). *Mathematics*. <<http://www.sfoxclarinets.com/Mathematics.html>> [accessed 4 June 2009].
- Grove, George (1880). *A Dictionary of Music and Musicians*. London: MacMillan.

- Grove, George (1904). *A Dictionary of Music and Musicians. Second Edition*. London: MacMillan.
- Grove, George (1927). *A Dictionary of Music and Musicians. Third Edition*. London: MacMillan.
- Grove, George (1954). *A Dictionary of Music and Musicians. Fifth Edition*. London: MacMillan.
- Haynes, Bruce (2002). *A History of Performing Pitch: The Story of "A"*. Lanham, MD and Oxford: The Scarecrow Press.
- Helmholtz, Hermann von (1863). *Tonempfindungen*. Tr. *On the sensations of tone*. (1954) New York: Dover reprint.
- Hoeprich, Eric (2008). *The Clarinet*. New Haven and London: Yale University Press.
- Hughes, Gervase (1960). *The Music of Arthur Sullivan*. New York: St. Martin's Press.
- Hyer, Brian (2009). *Key (i)*. *Grove Music Online. Oxford Music Online*. 12 September 2009.
- Joppig, Gunter (2007). *"Schalltrichter auf!" Die Klarinettenfamilie im Werk Gustav Mahlers in: Musikinstrumente und Musizierpraxis zur Zeit Gustav Mahlers*. Vienna: Böhlau Verlag pp. 146 - 163.
- Kalina, David (1972). *The Structural Development of the Bass Clarinet*. New York: Columbia University Ed. D. thesis.
- Kalker, Johan van (1997). *Die Geschichte der Klarinetten: Eine Dokumentation*. n.p. Verlag Textilwerkstatt Oberems.
- Kochnitzky, L. (1949). *Adolphe Sax and his Saxophone*. New York: Belgian Information Center.
- Koury, Daniel James (1981). *The orchestra in the nineteenth century: physical aspects of its performance practice. (volumes 1-3)*. Boston: Boston University Ph.D. thesis.
- Kroll, Oskar (1968). *The Clarinet*. Batsford. Tr. by Hilda Morris, ed. Anthony Baines.
- Lawson, Colin (1983). The Authentic Clarinet: Tone and Tonality. *The Musical Times, Vol. 124, No. 1684 (Jun.), pp. 357-358*
- Leeson, Daniel N. (1993). Some remarks on the bass clarinet in A. *The Clarinet, XXI/1*, 52-56.
- Leeson, Daniel N. (1991). Mozart and the Clarinet in B-Natural - An Essay about Clarinet Substitution in Music of the Classical and Early Romantic Periods. *The Clarinet XIX/1*, 50-52.
- Leeson, Daniel N. and Robert Levin (1998). Mozart's deliberate use of incorrect key signatures. *Jahrbuch der Akademie für Mozart-Forschung der Internationalen Stiftung Mozarteum Salzburg (Bärenreiter)*, 139-152.
- Lockspeiser, Edward (1969). The Berlioz-Strauss treatise on instrumentation. *Music and Letters*, 1969; 1: 37 - 44.

Longyear, R.M. (1983). Clarinet Sonorities in Early Romantic Music. *The Musical Times*, Vol. 124, No. 1682 (April), pp. 224-226.

Millington, Barry et al. (2009). *Wagner*. *Grove Music Online*. *Oxford Music Online*. August 23, 2009.

Myers, Arnold (Ed.) (2007). *Catalogue of the Sir Nicholas Shackleton Collection*. Edinburgh: Edinburgh University Collection of Historic Musical Instruments.

Newman, Ernest (1931), *Fact and Fiction About Richard Wagner*. Cassell, London.

Niloff, Artur (pseudonym of Heinrich Schenker) (1908). *Instrumenten-Tabelle*. Vienna: Universal (cited in Joppig 2005 p154 note 22).

Redlich, Hans F. (1966). *Mahler, Symphony No. 4*. London: Eulenberg.

Rendall, F. Geoffrey (1954). *The Clarinet: Some Notes on its History and Construction*. London: Williams and Norgate. Third edition revised by Philip Bate (1971). London: Ernest Benn.

Rice, Albert R (2009). *From the Clarinet D'amour to the Contra Bass: A History of the Large Size Clarinets, 1740-1860*. OUP USA.

Rice, Albert R. (2003). *The Clarinet in the Classical Period*. Oxford: Oxford University Press.

Rice, Albert R. (1992). *The Baroque Clarinet*. Oxford: Clarendon Press.

Riehm, Diethard (ed.) (1996). Artikel *Klarinetten*. Abschnitt II. In *Musik in Geschichte und Gegenwart* (ed. Ludwig Finscher). Sachteil. Bd. 5.2. neubearbeitete Auflage. Kassel: Bärenreiter, pp. 177 – 195.

Roeckle, Charles Albert (1966). *The bass clarinet – an historical survey*. MMus Dissertation, University of Texas.

Schreiber, O. (1938), *Orchester und Orchestrapraxis in Deutschland zwischen 1780 und 1850*. Phil. Diss. Berlin. Berlin: Triltich & Huther; reprinted by Georg Olms Verlag, Hildesheim 1978.

Schubart, Christian Friedrich Daniel (1806). *Ideen zu einer Aesthetik der Tonkunst*. Vienna: Degen.

Shackleton, Nicholas J. (2009). *Bass Clarinet*. *Grove Music Online*. *Oxford Music Online*. 3 March 2009.

van der Meer, John Henry (1987). *The Typology and History of the Bass Clarinet*, J. Amer. Mus. Inst. Soc. 13, p. 65-88.

Silverman, Richard S. (1975). Longfellow, Liszt and Sullivan. *The Musical Review* 36, 253-260.

Taylor, Benedict (2002). *Sullivan's Golden Legend – a preliminary study*. Online journal: <http://www.sullivan-forschung.de/GL8d.pdf> consulted 23 August 2009.

Tremmel, Erich (1993). *Blasinstrumentenbau im 19. Jahrhundert in Südbayern*. Augsburg: Wißner.

Waterhouse, William (1993). *The New Langwill Index: A Dictionary of Musical Wind Instrument Makers and Inventors*. London: Tony Bingham.

Young, Phillip T. (1980). *The look of music: rare musical instruments, 1500 – 1900*. Vancouver: Vancouver Museums & Planetarium Association.

Young, Phillip T. (1993). *4500 Woodwind instruments*. London: Tony Bingham.