Figure 1
Keyed ophicleide in C by Gautrot aîné, Paris, mid-19th century, GB.E.u 4287
Photo: Raymond Parks

ARNOLD MYERS

The Taxonomy of the Valved Ophicleide

Ophicleide Terminology

When the valve was invented it was at first incorporated into existing instruments, primarily the french horn, the trumpet and the trombone. Valved versions of these instruments sounded recognisably like their natural or slide predecessors. Later, new instruments such as the cornet and the tuba were invented. In the 1830s instruments were introduced in France with the name *ophicléïde à pistons*, and in German-speaking countries *Ventil-ophikleide*. The use of these terms for a valved ophicleide suggested an instrument which could serve the same functions as the keyed ophicleide and give similar results, but the reality was rather different.

The keyed ophicleide was invented by Halary in Paris in 1817, and rapidly became widely used as a band, orchestral and solo instrument. It was a very successful invention: large numbers were made and used, and the design, as in Figure 1, never required any significant change. Later, in the middle of the 19th century, its roles were gradually taken over by valved instruments. For solo work it was largely replaced by the bass saxhorn or euphonium, and its role in providing the bass line in a wind band was assumed by various forms of valved ophicleide, bombardon or tuba. Herbert Heyde has discussed in detail the confused 19th-century usage of the terms *bombardon* and *ophicleide* and the development of early valve bass instruments in German-speaking lands.[1]

Both historical and present-day uses of the term *valved ophicleide* have denoted a valved instrument with similar form and similar compass to those of the keyed ophicleide. Over

1 Herbert Heyde: »The Bass Horn and Upright Serpent in Germany, Part 3: Bombardon and Ophicleide: Sound and Musical Use of the Bass Horn, Serpent, and Ophicleide«, in: *Historic Brass Society Journal* *29*, 2017, pp. 13–45.

Figure 2 Valved ophicleide in 13-ft E♭ by Georges Chrétien Bachmann, Brussels, a. 1842, B.B.mim 1282
Photo: CC BY–RMAH / © Image Studio RMAH Brussels

Figure 3 Valved ophicleide in 12-ft F by August Beyde, Vienna, c. 1840, B.B.mim 1280
Photo: CC BY–RMAH / © Image Studio RMAH Brussels

twenty valved ophicleides survive in museum collections. Figures 2 and 3 show typical valved ophicleides. The configuration and overall shape with the U-bend at the foot correspond to that of the keyed ophicleide. In some cases, the valves are mounted on a detachable crook, echoing the crook of the keyed ophicleide. Many valved ophicleides have double-piston valves, but other types of valve (Stölzel, rotary) were also used. In all these designs there is a long section of relatively narrow tubing between the mouthpiece receiver and the valves, a result of keeping the general layout of the keyed ophicleide.

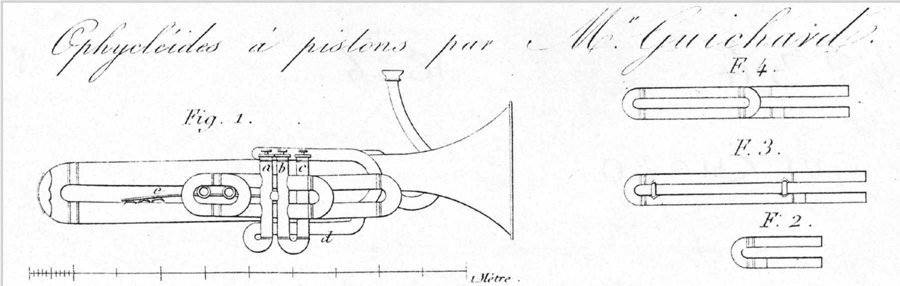


Figure 4 Guichard's patent drawing of 1836, INPI

We can compare these with Jean-Auguste Guichard's patent of 1836 for a »valved ophicleide« in E♭ with tuning-slide crooks down to B♭ (see Figure 4).[2] No surviving instrument is known which matches exactly the Guichard patent.

There are three inescapable differences between valved ophicleides and keyed ophicleides:

Keyed	**Valved**
The keyed ophicleide has a range down to its lowest pedal note, with all keys closed: B_1 or A_1 (for ophicleides in C and B♭ respectively).	The pedal notes of valved instruments are not usually used, so the valved ophicleide's lowest note is the second partial of the instrument with all valves operated.
The keyed ophicleide has a 9-foot or 10-foot tube which is shortened as the keys (apart from the first) are operated.	The three-valved ophicleide, to have the same range (down to B_1 or A_1), has to have a 12-foot or 13-foot tube (F or E♭) which is lengthened as valves are operated.
The keyed ophicleide has a bore profile which expands throughout.	The valved ophicleide has a bore profile which necessarily has a considerable length of near-cylindrical tube through the valves.

The different bore profile is the factor which has the greatest effect on timbre. Figure 5 shows the profile of a typical keyed ophicleide. The initial small dip in the bore is the taper of the mouthpiece receiver. The first two short sections of cylindrical tubing are the tuning-slide mounted in the crook, the later section of cylindrical tubing is where the crook joins the body of the instrument. The bore profile is as close to conical as it is in any chromatic instrument (a pure cone would be a straight line on this graph).

The valved ophicleide, on the other hand, has a compromised bore profile (see Figure 6). Here there is a narrow and approximately cylindrical section of tube through the valves and tuning-slide which extends over one metre, following which the bore expands gently at first.

2 Jean-Auguste Guichard: Ophicléïde à pistons. French patent No. 4936, 14.6.1836, Institut national de la propriété industrielle (INPI), Courbevoie, France.

Figure 5 Bore profile of keyed ophicleide in C by Gautrot aîné, Paris, mid-19th century, GB.E.u 4287

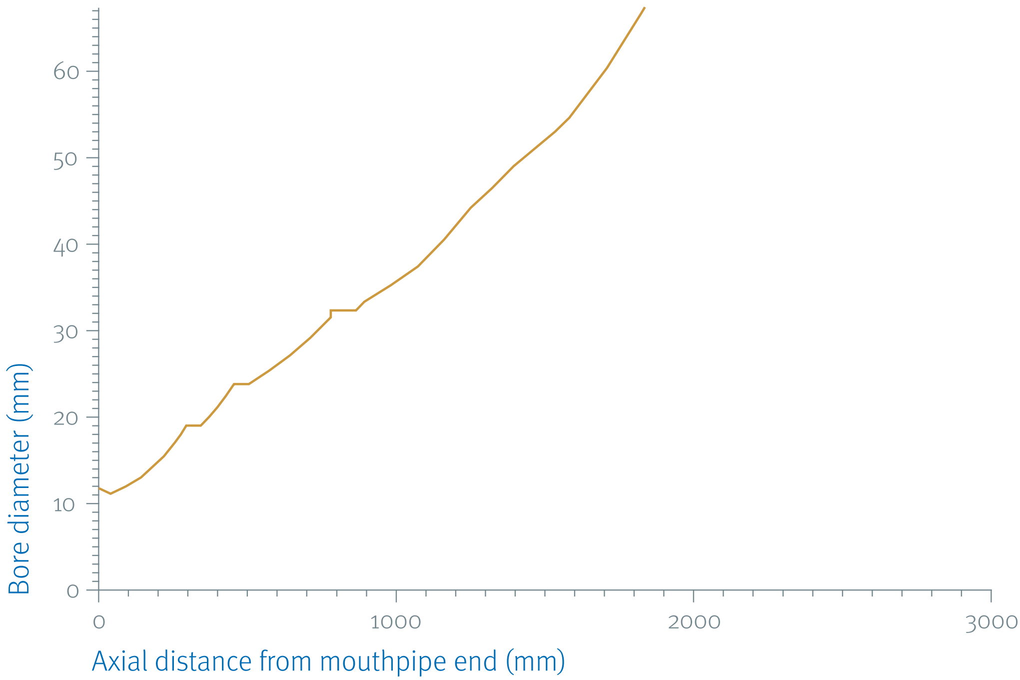


Figure 6 Bore profile of valved ophicleide in F by August Heinrich Rott, Vienna, mid-19th century, CH.BE.km 1221

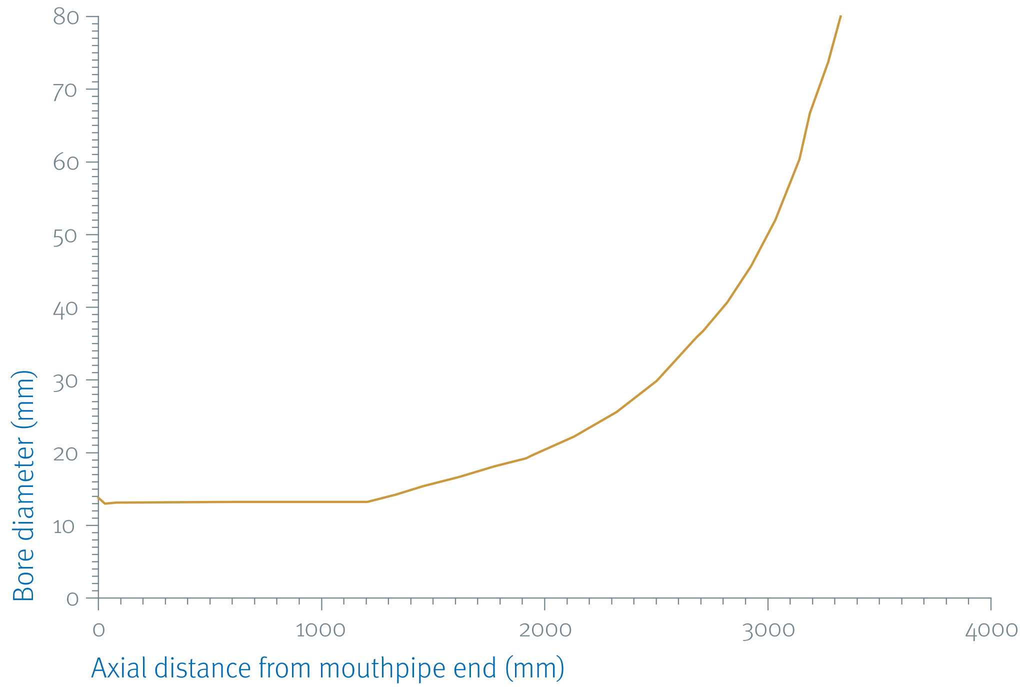
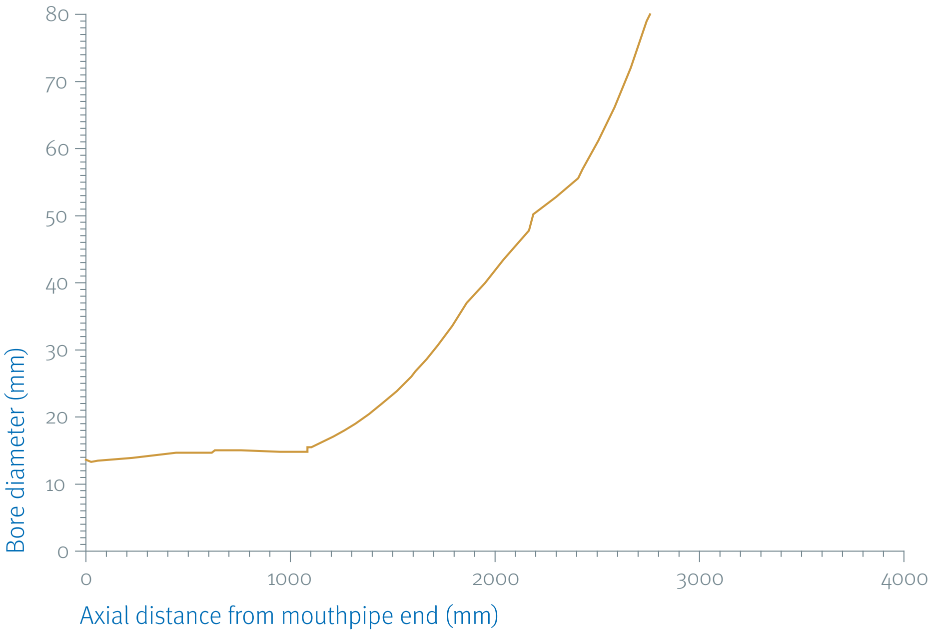


Figure 7 Bore profile of valved ophicleide in F, Italy, mid-19th century, D.LE.u 1765



Some other valved ophicleides adopted in part the conical bore shape of the keyed ophicleide: in the anonymous Italian valved ophicleide (Figure 7) the valves and tuning-slide impose a stretch of narrow tubing over one metre, following which the bore expands conically. What can be observed in all valved ophicleides is that there is very little bore expansion in the first metre of tubing. This is a marked contrast with keyed ophicleides, and is a consequence of copying in a valved instrument the configuration and playing position of the keyed ophicleide.

Spectral Enrichment and Timbre

The phenomenon of spectral enrichment is an important determinant of the timbre of a brass instrument, and is consequence of the non-linear propagation of sound through a tube.[3] At moderate, and even more at high dynamics, sound waves travelling from the mouthpiece through the instrument tubing arrive at the bell with some of their energy converted from low frequencies to high. This phenomenon is due to non-linear propagation of sound occurring when the acoustic pressure variation is high enough to be non-negligible compared with atmospheric pressure.

3 Arnold Myers: Art. »Timbre«, in: *The Cambridge Encyclopedia of Brass Instruments*, ed. by Trevor Herbert / Arnold Myers / John Wallace, Cambridge 2018, pp. 401–402; Murray Campbell / Joël Gilbert / Arnold Myers: *The Science of Brass Instruments*, Cham 2021.

A typical brass instrument bell preferentially radiates high-frequency sound components, and the timbre of a sound rich in high-frequency components is perceived as bright. The extent to which an instrument engenders non-linear sound propagation and produces a spectrum enriched with high-frequency components depends on the bore profile – it is greater with relatively narrow tubing. The reason why a trombone sounds brighter than a euphonium is that the trombone has a relatively narrow bore over much of its length which gives rise to significant spectral enrichment of sound inside the instrument, while in the relatively wide bore of a euphonium the sound energy is distributed over a greater cross-sectional area for most of its length and the acoustic pressure variation is much lower. The euphonium can be played quite loudly without the sound developing a brassy »edge« or *cuivré* effect. The ophicleide and the serpent are the least brassy of brasswind instruments. The spectral enrichment effect depends on the geometric design of the instrument which is determined by its maker and is largely independent of the choice of mouthpiece, the playing technique or the room acoustics. It is impossible to play a trombone loudly without sounding brassy, though (other things being equal) a wide bore trombone sounds less brassy than a narrow-bore trombone at the same acoustic power output.

To quantify the brightening effect and to make comparisons between instruments of differing bore profiles, a spectral enrichment parameter E has been developed which can be calculated from physical measurements of instruments using simple measuring tools.[4] Measurements taken at typically twenty to thirty points distributed over the length of the tube of an instrument (preferably with more precision for the narrower parts of the bore) allow a good approximation to the value of the dimensionless parameter E which is given by the sum

$$E \approx \sum_{1}^{N} \frac{Cl_n}{2L'} \left(\frac{1}{D_n} + \frac{1}{D_{n+1}} \right)$$

where the sounding length of the instrument is divided into N sections of arbitrary length starting at 20 mm from the mouthpiece receiver, l_n is the length of the n^{th} section D_n is the bore diameter at the start of the n^{th} section and L' is the sounding length less 20 mm. The first 20 mm of the instrument is excluded because it is the typical depth of insertion of a mouthpiece and does not form part of the acoustical bore. The diameter at the bell is D_{n+1}. For consistency in comparisons, measurements are taken with no valves operated (or with all tone-holes covered) and the tuning-slide fully inserted. The constant C is conveniently taken to be 88 mm. Division by L' is carried out so that the predicted enrichment in long and short instru-

4 Murray Campbell / Arnold Myers: »The Contributions of Joël Gilbert to the Understanding of ›Brassiness‹«, in: *Proceedings, Forum Acusticum 2023. 10th Convention of the European Acoustics Association*, Turin, Italy, 11–15 September 2023, https://appfa2023.silsystem.solutions/atti/000481.pdf [20.9.2024].

ments relates to notes in their normal playing registers. (The spectral enrichment parameter is a refinement of the »brassiness potential« parameter previously used in various publications, incorporating the absolute bore size as a factor.) The present author has measured over 2000 instruments in museums and other collections, and has calculated the value of *E* for most of them to inform a comprehensive brasswind taxonomy. Here are some typical instruments in 8-ft C and 9-ft B♭ with their *E* values:

	Instrument, Nominal Pitch	**Maker, Place, Date**	***E***
GB.E.u 1156	Serpent, 8-ft C	Haye, London, c. 1825	2.36
GB.E.u 4287	Ophicleide, keyed for B	Pierre Louis Gautrot, Paris, c. 1860	2.60
GB.E.u 3412	Kaiserbaryton, 9-ft B♭	Červený, Königgrätz, c. 1900	3.25
GB.E.u 2771	Euphonium, 9-ft B♭	Joseph Higham, Manchester, c. 1886	3.50
GB.E.u 4470	Bass saxhorn, 9-ft B♭	Adolphe Sax, Paris, 1864	3.80
GB.E.u 2854	Wagner tuba, 9-ft B♭	Alexander, Mainz, c. 1930	4.51
GB.E.u 6423	Baritone saxhorn, 9-ft B♭	Adolphe Sax, Paris, 1866	4.56
GB.E.u 4045	Bass trumpet, 9-ft B♭	Robert Schopper, Leipzig, a. 1910	4.95
GB.O.ub 660	Clavicor, 8-ft C	Guichard, Paris, c. 1850	5.17
GB.E.u 5877	Bass trombone, 9-ft B♭	Michael Rath, Huddersfield, 1999	5.25
GB.E.u 3207	Tenor trombone, 9-ft B♭	Robert Schopper, Leipzig, c. 1910	5.65
GB.E.u 1804	Double horn, B♭ side	Alexander, Mainz, c. 1950	6.19
GB.L.msm 164	Tenor fanfare trumpet in B♭	Boosey & Hawkes, London, 1938	6.24
GB.E.u 3747	Tenor trombone, 9-ft B♭	Antoine Courtois, Paris, 1865	6.68
GB.E.u 3205	Tenor trombone, 9-ft B♭	Joseph Huschauer, Wien, 1794	7.11
F.NI.pl 111	Tenor sackbut, 10-ft A	Anton Schnitzer II, Nürnberg, 1581	7.45

Unsurprisingly, serpents and ophicleides have low spectral enrichment values, while narrow-bore trombones and sackbuts have high spectral enrichment values. One can play a trombone in a *cuivré* manner, but not an ophicleide. On the scale from zero to ten, the spectral enrichment parameter values of typical instruments are:

Instruments	**Spectral enrichment parameter**
Ophicleides	2.45 to 2.72
Euphoniums	3.21 to 4.10
Baritones (narrower bore saxhorns)	4.05 to 5.23
Modern bass trombones	4.95 to 5.35
Narrow bore slide trombones	6.27 to 7.19
Sackbuts	7.20 to 8.18

For larger instruments, those in 12-ft F and 13-ft E♭, the spread in the values of *E* is from tubas to bass trombones and french horns:

	Instrument, Nominal Pitch	**Maker, Place, Date**	***E***
GB.E.u 4278	Tuba, 13-ft E♭	Boosey & Hawkes, London, 1978	2.56
GB.E.u 4091	Bass Tuba, 12-ft F	Zetsche, Berlin, mid-19th century	3.35
A.W.km 1032	Bombardon, 12-ft F	Ignatz Lorenz, Linz, c. 1850	3.61
GB.L.hm 2004.1183	Contrabass saxhorn in E♭	Adolphe Sax, Paris, 1854	3.79
GB.E.u 581	Bass trombone, 11-ft G	Antoine Courtois, Paris, c. 1869	5.95
D.M.bn MU289	Bass sackbut, 13-ft E♭	Isaac Ehe, Nürnberg, 1616	6.65
GB.L.hm 2004.820	French horn, 12-ft F	Hawkes & Son, London, 1930	6.82
I.F.ga 184	Bass trombone, 12-ft F	Joseph Huschauer, Wien, 1813	6.94
GB.E.u 2492	Natural horn, 14-ft D	Nicholas Winkings, London, c. 1760	7.36
F.P.kampmann 181	Vienna horn, 12-ft F	Produktiv Genossenschaft, Wien, early 20th century	7.41

Valved ophicleides in 12-ft F or 13-ft E♭ have values of the spectral enrichment parameter *E* in the range 3.11 to 4.53 with a mean value of 3.70. These figures are derived from physical measurements of the bore profiles of the instruments in museum collections listed in the Appendix.

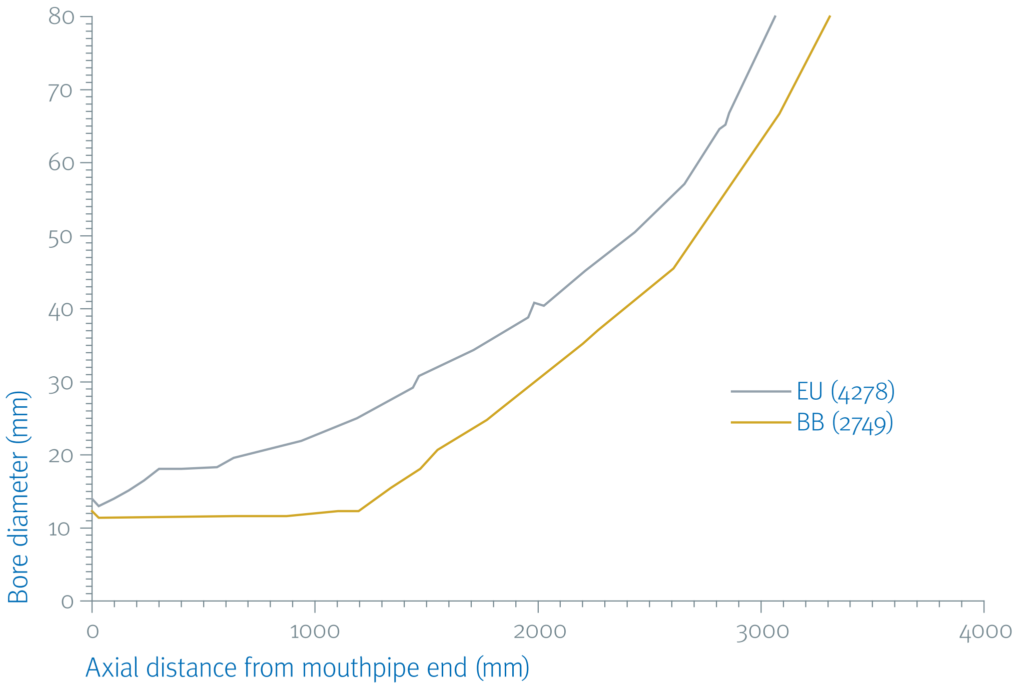
We can contrast valved ophicleides with modern tubas which have values of spectral enrichment parameter *E* in the range 2.29 to 3.11. Figure 8 shows a modern E♭ tuba whose bore profile can be compared with that of a valved ophicleide (Figure 9).

Figure 8 Tuba in 13-ft E♭ by Boosey & Hawkes, London, 1978, GB.E.u 4278. Photo: Raymond Parks

Note that the modern Boosey & Hawkes tuba has a much shorter leadpipe and a wider bore through the valves (from 315 mm to 635 mm from the mouthpipe end). This gives it a spectral enrichment of 2.56 whereas for the valved ophicleide in the Basel museum *E* = 4.29. The differences between valved and keyed ophicleides were observed at the time of their use. In 1843 Joseph Caussinus wrote »L'Ophicléïde à piston est généralement moins juste que l'autre«[5] comparing it unfavourably with the keyed ophicleide. Timbre is, of course, not the only attribute in which keyed ophicleides and their valved replacements differ: intonation control and playability are also of importance.[6]

5 Joseph Caussinus: *Solfège-méthode pour l'ophicléïde basse*, Paris 1843, vol. 1, p. 5. Cited in Clifford Bevan: *The Tuba Family*, 2nd edition, Winchester 2000, p. 219. **6** Arnold Myers / Seona Bromage / D. Murray Campbell: »Acoustical Factors in the Demise of the Ophicleide«, in: *Proceedings, International Symposium on Musical Acoustics, Nara, Japan, 31 March–3 April 2004*, CD-ROM, Nara, Japan: The Acoustical Society of Japan, 2004.

Figure 9 Bore profile of valved ophicleide in 12-ft F by Schuster, Karlsruhe, mid-19th century, CH.B.hm 2749, and tuba in 13-ft E♭ by Boosey & Hawkes, London, 1978, GB.E.u 4278



Other Brass Basses

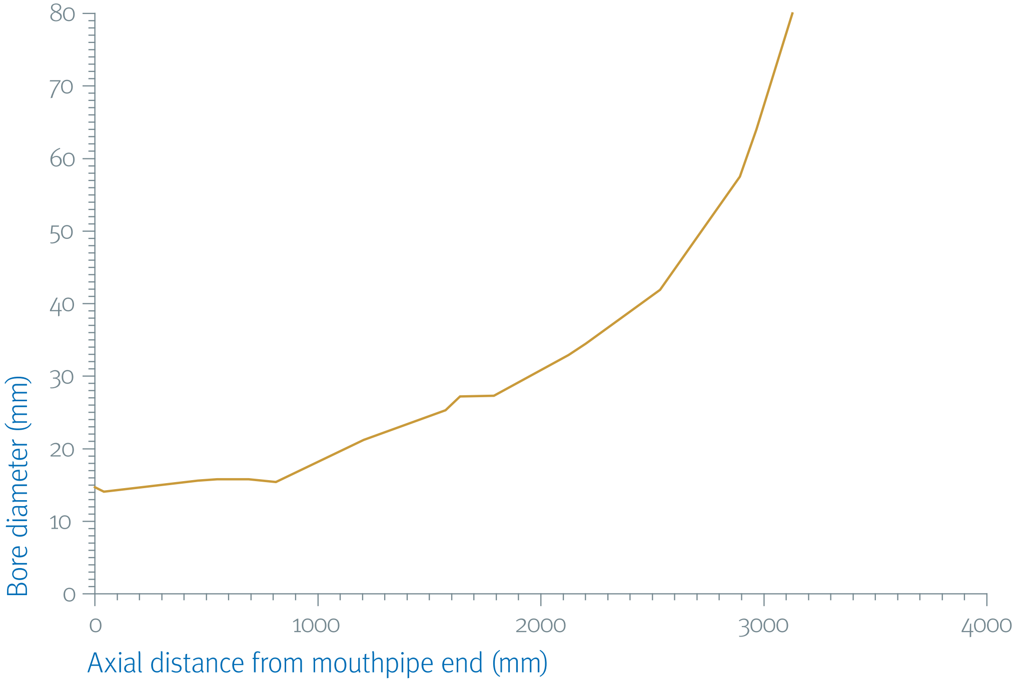
Not all early bass brass instruments were in ophicleide shape. The five-valve bass tuba of Moritz and Wieprecht shown in Figures 10 and 11 took a step towards the modern tuba shape, with the leadpipe is a little shorter than on a typical valved ophicleide. Its spectral enrichment $E = 3.35$.

Some three-valve instruments in 12-ft F or 13-ft E♭ of the mid-19th century departed from ophicleide wrap, no longer having the tight U-bend at the foot or such a long initial section of narrow tubing (as in Figure 12 where $E = 3.41$), and are better described as »bombardons«. Some of these were similar in bore profile to valved ophicleides, but some were closer to tubas. As designs evolved, models with lower spectral enrichment were the fittest and survived.[7] There was no clear-cut distinction between valved ophicleides, bombardons and tubas, although we now generally use the term »tuba« to mean an instrument with a compass extending lower than B_1 or A_1.

7 Arnold Myers: »The Typology and Timbre of the Tuba«, in: *Vom Serpent zur Tuba. Entwicklung und Einsatz der tiefen Polsterzungeninstrumente mit Grifflöchern und Ventilen*, ed. by Christian Philipsen, Augsburg / Michaelstein 2019 (Michaelsteiner Konferenzberichte 83), pp. 159–174.

Figure 10
Bass tuba in 12-ft F by Carl Wilhelm Moritz, Berlin, c. 1840, B.B.mim 1281.
Photo: CC BY–RMAH / © Image Studio RMAH Brussels

Figure 11 Bore profile of bass tuba in 12-ft F by Carl Wilhelm Moritz, Berlin, c. 1840, B.B.mim 1281



The Raoux *Ophicléide à pistons*

One other attempt at designing an instrument that was termed *ophicléide à pistons* is very interesting, although it was a failure. This was a three-valve instrument in 8-ft C by the maker Raoux (better known for horns) which was exhibited in the Paris exposition of 1844 (Figures 13, 14). This instrument has unusually wide valves of a type termed *emboliclave* in which vanes move inside the tubing. Although the bore profile is close to that of a keyed ophicleide ($E = 3.01$), the mechanical problems of the emboliclave led to its failure. Also, its lowest note was $F\sharp_2$, not giving the full compass of the keyed ophicleide.

Ventilophikleide reconstructions

The historic valved ophicleide could be regarded as a species of brass instrument with its own identity, and thus worthy of revival. There is a perceived need in period-instrument performance for an instrument with a lighter sound in mid-19th-century works. One firm, Friedbert & Frank Syhre of Leipzig, developed a modern valved ophicleide (see Figure 15), a design the makers claim is based on an instrument in

Figure 12
Bombardon in 12-ft F
by Gross & Brambach, Innsbruck, mid-19th century,
GB.E.u 3844
Photo: Antonia Reeve

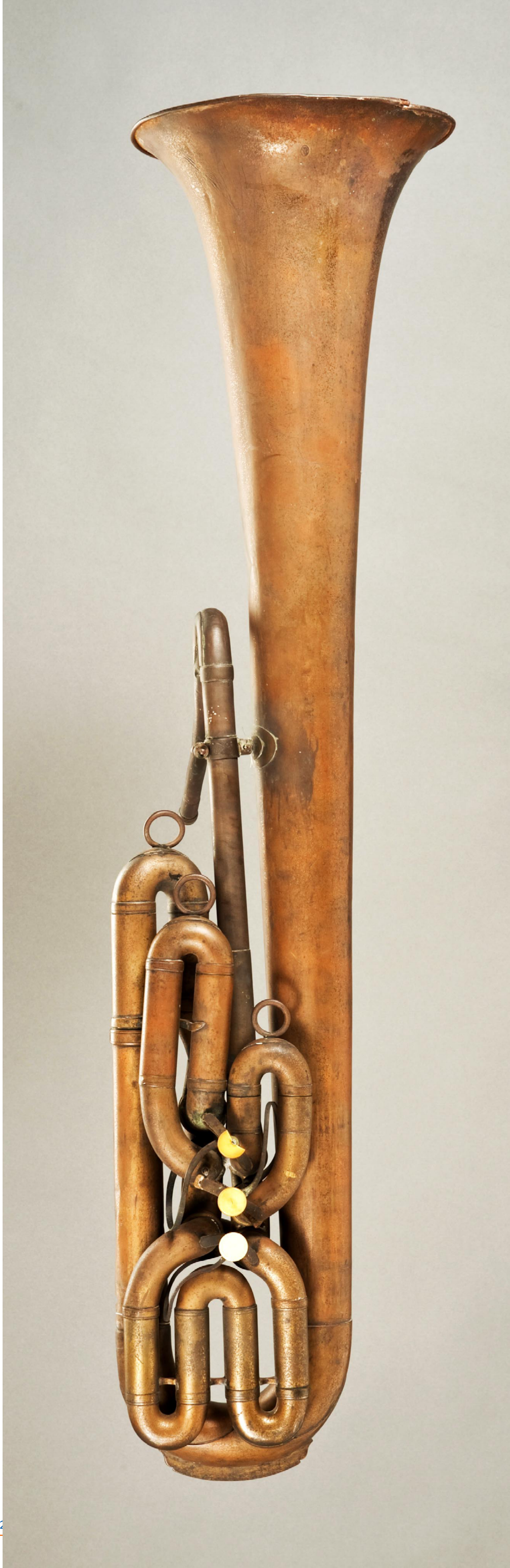
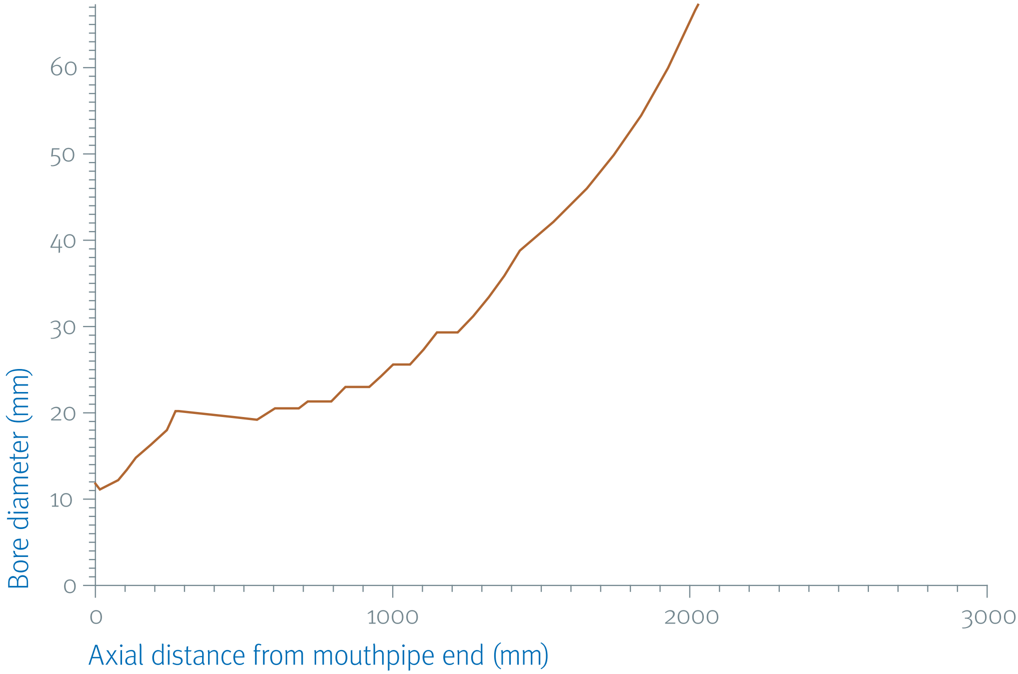


Figure 13
Ophicléide à pistons in 8-ft C
by Auguste Raoux, Paris, c. 1844, B.B.mim 1275
Photo: CC BY–RMAH / © Image Studio RMAH Brussels

Figure 14 Bore profile of *Ophicléide à pistons* in 8-ft C by Auguste Raoux, Paris, c. 1844, B.B.mim 1275



the Leipzig Musical Instrument Museum. The first was completed in 2005. It is intended to provide an instrument for modern tuba players, and according to Bernd Angerhöfer (who cooperated in its development) it is indeed successful in the mid-19th-century repertoire. The present author visited the factory and was allowed to see and hear this instrument, but unfortunately was not permitted to take any measurements.

In 2015, the British firm Wessex Tubas (whose products are made in China) developed a prototype valved ophicleide in E♭ with a spectral enrichment value of 3.29. This is available only to special order.

Figure 15 Ophicleide in F by Friedbert & Frank Syhre, Leipzig, 2007, played by Bernd Angerhöfer (MDR Symphony Orchestra)
Photo: Ludwig Angerhöfer

Conclusion

The strengths and weaknesses of the keyed ophicleide derive from the fact that for a bass instrument its tube length is short and almost conical throughout. As the valved ophicleide does not use the pedal register, its tube length at the maximum given by the valves is twice as long as that of a keyed ophicleide with the same compass. It is also characterised by the significant length of narrow tubing between the mouthpiece receiver and the valves which gives the instrument its ophicleide shape. Since the valves cannot accommodate wide tubing, a valved ophicleide has an initial section of relatively narrow bore. Therefore, in comparing timbre, a keyed ophicleide has a very low value of the spectral enrichment parameter E giving a sound spectrum in which low frequencies are relatively strong even in quite loud playing, while a valved ophicleide has a significantly higher value of the spectral enrichment parameter; the timbre will be brighter especially in loud playing.

Together with the intonation problems of instruments which most commonly had only three valves, the limitations of the valved ophicleide were apparent at the time of its use. The later bass tubas and bombardons, with their shorter leadpipes, were less brassy, and their timbre was in fact closer to the keyed ophicleide than was that of the valved ophicleide. The term *valved ophicleide* can be seen to be an oxymoron, a contradiction.

Appendix: Some valved ophicleides and early bombardons

Siglum and inventory	Nominal pitch	Maker, Place, Estimated date	*E*
B.B.mim 1275	8-ft C	Raoux, Paris, c. 1844	3.01
B.B.mim 2021	8-ft C	Finck, Strasbourg, c. 1850	3.37
F.P.cm E0309	8-ft C	probably France, c. 1840	3.79
US.NY.mma 2460	9-ft B♭	Liebelt, Innsbruck, 1855	4.15
CH.BE.km 1222	9-ft B♭	Dürrschmidt, Neukirchen, a. 1858	4.37
CZ.P.nm 420	12-ft F	Stastny, Prague, c. 1850	3.11
B.B.mim 1282	13-ft E♭	Bachmann, Brussels, a. 1842	3.21
I.F.ga 189	12-ft F	Roth, Milan, a. 1861	3.22
GB.O.ub 664	12-ft F	Leibelt, Innsbruck, mid-19th century	3.25
CH.B.hm 2621	12-ft F	Lorenz, Linz, mid-19th century	3.33
A.S.ca 1277	12-ft F	Uhlmann, Vienna, 1839	3.33
D.LE.u 1765	12-ft F	Italy, 1850–55	3.39
A.S.ca 1529	12-ft F	Lorenz, Linz, 1848–51	3.41
US.NY.mma 2457	12-ft F	Uhlmann, Vienna, c. 1840	3.43
I.MO.m 51	12-ft F	Anciuti, Modena, 1841	3.47
I.MO.m 501	12-ft F	Uhlmann, Vienna, c. 1850	3.51
A.W.km 1032	12-ft F	Lorenz, Linz, c. 1850	3.61
B.B.mim 1280	12-ft F	Beyde, Vienna, c. 1840	3.72
D.N.gnm 68	12-ft F	Rott, Prague, c. 1850	3.75
US.V.n 3469	13-ft E♭	Saxony?, c. 1840	3.77
US.NY.mma 2269	12-ft F	Beyde, Vienna, 1845–55	3.80
US.W.si 95,273	12-ft F	Beyde, Vienna, c. 1835	3.84
CH.B.hm 2749	12-ft F	Schuster, Karlsruhe, mid-19th century	4.29
CH.BE.km 1221	12-ft F	Rott, Wien, mid-19th century	4.48
CH.BE.km 1051	12-ft F	Bauer, Prague, mid-19th century	4.49
A.KR.sk 876	12-ft F	Rott, Wien, c. 1844	4.53
D.LE.u 1767	16-ft C	Saurle, München c. 1840	3.41

A further valved ophicleide by Anton Michálek, Wien, 1844–59 (held in the Městské muzeum Týn nad Vltavou) is described by Jack Adler-McKean.[8]

8 Jack Adler-McKean: »Historické hluboké žesťové nástroje z okolí Vltavy: Michálkovai ventilová ofiklejda«, in: *Výběr* 59, 2022, pp. 249–267. English-language version here [20.9.2024].

Acknowledgements and Abbreviations

The author is grateful to staff in the following museums and private collections for permitting and facilitating measurements:

A.KR.sk	Kremsmünster	Musikinstrumentenmuseum Schloss Kremsegg
A.S.ca	Salzburg	Salzburger Museum Carolino Augusteum
A.W.km	Wien	Kunsthistorisches Museum (Sammlung alter Musikinstrumente)
B.B.mim	Brussels	Musical Instrument Museum (Mahillon Collection)
D.B.im	Berlin	Musikinstrumenten-Museum, Staatliches Institut für Musikforschung Preußischer Kulturbesitz
CH.B.hm	Basel	Musikmuseum, Historisches Museum Basel
CH.BE.km	Bern	Klingendes Museum (Hochschule der Künste Bern Collection)
CZ.P.nm	Prague	National Museum of Czech Music
D.LE.u	Leipzig	Musikinstrumenten-Museum der Universität Leipzig (Grassi Museum)
D.M.bn	München	Bayerisches Nationalmuseum
D.M.sm	München	Stadtmuseum
D.N.gnm	Nürnberg	Germanisches Nationalmuseum
DK.K.m	København	National Museum of Denmark (Musikmuseet – Musikhistorisk Museum & Carl Claudius Samling
F.NI.pl	Nice	Palais Lascaris
F.P.cm	Paris	Cité de la Musique, Musée de la Musique
F.P.kampmann	Paris	Bruno Kampmann Collection
GB.E.u	Edinburgh	Edinburgh University Collection of Historic Musical Instruments
GB.L.hm	London	Horniman Museum
GB.L.msm	London	Museum of Army Music, Kneller Hall
GB.O.ub	Oxford	Oxford University: Bate Collection
I.F.ga	Florence	Galleria dell’Academia (Collezione del Conservatorio Luigi Cherubini)
I.MO.m	Modena	Museo Civico di Storia e Arte Medievale di Modena
US.NY.mma	New York	Metropolitan Museum (Crosby Brown Collection)
US.V.n	Vermillion	National Music Museum, University of South Dakota
US.W.si	Washington	Smithsonian Institution (National Museum of American History)

The sigla used here are drawn from the Sigla for Musical Instrument Collections created for the *New Grove Dictionary of Musical Instruments* and maintained by CIMCIM (Comité international pour les musées et collections d'instruments et de musique).[9]

Abstract

The Taxonomy of the Valved Ophicleide

Invented in 1817, the keyed ophicleide rapidly became very widely used as a versatile band, orchestral, and solo instrument. In the middle of the 19th century, its roles were taken over by valved instruments. Some of the valved instruments of the 1830s, 1840s, and 1850s were built to resemble keyed ophicleides and were given names such as »ophicléïde à pistons« or »Ventilophikleide«. These valved ophicleides are often viewed as transitional, and are not generally recognised as a distinct form of instrument. However, examination of their acoustical design shows that when valves replace keys, the timbre of the instrument is radically altered, especially in models built to resemble a keyed ophicleide.

This paper examines the acoustically important features of valved ophicleides. Surviving examples in more than a dozen collections were measured and values of the Spectral Enrichment parameter (an indicator of timbre) were derived. The conclusions are drawn that the valved ophicleide can be regarded as a species of brass instrument with its own identity, and that it is worthy of revival.

Die Taxonomie der Ventilophikleide

Die 1817 erfundene Ophikleide mit Klappen fand als vielseitiges Harmoniemusik-, Orchester- und Soloinstrument schnell weite Verbreitung. In der Mitte des 19. Jahrhunderts wurden ihre Aufgaben von Instrumenten mit Ventilen übernommen. Einige der Ventilblasinstrumente der 1830er, 1840er und 1850er Jahre wurden so gebaut, dass sie Ophikleiden mit Klappen ähnelten, und erhielten Namen wie »Ophicléïde à pistons« oder »Ventilophikleide«. Diese Instrumente werden oft als Übergangsphase betrachtet und im Allgemeinen nicht als eigenständige Instrumentenform anerkannt. Eine Untersuchung ihrer akustischen Bauweise zeigt jedoch, dass sich die Klangfarbe des Instruments radikal verändert, wenn Ventile die Klappen ersetzen, insbesondere bei Modellen, die von der Bauweise her einer Ophikleide mit Klappen ähneln.

In diesem Beitrag werden die akustisch wichtigen Merkmale von Ventilophikleiden untersucht. Erhaltene Exemplare in mehr als einem Dutzend Sammlungen wurden vermessen, und es wurden Werte für den Parameter *Spectral Enrichment* (ein Indikator für die Klangfarbe) abgeleitet. Es wird der Schluss gezogen, dass die Ventilophikleide als eine Art von Blechblasinstrument mit eigener Identität betrachtet werden kann und dass sie es wert ist, wiederbelebt zu werden.

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9 Some parts of this article were previously published in *Liranimus 2*, 2013, pp. 9–21.

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