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**Kastner, the Distin Family, and the Emergence
of “New” Brasswind Instruments by Adolphe Sax**

Adolphe Sax (1814–1894) was arguably the most active promoter of his own instruments, but he eagerly sought the support of influential composers, performers and writers to support his endeavours. This article demonstrates how Sax’s relationships with Jean-Georges Kastner and the Distin family brass ensemble helped to achieve his objectives in promoting the saxhorn and saxotromba, concentrating on the early years of his residency in Paris. My essay inevitably covers much of the same ground as that of other writers, but it also brings to light a few sources that have been to some extent overlooked, including periodical articles, Kastner’s orchestration treatises, and Kastner’s compositions.

Sax and his promotion of the saxhorn, 1843–1844 Sax was keenly interested in making “improvements” to wind instruments, even creating new – or purportedly new – families of them. This was one of his prime objectives – to create series of instruments of the same basic type, homogeneous from top to bottom, with the same proportions and the same fingering. Specifically concerning brasswind instruments, he also sought to minimise sharp bends in the tubing and extend their range. The best-known of his new families of brass instruments, saxhorns and saxotrombas, have been the subject of considerable controversy, but recent work by Eugenia Mitroulia and Arnold Myers has done much to clarify the situation.¹

Sax was slow to adopt the name “saxhorn”, initially preferring to call the members of what eventually became his best-known family of brasswinds *bugles à cylindres* – a term that clearly demonstrates the relationship of these instruments to the bugle or flugelhorn. While his 1843 patent has often been characterised as the “saxhorn patent”, the word “saxhorn” does not appear in the documentation.² The instrument in Figure 4 of the article by Mitroulia and Myers in this volume is one of three bugles shown in the drawing section of the 1843 patent.³

- 1 See Eugenia Mitroulia/Arnold Myers: Adolphe Sax. Visionary or Plagiarist?, in: *Historic Brass Society Journal* 20 (2008), pp. 93–141; and Eugenia Mitroulia: Adolphe Sax’s Brasswind Production with a Focus on Saxhorns and Related Instruments, Edinburgh 2011, www.era.lib.ed.ac.uk/handle/1842/5490 (25 June 2018).
- 2 Mitroulia/Myers: Adolphe Sax. Visionary or Plagiarist?, p. 104.
- 3 *Ibid.*, pp. 93–95.

The 1843 patent shows Sax's own versions of *Berliner Pumpen* valves, calling them "cylinders" (*cylindres*). As Mitroulia and Myers have noted, Sax's initial modifications of the Berlin valves employed circular or oval valve loops and in general avoided right angles at the valve ports. The issue is complicated, however, by the fact that Sax, like most Parisian makers of brass instruments at the time, frequently farmed out the production of valve assemblies to sub-contractors, whose designs did not necessarily follow Sax's originals.⁴ As we shall presently see – and as Mitroulia and Myers have shown – beginning in mid-1844 the term *bugle à cylindres* was used interchangeably with "saxhorn", and not long thereafter the latter term completely replaced the former.

In August 1843, Castil-Blaze published an article on Sax's new instruments in *La France musicale*. Of particular interest is his description of the application of *cylindres* to trumpets and trombones.

"Mr Sax has given the trumpets and trombones moveable cylinders that make the stopped notes [*notes bouchées*]⁵ resonate and adjust the intonation without having recourse to valves [*pompes*] that the hand cannot pull and push with enough exactitude nor, especially, with [sufficient] speed. These *cylindres*, entirely of metal, do not arrest the vibrations [of the instrument], and preserve in the instrument the quality of sound of the natural trumpet, the true orchestral trumpet. The same additions, made to the bugle, have tamed its formerly savage voice."

"Les trompettes, les trombones ont reçu de M. Sax des cylindres mobiles qui font sonner les notes bouchées et règlent l'intonation sans avoir recours aux pompes que la main ne peut tirer et pousser avec assez d'exactitude et surtout de vivacité. Ces cylindres, entièrement métalliques, n'arrêtant point les vibrations, conservent à l'instrument la qualité de son de la trompette droite, la vraie trompette d'orchestre. Les mêmes additions, faites au bugle, en ont rendu la voix agréable de sauvage qu'elle était."⁶

Castil-Blaze's reference to "valves that the hand cannot pull and push" is an exaggeration, but he is careful to distinguish between *pompes* and *cylindres*. Probably the former term refers to Stölzel valves, or perhaps double-piston valves. Just a few weeks later, Sax placed an advertisement in *La France musicale*, advertising his *Bugle à cylindre*, *Trompette à cylindre*, *Ténor-Basse*, *Basse*, and *Contre-Basse d'harmonie à trois, quatre, cinq, et six cylindres*, as well as other instruments (see Figure 1).⁷

In September 1843, Henri Blanchard published an article about Sax in the *Revue et gazette musicale de Paris*:

4 Ibid., pp. 93–96.

5 Sax probably refers here to notes that are not "open" – that is, they are played by depressing one or more valves.

6 Castil-Blaze: Adolphe Sax, in: *La France musicale* [hereafter referred to as FM] 6, No. 35 (27 August 1843), pp. 277 f., here p. 278. All English translations by the author.

7 FM 6, No. 39 (24 September 1843), p. 316.

FIGURE 1 Advertisement for Sax's instruments in *La France musicale* 6, No. 30 (24 September 1843), p. 316

MANUFACTURE D'INSTRUMENTS DE MUSIQUE, EN CUIVRE ET EN BOIS,
D'ADOLPHE SAX ET C^{IE},
 10, rue Neuve-Saint-Georges.
 Nouveaux instrumens : Bugle à cylindre ; — Trompette à cylindre ;
 — Cor ; — Trombone ; — Ténor-Basse ; — Basse ; — Contre-Basse
 d'harmonie à trois, quatre, cinq ou six cylindres ; — Nouvelles clari-
 nettes soprano, alto et basse ; — Instrumens ordinaires, etc., etc.
 Voir dans *la France Musicale* du 27 août 1843, l'article de M. CASTIL-
 BLAZE, sur les instrumens de l'invention de M. ADOLPHE SAX.

“Even if Mr Sax did not create the bugle, he has greatly extended the family [...]. We have now, thanks to him, the *petit bugle* in E♭, the bugle in B♭, the tenor or baritone bugle in E♭, the bass bugle, the contrabass bugle, and the *ophicléide-trombone*.⁸ [...] The sound of all these instruments, already less harsh than the trumpet because of their greater development, is further softened by the two systems of cylinders, different from those in use in Vienna, Berlin, and Brussels. Previously these brass instruments were fitted with a complicated, fragile mechanism that is consequently subject to malfunction, and what is more, affects the sonority, due to the inconvenience of its sharp curves and angles. With the operation of the two new types of cylinders of Mr Sax, these problems are no more to be feared than in instruments without cylinders [*instruments non cylindriques*].⁹ On instruments of this type made up to the present time, the intonation cannot be in tune or modified. Now the valve [*cylindre*] that lowers the pitch by a semitone, for example, producing b♭ or f♯, gives, with the same length of tubing, f♯ or c♯. When the [length of the] instrument is altered by about half, and so forth, this means that [what should be] the semitone is not more than a large quarter-tone in this case.¹⁰ Up to the present time, some instruments with pistons, cylinders, keys or holes, could not make glissandos or notes sensibles¹¹ like the violin, for example. One can now attain these effects by means of a spring-slide [*coulisse à ressort*], the design of which does not complicate the form of the instrument. Just to give an idea of this, it suffices to say that it is the slide or *pompe* of the *cornets à pistons* that serves to raise or lower the note, put in movement by a spring operated by the second finger of the left hand, and thus alters, modifies the sound without losing the intensity of the sound, its brilliance, or its quality.”

“M. Sax, s'il n'a pas créé le bugle, en a fort étendu la famille [...]. Nous avons maintenant, grâce à lui, le *petit bugle* en mi bémol, le bugle en si bémol, le bugle en mi bémol ténor ou baryton, le bugle-basse, le bugle-contre-basse et l'*ophicléide-trombone*. [...] Tous ces instruments, d'un son déjà moins âpre que la trompette par leur plus grand développement, sont encore adoucis par deux systèmes de

- 8 It is difficult to know what Blanchard means by the term *ophicléide-trombone*. Perhaps a bass *Klappenhorn*?
- 9 It is possible that by *non cylindriques* Blanchard refers to instruments with a bore that is more conical than cylindrical, but the context suggests that he means instruments with valve systems other than Sax's modified *Berliner Pumpen*.
- 10 Blanchard probably means that while the second valve lowers the pitch of the instrument by a semitone, when one or more valves is already depressed, adding another does not always lower the pitch by the desired increment because the effective length of the entire instrument has increased. For example, when the first and third valves are depressed, adding the second lowers the pitch by less than a half-step. This is one of the reasons for Sax's spring slide, or “compensator”.
- 11 By *notes sensibles* Blanchard means leading notes, or *appoggiaturas* a half-step below a chord member.

cylindres différents de ceux en usage à Vienne, à Berlin et à Bruxelles. Jusqu’à ce jour, on avait joint à ces instruments de cuivre un mécanisme compliqué, fragile, et par conséquent sujet à se déranger, et qui de plus, par l’inconvénient des courbes ou des angles trop rapprochés les uns des autres, nuisait à la sonorité. Par le procédé des deux nouveaux systèmes à cylindres de M. Sax, ces inconvénients ne sont pas plus à craindre que dans les instruments non cylindriques. Tels qu’ont les avait fabriqués jusqu’à ce moment, l’intonation de ces instruments ne pouvait être juste ou modifiée: maintenant, le cylindre d’un demi-ton, par exemple, qui fait si naturel ou *fa dièze*, doit donner, avec la même longueur de tube, *fa dièze* ou *ut dièze*, quand l’instrument est changé à peu près de moitié, ainsi de suite, ce qui fait que le demi-ton ne fait plus qu’un fort quart de ton dans ces derniers cas. Jusqu’à présent, aucun instrument à pistons, à cylindres, à clefs ou à trous, n’a pu faire les sons glissés, altérés, ou notes sensibles comme le violon, par exemple; on obtiendra maintenant ces effets par le moyen d’une coulisse à ressort, qui ne complique pas la forme de l’instrument dans ses contours. Pour en donner une idée, il suffira de dire que c’est la coulisse ou pompe des cornets à pistons, qui servait à baisser ou hausser le ton, mise en mouvement par un ressort recevant l’impulsion du deuxième doigt de la main gauche, et qui altère, modifie le son sans lui faire perdre de son intensité, de son éclat et de sa qualité.”¹²

Blanchard’s article raises a few questions. He refers to an important issue concerning Sax’s valve systems, that of the reduction of sharp bends in the tubing, which was believed to have a negative effect on the tone. Blanchard further mentions two different types of cylinders, but does not clearly identify them, thereby creating something of a puzzle, since Sax’s modified form of the Berlin valve is the only “new” system he is known to have created. Mitroulia suggests that Sax’s spring slide, later called the “compensator”, though it does not constitute a “valve system”, might be what Blanchard had in mind – particularly since Blanchard mentions these slides in relation to glissandos and leading notes.¹³

On 13 November of the same year, the premiere of Gaetano Donizetti’s opera *Dom Sébastien, roi de Portugal* took place at the Paris Opéra. According to Kastner in the *Supplément* to his *Cours d’instrumentation*, the composer wrote parts for four *trompettes à trois cylindres* in E \flat and two *bugles à cylindres* in B \flat in this opera. Both of these instruments, says Kastner, had been improved by Sax.¹⁴ In his review of the premiere in the *Revue et gazette musicale de Paris*, Maurice Bourges mentions the use of Sax’s bass clarinet and his *bugle à cylindres*, but not the *trompette à cylindres*.¹⁵ According to a report in the *Revue et gazette des théâtres de Paris*, Sax’s rivals fomented trouble in the orchestra pit during rehearsals, and some of the musicians declared that Sax’s new instruments were impossible to play. At

12 Henri Blanchard: Adolphe Sax, in: *La Revue et gazette musicale de Paris* [hereafter referred to as *RGMP*] 11, No. 37 (10 September 1843), pp. 314–316, here p. 315.

13 Mitroulia: *Adolphe Sax’s Brasswind Production*, p. 115.

14 G. [Jean-Georges] Kastner: *Cours d’instrumentation considéré sous les rapports poétiques et philosophiques de l’art, à l’usage des jeunes compositeurs, Supplément*, Paris: Meissonier [1844], p. 9.

15 See *ibid.* Bourges’s review appears in the *RGMP* 10, No. 47 (19 November 1843), pp. 391–393, here pp. 392f. Bourges specifically mentions Sax as a remarkable inventor of musical instruments, and further notes Donizetti’s use of Sax’s new bass clarinet in this opera.

least a few of the orchestra's musicians had close ties to instrument makers who were rivals of Sax or were makers themselves, so personal and financial considerations may have had more to do with this flap than any problems with the instruments.¹⁶

“Rehearsals for *Dom Sébastien* have seen a small conspiracy in a little corner of the orchestra of the Opéra – a conspiracy that menaces at once the interests of art, of this new score, and of a young manufacturer of instruments who is responsible for many important inventions. Mr Sax's clarinettes basses, his bugles, and his trompettes à cylindres have amazed the most celebrated composers – Rossini, Meyerbeer, Donizetti, Halévy, Carafa, Berlioz, etc. – by the power of their sounds. Donizetti wanted to be the first to make use of these new musical marvels in *Dom Sébastien*, but Mr Sax's rivals have found faithful supporters in the orchestra of the Opéra, and little by little, under the pretext of impossibility [that is, finding them impossible to play], they have forced the maestro to cut the passages written for the new instruments. In order to better suppress their effect, they have gone further and have convinced Mr Habeneck to weaken the effect by having the old bass clarinet played simultaneously with the new. Mr Sax has complained in writing to Mr Léon Pillet [the Director of the Opéra] of the violence of which he is the victim. Will he parry this new attack? We hope he will, for the director and the composer cannot allow, under their very eyes, a persecution so harmful and so scandalous.”

“Les répétitions de *Don Sébastien* ont donné lieu à une petite conspiration dans un petit coin de l'orchestre de l'Opéra, conspiration qui menace à la fois l'intérêt de l'art, celui de la partition nouvelle, et celui d'un jeune facteur d'instruments, auteur de plusieurs inventions importantes. Les clarinettes basses de M. Sax, ses bugles et ses trompettes à cylindres, ont émerveillé, par la puissance de leurs sons, les compositeurs les plus célèbres, Rossini, Meyerbeer, Donizetti, Halevy [sic], Carafa, Berlioz, etc. Donizetti a voulu, le premier, se servir, dans *Don Sébastien*, de ces nouveaux prestiges harmoniques; mais les rivaux de M. Sax ont trouvé de fidèles auxiliaires dans l'orchestre de l'Opéra, et, petit à petit, sous prétexte d'impossibilité, ils ont forcé le maestro de couper les passages écrits pour les nouveaux instruments. Pour mieux étouffer leur effet, ils ont enchéri, et ont obtenu de M. Habeneck qu'il amoindrit l'effet en jouant l'ancienne clarinette-basse, simultanément avec la nouvelle. M. Sax, qui s'est plaint par écrit à M. Léon Pillet de la violence dont il est victime, parera-t-il ce nouveau coup? Nous l'espérons; car le directeur et le compositeur ne peuvent souffrir sous leurs yeux une persécution aussi nuisible et aussi scandaleuse.”¹⁷

Clearly the focus of this conspiracy was Sax's new bass clarinet.¹⁸ The above report was quoted in an article in *La France musicale* for 12 November 1843, which adds:

“It is deplorable to see such improprieties that insinuate themselves into a group of great artists, who should think only of the interests of the composers and of the public. Why would anyone want to obstruct one of the most useful modern inventions, just because among the malcontents of this orchestra there are found some makers of flutes, trumpets, bassoons, or clarinets? Art has thus become a chimera, and all that one could do in future in the interest of improving the instruments will

¹⁶ See Wally Horwood: *Adolphe Sax 1814–1894. His Life and Legacy*, Baldock 1983, p. 48.

¹⁷ Unsigned report in *La revue et gazette des théâtres de Paris* (probably 9 November 1843), quoted in FM 6, No. 46 (12 November 1843), p. 369.

¹⁸ See Albert R. Rice: *From the Clarinet d'Amour to the Contra Bass. A History of Large Size Bass Clarinets, 1740–1860*, Oxford/New York 2009, pp. 300–302.

run the risk of being proscribed under the pretext of personal interest! Why has Mr Habeneck not stopped the conspiracy plotted against Sax? Does he also have some interest in the makers of instruments? Mr Habeneck, in this circumstance as in many others, has failed in his duty to impose on the musicians under his direction – the recalcitrant musicians – the instruments of Mr Sax that Mr Donizetti desires to have, instruments that, we affirm, offer new resources and new effects to our composers.”

“Il est déplorable de voir de semblables inconvenances se glisser dans une réunion de grands artistes qui devrait songer purement aux intérêts des compositeurs et du public. Comment, parce que parmi les mécontents de cet orchestre il se trouve [sic] quelques fabricans de flûtes, de trompettes, de bassons ou de clarinettes, on voudrait arrêter une des plus utiles inventions modernes? L’art est donc devenu une chimère, et tout ce que l’on pourrait faire à l’avenir dans le but d’améliorer les instrumens, courrait le risque d’être proscriit sous le prétexte d’intérêt personnel! Comment se fait-il que M. Habeneck n’ait pas arrêté la conspiration ourdie contre M. Sax? Il a donc aussi, lui, quelque intérêt dans des fabriques d’instrumens? M. Habeneck, en cette circonstance, comme dans beaucoup d’autres, a manqué à son devoir, en n’imposant pas aux musiciens qu’il dirige, aux musiciens récalcitrans, les instrumens de M. Sax, que M. Donizetti désirait avoir, instrumens qui, nous l’affirmons, offrent à nos compositeurs des ressources et des effets nouveaux.”¹⁹

The upshot of this contretemps was that Sax’s bass clarinet was played alongside a more conventional instrument. As for the *bugles à cylindres* and *trompettes à cylindres*, none of the contemporary reports state exactly what happened with them, but neither the first published edition of the score nor Mary Ann Smart’s critical edition includes a part for an instrument of either name (though parts for *trompettes à pistons* appear frequently), nor do Smart’s critical notes say anything about them.²⁰

Bourges’s review, cited above, is vague about the precise location of the parts for the two *bugles à cylindres* in the score, but probably they were intended to appear, along with the bass clarinets, in the dance sequence following Zayda’s aria in Act II – specifically, in the Allegretto of the *pas de trois*.²¹ Parts for two *trompettes à pistons* in B \flat can be found here; possibly Donizetti originally designated these parts for *bugles à cylindres*.

Whatever the precise disposition of instruments in Donizetti’s opera in November of 1843, Sax continued to push his new “inventions”. His “cylinder bugles” were very much in evidence in a concert he organised at his place of business in the rue Nouvelle-St. Georges late in the following month, as described in the “Nouvelles” section of the *Revue et gazette musicale*.

¹⁹ FM 6, No. 46 (12 November 1843), p. 369.

²⁰ For the first edition of the score see Gaetano Donizetti: *Dom Sébastien*. Opéra in five acts, Paris 1843, Reprint New York 1980. For the critical edition see Donizetti: *Dom Sébastien, roi de Portugal*. Opéra en cinq acts, ed. Mary Ann Smart, Milan 2003.

²¹ See Donizetti: *Dom Sébastien*, ed. Smart, pp. 243–262; see also Rice: *From the Clarinet d’Amour to the Contra Bass*, pp. 364f.

“In the course of the week just passed, an imposing meeting took place at Mr Adolphe Sax’s establishment. This young and skilful artist, whose incontestable talent has aroused up to this time such unjust opposition, assembled in his workshop many judges competent to submit to their disinterested appreciation the different instruments of his invention which have made him so many enemies. Messieurs Meyerbeer, Spontini, Berlioz, Kastner, General Rumigny, and many distinguished composers and journalists listened with keen interest to the *clarinette-basse* and *clarinette-soprano*, both perfected by Mr Adolphe Sax. The *trompette à cylindres*, the *bugle à cylindres*, the brilliant sonority of which was demonstrated by Mr Arban, the *bugle-basse*, the *bugle-contrebasse*, and above all the *saxophone*, a true creation of genius, were heard with admiration by this elite audience.”

“Dans le courant de la semaine qui vient de s’écouler, une séance imposante a eu lieu chez M. Adolphe Sax. Ce jeune et habile artiste, dont le talent incontestable a suscité jusqu’à présent tant d’oppositions injustes, avait rassemblé dans ses ateliers plusieurs juges compétents pour soumettre à leur appréciation désintéressée les différents [sic] instruments de son invention qui lui ont acquis déjà tant d’ennemis. MM. Meyerbeer, Spontini, Berlioz, Kastner, le général Rumigny et plusieurs compositeurs et journalistes distingués ont écouté avec un vif intérêt la *clarinette-basse*, la *clarinette-soprano* perfectionnées par M. Adolphe Sax. La *trompette à cylindres*, le *bugle à cylindres*, dont M. Arban a fait valoir la brillante sonorité, le *bugle-basse*, le *bugle-contrebasse* et surtout le *saxophone*, véritable création de génie, ont été entendus avec admiration par cet auditoire d’élite.”²²

It was probably this event at Sax’s place of business that Escudier had in mind when he published an article entitled “Les nouveaux instruments de Ad. Sax” in *La France musicale* on 7 January 1844. Both this report and the unsigned article quoted above leave little doubt that Sax intended this meeting as a test or trial, intended to prove the superiority of his instruments. After describing the militant opposition of Sax’s rivals, Escudier continues:

“Last week Mr Sax brought together at his place some very competent judges, chosen from among the most celebrated composers and the most distinguished men of the press. General Rumigny, well known for his passion for progress in military music, also attended this interesting meeting.

The first instrument that we heard was the improved bugle by Mr Sax, from the very small one in E \flat to the contrabass bugle in the same key. Mr Sax’s bugle has greater equality of sound, a wider range, and more power than the bugle one ordinarily uses. The bugle in B \flat , or the Sax bugle, which Mr Arban plays with a very remarkable talent, has a sound that is masculine, full, and round, a voice charming and moving, qualities that make it superior to the *cornet à piston*, the voice of which is always thin and nasal.”

“L’autre semaine, M. Sax avait réuni chez lui des juges très compétents, choisis parmi les compositeurs les plus célèbres et les hommes de la presse les plus distingués. Le général Rumigny, très connu par son zèle pour les progrès de la musique militaire, assistait aussi à cette intéressante séance.

Le premier instrument que nous avons entendu est le bugle perfectionné par M. Sax, depuis le plus petit en mi bémol, jusqu’au bugle contrebasse, dans le même ton. Le bugle de M. Sax a plus d’égalité dans les sons, plus d’étendue et plus de force que le bugle dont on se sert ordinairement. Le bugle en si bémol OUBUG LE SAX [sic], que M. Arban joue avec un talent très remarquable, a un son mâle, et plein de rondeur, une voix qui charme et émeut, qualités qui le rendent bien supérieur au *cornet à piston* dont la voix est toujours maigre et nazillarde.”²³

22 RGMP II, No. 53 (31 December 1843), p. 445.

Just a few weeks later, on 3 February 1844, Berlioz organised a concert of his own music at the Salle Herz. One piece was intended as a demonstration of Sax’s new instruments, as described in Maurice Bourges’s review in the *Revue et gazette musicale*.

“The Hymne, transcribed for six of Mr Adolphe Sax’s wind instruments, was not originally destined to be performed as M. Berlioz did at this concert. [Originally] a vocal setting, this hymn was sung in Marseille with great success. In reducing it for an instrumental sextet, the composer wanted simply to offer Mr Adolphe Sax the opportunity to demonstrate in public some of his inventions or improvements [to wind instruments], the merits of which almost all the composers and distinguished critics of the time have appreciated. This was the general impression felt by the listeners. The *petite trompette à cylindres* in E♭, the *petit bugle à cylindres* in E♭, the *grand bugle à cylindres* in B♭, the soprano clarinet, the bass clarinet, and the saxophone, exhibited a beautiful timbre and a sonority as full as it was satisfying. Although practitioners alone have the right to evaluate the difficulties of a mechanism, being its natural judges, every well-formed ear, however little exercised it might be, is competent enough to appreciate the quality of the sound of an instrument.

Public opinion has ratified the efforts of Mr Adolphe Sax by its approval, recognising that the performers have not had the time to familiarise themselves sufficiently with these new instruments, in spite of their undeniable talent. But this is only a secondary issue. Other, more specialised tests, prepared over a longer period of time, will conclude by conveying the conviction [of success] to all impartial minds.”

“L’Hymne, transcrit pour les six instruments à vent de M. Adolphe Sax, n’avait pas originellement la destination que M. Berlioz lui a assignée dans ce concert. Composé sur des paroles, cet hymne a été chanté à Marseille avec grand succès. En le réduisant pour en faire un sextuor instrumental, l’auteur a voulu simplement offrir à M. Adolphe Sax l’occasion de produire en public des inventions ou des perfectionnements, dont presque tous les compositeurs et les critiques distingués de l’époque ont apprécié le mérite. Voici l’impression généralement éprouvée par l’auditoire. La *petite trompette à cylindres* en mi bémol, le *petit bugle à cylindres* en mi bémol aussi, le *grand bugle à cylindres* en si bémol, la clarinette-soprano, la clarinette-basse et le saxophone, ont paru d’un beau timbre et d’une sonorité aussi pleine que satisfaisante. Si les praticiens ont seuls le droit de prononcer sur les difficultés du mécanisme, dont ils sont les juges naturels, toute oreille bien conformée et tant soit peu exercée est compétente pour apprécier la qualité de son d’un instrument.

L’opinion publique a ratifié par ses suffrages les tentatives de M. Adolphe Sax, tout en reconnaissant que, malgré leur talent incontestable, les exécutants n’avaient pas eu le temps de se familiariser assez avec ces instruments nouveaux; mais ceci n’est que secondaire. D’autres épreuves plus spéciales et préparées de plus longue main finiront par porter la conviction dans tous les esprits exempts de partialité.”²⁴

In spite of the positive tone of Bourges’s review, his closing lines suggest that the demonstration of Sax’s instruments was not altogether successful. Joseph d’Ortigue, in a review in *La France musicale*, is more explicit: he states that although the sound of Sax’s instruments created the illusion of a “sonorous organ”, the public was not pleased. His

23 Léon Escudier: Les nouveaux instrumens d’Ad. Sax, in: *FM* 6, No. 54 (7 January 1844), pp. 431f.

24 Maurice Bourges: Concert de M. H. Berlioz, in: *RGMP* 11, No. 6 (11 February 1844), pp. 43f., here p. 43.

description of this piece mentions a *petite trompette à cylindres*, *grand et petit bugles à cylindres*, soprano and bass clarinets, and a saxophone.²⁵ In his biography of Sax, Oscar Comettant provides a rather humorous and undoubtedly somewhat embellished account of the performance.²⁶ Comettant's report is the only one that identifies the performers: François Dauvernay (*recte* Dauverné) on the *trompette suraiguë*, Defresne (probably L. Dufresne) on the *nouveau cornet*, Jean-Baptiste Arban (who was only eighteen years old at the time) on the *bugle perfectionné*, Leperd on the clarinet, Édouard Duprez on the *clarinette-basse*, and Sax himself on the saxophone. Comettant's identification of the instruments does not quite match that of Bourges, but his book, written some sixteen years after the event described here, is not entirely reliable.

The *Hymne* mentioned in Bourges's review, evidently an arrangement of Berlioz's *Chant sacré*, is probably the earliest composition with a part for saxophone; it is, moreover, the only composition for which Berlioz provided a part for that instrument. Unfortunately, the music does not survive.²⁷ The presence of two different sizes of *bugles à cylindres*, as described by Bourges, is quite significant, however, as I have mentioned above, these instruments apparently were saxhorns in all but name.

The development of the saxotromba During his early years in Paris, Sax promoted his saxhorns more energetically than his saxotrombas, even though both appear to have been developed at roughly the same time. There are very few references in print to the latter family of instruments during the years 1843/44, except for the supplements to Kastner's two orchestration treatises, described below. On 13 October 1845 Sax was granted a patent for the saxotromba, valid for fifteen years. The patent mentions the application of the instrument to military music, particularly for the cavalry, and recognises that the valves are the same as those of the 1843 patent – that is, Sax's modification of Berlin valves.²⁸ The instruments depicted in the drawings accompanying the patent are all in upright form, but some of them are actually saxhorns (see Figure 5 in the article by Mitroulia and Myers in this volume, p. 22). As we shall see in the following section of this essay, Kastner considered the *bugle à cylindres* – later known as the saxhorn – and the saxotromba to be two distinct families. Subsequent developments reveal, however, that the term “saxotromba”, though to some extent ambiguous, came to refer to the bell-up form for a brass instrument, with little connotation as to bore profile or bell expansion.

25 Joseph d'Ortigue: *Deuxième concert de M. H. Berlioz*, in: *FM* 7, No. 6 (12 February 1844), pp. 45 f.

26 Oscar Comettant: *Histoire d'un inventeur au dix-neuvième siècle. Adolphe Sax, ses ouvrages et ses luttes*, Paris 1860, p. 51.

27 See Robert S. Howe: *The Invention and Early Development of the Saxophone, 1840–55*, in: *Journal of the American Musical Instrument Society* 29 (2003), pp. 97–180, here p. 115.

28 See Mitroulia: *Adolphe Sax's Brasswind Production*, pp. 486–492.

Kastner’s treatises on instrumentation In 1837, just two years after he moved from Strasbourg to Paris, Kastner published his *Traité général d’instrumentation*, the most comprehensive treatise on orchestration to appear up to this time.²⁹ Two years later he published a companion volume, entitled *Cours d’instrumentation*.³⁰ Both books were designed to assist young composers in dealing with the vast and rapidly developing panoply of instruments available to them. Both were approved by the Institut de France and adopted by the Conservatoire for use in their classes. The *Traité* deals primarily with practical matters relating to instruments – ranges, transpositions, and the like – while the latter is devoted to issues of employing and combining instruments, with many references to specific compositions and several illustrative examples in full score. Neither book mentions Sax, who probably did not meet Kastner until after the Belgian’s move to Paris in 1842. But in 1844, after Kastner and Sax had become fast friends – and probably just a few weeks after the concert at the Salle Herz mentioned above – the former published entirely new editions of both his treatises.³¹ Kastner refers to Sax many times in both supplements, particularly in the sections devoted to wind instruments. Berlioz published his *Grand traité d’instrumentation et d’orchestration* at approximately the same time, but while the book does include a section on the saxophone, mention of Sax’s “new” brasswind had to wait until the second edition of 1855.³²

In the supplement to the *Cours d’instrumentation*, Kastner introduces young composers to five complete families of instruments created by Sax. The first three represent modifications to existing instruments – clarinet, *trompette à cylindres*, and *bugle à cylindres* – while the last two are “new” families: *saxo-tromba chromatique* and saxophone. Each

29 Published by Prilipp in Paris.

30 Complete title: Georges Kastner: *Cours d’instrumentation. Considéré sous les rapports poétiques et philosophiques de l’art. À l’usage des jeunes compositeurs*, Paris: Meissonnier [1839].

31 The title page of the second edition of Kastner’s *Traité général* is identical to that of the first edition of 1837, except for the following addition near the bottom: “2.^e Edition entièrement tenue par l’Auteur augmentée d’un Supplément”. The contents of pp. 1–64 are identical to the first edition. The supplement, which bears the title *Supplément au Traité général d’instrumentation*, was also published in Paris by Prilipp; it has its own pagination, with pages numbered 1–56. The supplement to the *Cours d’instrumentation* appears to have been published without a title page; none appears in any of the surviving copies I have seen. I have been unable to ascertain whether the original edition of 1839 was reprinted and sold along with the supplement. In any case, the supplement to the *Cours d’instrumentation* has its own pagination, with pages numbered 1–28. Neither supplement bears a date, but a notice in the *RCMP* 11, No. 15 (14 April 1844), p. 134 announces the publication of both.

32 Hector Berlioz: *Grand traité d’instrumentation et d’orchestration*, Paris: Schonenberger [1843/44]. According to Macdonald, the *Grand Traité* was actually in print late in 1843, but was not placed on sale until 1 March 1844; see Hugh Macdonald: *Berlioz’s Orchestration Treatise. A Translation and Commentary*, Cambridge 2002, p. xxi. Schonenberger published a second edition of this treatise in 1855.

family has from four to six members, ranging from soprano to bass or contrabass. In an explanatory note concerning the bugle, Kastner adds:

“The bugle à cylindres is nothing other than the ancient bugle or keyed trumpet [...] but in substituting cylindres for keys, Mr Sax has so ameliorated and modified the timbre and the resources of this instrument that one can say he has almost created a new genre.”

“Le Bugle à Cylindres n’est autre chose que l’ancien Bugle ou Trompette à Clefs [...] mais en substituant des cylindres aux clefs, M^r. Sax à tellement amélioré et modifié le timbre et les ressources de cet Instrument, qu’on peut dire qu’il a presque créé un genre nouveau.”³³

Kastner does not specifically mention the saxhorn in the supplements to either of his treatises, but in the supplement to the *Traité* he includes a substantial section on the bugle à pistons ou à cylindres (flugelhorn). He remarks, significantly, that the instrument was perfected in Germany by substituting cylindres for pistons. Sax’s cylindres, as we have seen, were his own modifications of the Berliner Pumpen, or Berlin valves; they were originally developed by Wilhelm Wieprecht and Carl Wilhelm Moritz in ca 1835.³⁴ He further states that Sax has constructed an entire five-member family of these instruments – petit bugle in E♭, “ordinary” bugle in B♭ or C, tenor in F or E♭, bass in B♭, and contrabass in E♭. Though not quite complete, these two parallel series, C/B♭ – F/E♭, match the list in the *Cours d’instrumentation*, mentioned above, and they are indicative of Sax’s preference for keys for all his instruments over the course of his career.

“The instrument of which we now speak was perfected in Germany by the substitution of pistons or cylinders for keys. These pistons or cylinders, three in number, have given the bugle greater accuracy and an incomparably improved homogeneity of sound. In other words, its timbre has acquired a nobility that formerly it was far from possessing. The Bugle à Pistons ou à Cylindres is ordinarily in B♭; here is its customary range: [musical notation: the instrument’s range in both written pitch (extending from f to c³ in the treble clef, with Chromatiquement written above the staff) and in concert pitch (a whole step lower)].

We have heard Mr. Forestier play this entire range from the lowest note to the highest, with remarkable accuracy, purity, and facility, but one should ordinarily write for it as follows: [musical notation, showing the range extending from b to a², in written pitch, then the same in concert pitch] because the notes in the lower range and above all those in the higher range cannot be played except by artists of consummate talent.

Bugles à Pistons ou à Cylindres are also made in C (that is to say, one tone higher than those in B♭) and others in E♭ (that is to say, a fourth higher than those in B♭). The [written] range is always the same, but it is necessary to observe that the difficulty of the highest notes is augmented in proportion to the pitch of the instrument [that is, high notes are more difficult on a high instrument]. The fingering of the Bugle à Pistons ou à Cylindres is absolutely the same as that of the Cornet à trois Pistons, and every artist who plays the cornet will be able to play the bugle in the same manner. It is thus only the timbre that is different. The younger Mr Forestier is completing a method book that serves for both the Cornet

33 Kastner: *Cours – Supplément*, p. 3.

34 Mitroulia: *Adolphe Sax’s Brasswind Production*, p. 123.

à trois Pistons and the Bugle à trois Pistons ou trois Cylindres.³⁵ This instrument is already in general use in all the German military bands. Mr Carafa, Director of the Gymnase musical militaire of Paris, is prescribing its adoption in this establishment, for introduction into French military bands.

Mr Sax the younger,³⁶ a distinguished craftsman, makes Bugles à trois Cylindres of very high quality, according to this system. He has created an entire family of them, to wit: [musical notation: ranges for petit bugles à trois cylindres in E♭, bugle in C or B♭, tenor bugle in F or E♭, bass bugle in B♭, and contrabass bugle in E♭.]

The ranges that we give above are those of the Bugles à trois Cylindres, but Mr A. Sax the younger is making others, notably in the keys of low B♭ and E♭, with four and also with five cylinders. The fourth and fifth cylinders serve to permit certain low notes that do not exist on the Bugle à trois Cylindres. In general, the number of [available] low notes increases in proportion to [the number of] cylinders; that is to say that one can play more low notes with four cylinders than with three, and more with five than with four cylinders.

On these instruments one can play all types of music, in all styles and in all tempi, with facility and accuracy.

As one can see, in all the ranges shown above the following notes: [musical notation: six quarter notes, ascending from C to F chromatically, but with the flat sign omitted on the first of two notes on D] are missing, and cannot be played except on the Bugles à 4 et à 5 Cylindres. These notes naturally vary in pitch according to the instrument; thus for the bugle in B♭ they are: [musical notation: six quarter notes, ascending chromatically from BB to E]; for the contrabass bugle in E♭ they are: [musical notation: six quarter notes, ascending chromatically from FF♯ to AA♭], etc.

Up to now Mr Sax has made only the lower members of the family with four or five cylinders; the higher instruments have only three, and this is easily explained because these melodic instruments rarely need the low notes.

We give below the entire range possible for a bugle in B♭ (bass) with four cylinders. [Musical notation, quarter notes extending chromatically from GG to f²]

The effect produced is one tone lower in the sense that [written] C represents [concert] B♭ and so forth. But the highest notes just as the lowest ones are in general poor and one will do well not to write them for anyone except a consummate virtuoso. Composers should content themselves with the ranges given above.

Finally, for the contrabass bugle in E♭, it is good to restrict it to two octaves because the high notes are not good. [Musical notation: notes extending diatonically from BB♭ to b♭, but with Chromat: written above the staff]

Mr A[dolphe] Sax makes the Bugles à Cylindres (the entire family) with two different mechanisms, leaving nothing to be desired.³⁷

- 35 Joseph Forestier (1815–1881), a leading cornet soloist in Paris in the 1830s and '40s, was a professor of military music at the Gymnase musical militaire. He published a *Méthode complète, théorique et pratique pour le cornet chromatique à pistons ou cylindres*, Paris 1844, 21862, as well as several solo works for cornet.
- 36 Kastner often refers to Adolphe Sax as “M. Sax fils” (literally, Mr Sax the son), in order to distinguish him from his father, Charles Sax, who developed a thriving musical instrument manufactory in Brussels, but moved to Paris in 1853.
- 37 As concerns Sax’s instruments, Kastner does not specifically mention any valve system apart from cylinders, which are modified Berlin valves. Mitroulia (*The Brasswind Production of Adolphe Sax*, p. 76), however, refers to a cornet with Périnet valves made by Sax in 1844, currently in the collection of Bruno Kampmann. He is also known to have made brasswinds with double-piston valves (*ibid.*, p. 91), rotary

The great advantage of the Bugle à Cylindres is that with the cylinder open [that is, with the valve depressed] the instrument makes as pure and as beautiful a sound as when one changes the crook on a natural instrument.

For some years bugles with three piston valves have been made in Germany, but we greatly prefer the invention and the refinements of Mr Sax, which consist in the use of cylinders.”

“L’instrument dont nous venons de parler a été perfectionné en Allemagne par la substitution de Pistons ou de Cylindres aux Clefs; ces Pistons ou ces Cylindres au nombre de trois ont donné au Bugle une bien plus grande justesse, une égalité de son incomparablement plus parfaite, et en outre son timbre a acquis une noblesse qu’il était loin de posséder auparavant. Le Bugle à Pistons ou à Cylindres est ordinairement en $SI \flat$; Voici son étendue générale: [musical notation; see main text].

Nous avons entendu M^r. Forestier donner toute cette étendue de la note la plus grave à la plus élevée, avec une justesse, une pureté et une facilité remarquables, mais on doit pour l’ordinaire s’en tenir à: [musical notation; see main text] parceque [sic] les notes limitrophes au grave et surtout à l’aigu ne peuvent être donnés que par des artistes d’un talent consommé.

On fabrique aussi des Bugles à Pistons ou à Cylindres en UT , (c’est-à-dire un ton plus haut que ceux en $SI \flat$) et d’autres en $MI \flat$, (c’est-à-dire une quarte plus haut que ceux en $SI \flat$); l’étendue est toujours la même, seulement, il faut observer que la difficulté des notes élevées augmente en proportion de la hauteur de l’instrument. Pour ce qui est du doigté du Bugle à Pistons ou à Cylindres, il est absolument le même que celui du Cornet à trois Pistons, et tout artiste qui jouera du Cornet, pourra pareillement jouer du Bugle; il n’y a donc que le timbre qui soit différent. M^r. Forestier jeune vient de terminer une méthode qui servira à la fois pour le Cornet à trois Pistons et pour le Bugle à trois Pistons ou trois Cylindres. Cet Instrument est déjà d’un usage général dans toutes les musiques Militaires Allemandes. M^r. Carafa, directeur du Gymnase musical Militaire de Paris, vient d’en prescrire l’adoption dans cet établissement, pour l’introduire dans les Musiques Militaires Françaises.

M^r. Sax fils, facteur distingué confectionne des Bugles à trois Cylindres, d’après ce système, d’une rare perfection. Il en a institué toute une famille savoir: [musical notation; see main text].

Les étendues que nous venons de donner cidessus [sic] sont celles des Bugles à trois Cylindres, mais M^r. A. Sax fils en confectionne d’autres, notamment pour les tons graves $SI \flat$ et $MI \flat$, à quatre et même cinq Cylindres; les 4.^e et 5.^e Cylindres servent à donner certaines notes graves qui n’existent pas sur le Bugle à trois Cylindres; en général les notes graves augmentent en proportion des cylindres, c’est-à-dire qu’on peut donner plus de notes graves avec 4 Cylindres qu’avec 3, et avec 5 qu’avec 4 Cylindres. Sur ces instruments on peut jouer toute espèce de musique, dans tous les caractères et dans tous les mouvements, avec autant de facilité que de justesse.

Comme on vient de le voir, dans toutes les étendues précédentes, les notes suivantes: [musical notation; see main text] manquent, et ne peuvent être données que par des Bugles à 4 et à 5 Cylindres; ces notes changent naturellement de hauteur suivant l’Instrument, ainsi pour le Bugle en $SI \flat$ basse elles représentent: [musical notation; see main text] pour le Bugle Contrebasse en $MI \flat$, elles représentent: [musical notation; see main text] & &.

Jusqu’à présent, M^r. Sax n’a donné 4 et 5 Cylindres qu’aux Instruments graves de la famille, les Instruments supérieurs n’en ont que trois, et cela s’explique assez facilement car ces Instruments chantants n’ont presque jamais besoin de leurs notes graves.

valves (ibid., p. 92), Périnet valves (ibid., p. 124), and Stölzel valves (Georges Kastner: *Manuel général de musique militaire*, Paris 1848, pl. xxiv).

Nous donnons cidessous [sic] toute l'étendue possible d'une Bugle en $SI\flat$ (basse) à 4 Cylindres. [Musical notation, see main text]

L'effet produit est un ton plus bas de manière que UT représente $SI\flat$ et ainsi de suite.

Mais les notes plus élevées ainsi que les plus graves sont en général mauvaises et l'on fait bien de ne pas s'en servir à moins d'être à virtuose consommé. Quant aux Compositeurs, ils doivent se contenter des étendues que nous avons indiquées plus haut.

Enfin pour le Bugle-Contrebasse en $MI\flat$, il est bon de se renfermer dans deux octaves car les notes supérieures ne valent rien. [Musical notation; see main text]

M^r. A. Sax fabrique des Bugles à Cylindres (toute la famille) dans deux mécanismes différents, qui ne laissent rien à désirer.

Le grand avantage du Bugle à Cylindres, c'est qu'avec le Cylindre ouvert l'instrument donne un son aussi pur et aussi beau que si on avait changé de ton sur un instrument ordinaire.

Depuis quelques années on a fait en Allemagne des Bugles à trois Pistons, mais nous préférons de beaucoup l'invention et les perfectionnements de M^r. Sax qui consistent dans l'emploi des Cylindres.”³⁸

In the list of new families of instruments by Sax in the supplement to the *Cours d'instrumentation* mentioned above, Kastner describes five sizes of saxotromba – soprano, alto, tenor/baritone, bass, and contrabass – without mentioning their pitch; but he says nothing further about this instrument. In the supplement to the *Traité*, however, he describes the *Saxo-Tromba chromatique* in greater detail.

“The younger Mr Sax has invented this instrument, which merits the attention of composers just as much as does the saxophone, which we will discuss later. The sonority of the Saxo-Tromba occupies a middle ground between the bugle and the trumpet. Its timbre is less full than that of the bugle, less strident than that of the trumpet, and in a word it has a very agreeable, special colour. The inventor has developed an entire family [...]. The Saxo-Tromba usually has three or four cylinders.”

“M^r. Sax fils vient d'inventer cet Instrument qui mérite de fixer l'attention des Compositeurs aussi bien que le Saxophone dont nous allons parler ci-après. La sonorité de la Saxo-Tromba participe du Bugle et de la Trompette: le timbre en est moins gros que celui du Bugle, moins strident que celui de la Trompette, en un mot il a une couleur spéciale fort agréable: L'inventeur en a institué toute une famille [...]. Les Saxo-Tromba sont généralement à 3 ou 4 Cylindres.”³⁹

Kastner's enumeration of the sizes of this instrument follows a plan very similar to that of the bugle à cylindres, mentioned above: soprano in F or $E\flat$, alto in C or $B\flat$, tenor/baritone in F or $E\flat$, bass in C or $B\flat$, and contrabass in F or $E\flat$. Kastner shows ranges in both written and concert pitch for all five sizes of the saxotromba.⁴⁰ He continues:

³⁸ Kastner: *Traité – Supplément*, pp. 35–37.

³⁹ *Ibid.*, p. 37.

⁴⁰ *Ibid.*, pp. 37f. For each of the ten different versions of the saxotromba (five different sizes, each size in two different keys; see main text), Kastner shows the range in both written pitch and concert pitch. Concert pitch for soprano, alto, and tenor/baritone extends from c to g^3 ; for bass and contrabass, from c to f^3 . Diatonic pitches only are notated, but the abbreviation *chromat.* appears above the staff in each case. For the two versions of the soprano saxotromba, the phrase “diff[icil]e si non impossible”

“As one can see, all these instruments have the same range, three and one-half octaves, though generally one should employ only three octaves, particularly for the soprano, alto, and tenor saxotromba, because the notes [musical notation, showing six notes, ranging chromatically from d^3 to g^3], if not absolutely impracticable, are at least of an extreme difficulty and can be played only by extraordinary virtuosos. As for the bass and contrabass saxotromba, one can give them the full three and one-half octaves. For all the members of this family, one should avoid passages that are too rapid in the lower ranges, because the low notes require a great volume of air. On the other hand, slow melodies are well adapted to the low notes. Example: [musical notation, showing passages in the low range for bass and contrabass saxotromba]”.

“Ces instruments ont, comme on voit, tous, la même étendue, qui consiste en 3 Octaves et demie, mais généralement il ne faut employer que 3 octaves, surtout pour les Saxo-Tromba Soprano, Alto et Ténor, parce que les notes [musical notation; see main text] sont, sinon [sic] absolument impraticables, au moins d’une difficulté excessive, et ne pourraient être données que par un virtuose extraordinaire. Quant aux Saxo-Tromba, Basse et Contrebasse, on y peut donner les 3 octaves et demie pleines. On doit, (pour toute la famille), éviter de donner des passages trop rapides dans les tons les plus graves, car ces tons exigent un grande volume d’air; au contraire un chant large et reposé conviendra parfaitement aux notes graves; Exemple:”.⁴¹

To the best of my knowledge, Kastner, in the supplements to his two treatises, was the first writer to mention the saxotromba in print. It is odd, however, that he failed to mention in either of his supplements the characteristic bell-up form of the saxotromba, or that it was destined for the cavalry. Furthermore, it is worth noting that no other published reports or musical scores from this period mention the saxotromba. Pontécoulant, however, transcribed a letter from the instrument maker Finck of Strasbourg, one of the first licensees for Sax’s instruments, dated 14 October 1844, praising Sax’s instruments and identifying several of them, including the Saxo-tromba and six different sizes of saxhorn.⁴² The earliest specific reference to the manufacture of a saxotromba indicates that the first exemplar was made by one of Sax’s employees, Hubart, on 23 March 1845. According to this report, Sax was frantic to complete the instrument because he had to present it to a Parisian commission the following day.⁴³ Given the rather detailed references to the saxotromba in Kastner’s treatises, as described above, it seems likely that Sax had developed prototypes for the instrument during the previous year.

(difficult if not impossible) appears below the last four (diatonic) notes; for the last four (diatonic) notes for both versions of the alto and both versions of the tenor, “diff[icile] rare” (difficult; rare); for the last four notes for both versions of the bass and contrabass, “diff[icile]”.

⁴¹ Ibid., p. 38.

⁴² Louis Adolphe le Doucet, comte de Pontécoulant: *Organographie. Essai sur la Facture Instrumentale. Art, Industrie et Commerce*, Paris 1861, pp. 234f. Regarding Finck’s license with Sax, see Mitroulia: *Adolphe Sax’s Brasswind Production*, p. 206.

⁴³ Ibid.

The Distin family and the saxhorn, 1844 The promotion of Sax’s new cylinder bugles for much of 1844 lay largely in the hands of five Englishmen, John Distin and his four sons, who together formed a family brass ensemble. Conflicting accounts survive regarding relations between Sax and the Distins in 1844/45,⁴⁴ but the family apparently attended Berlioz’s concert at the Salle Herz on 3 February 1844, and according to Comettant they visited Sax’s workshop the next day.⁴⁵ Just a few weeks after the concert at the Salle Herz, an unsigned report in the *Revue et gazette musicale* for 10 March 1844 described a “recent” concert by the Distins, playing on a petit bugle in E♭, two bugles-alto in B♭, a bugle-alto in E♭, and a trombone-ténor à cylindres, instruments with “a beautiful sonority, from the atelier of Mr Adolphe Sax”.⁴⁶ Though cylindres are mentioned here only in connection with the trombone, surely the bugles played on this concert were similarly equipped; probably they were identical in construction to those heard at Berlioz’s concert at the Salle Herz. Reports of their concerts throughout 1844 indicate that the Distins’ repertoire relied heavily on a few “signature” arrangements of tunes from contemporary operas – Meyerbeer’s *Robert le diable*, Bellini’s *I Puritani*, and Donizetti’s *Lucia di Lammermoor*, in addition to *God save the Queen*.

Charles Louis Baugniet’s well-known lithograph of the Distin family brass ensemble first appeared in 1845 (see Figure 1 in the article by Mitroulia and Myers in this volume, p. 20). As many scholars have noted, the instruments in the hands of these musicians are bell-front bugles or saxhorns, though not all of them have Sax’s distinctive cylinders. The instrument on the far right features double-piston valves of the Vienna type, though it probably was made by Sax.⁴⁷

John Distin’s interest in starting his own instrument manufactory may have been partly responsible for the ups and downs in the relationship between this brass-playing family and Sax over the next few years.⁴⁸ Nevertheless, the Distins did much to popularise Sax’s innovations. They performed frequently in France, England and Germany throughout 1844, and almost every account of their concerts mentions that they played Sax’s instruments, though most do not identify these instruments specifically.⁴⁹

44 See Adam Carse: Adolphe Sax and the Distin Family, in: *Galpin Society Journal* 6 (1946), pp. 193–201; and Eugenia Mitroulia/Arnold Myers: The Distin Family as Instrument Makers and Dealers, in: *Scottish Music Review* 2, No. 1 (2011), <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.849.4175&rep=rep1&type=pdf> (22 June 2018).

45 Comettant: *Histoire d’un inventeur*, p. 53.

46 *RGMP* II, No. 8 (10 March 1844), p. 86.

47 See Mitroulia: *Adolphe Sax’s Brasswind Production*, p. 91.

48 See Carse: *Adolphe Sax and the Distin Family*, p. 200.

49 Performances by the Distins, playing Sax’s instruments, took place, for example, in Paris, at the Salle Herz, on 26 March (*RGMP* II, No. 11 [17 March 1844 – announcement of concert], p. 96) (where the family is identified as “Delisle”); in the same location on 30 March (*ibid.*, No. 13 [31 March 1844], p. 116);

In May and June of 1844, Paris hosted an Industrial Exposition on the Champs Élysées. Thousands of industrial concerns exhibited their wares, and makers of all kinds of musical instruments were present. An article in the *Revue et gazette musicale* for 2 June of that year describes a performance by the Distins, with Sax's instruments very much in evidence.

“Last Monday the king, the queen, the Duke of Nemours, and the Prince of Joinville visited the Exposition. Their Majesties, accompanied by the Minister of Commerce, expressed a keen desire to hear the new instruments of Mr Sax, who, because of the many improvements that he has made to them, have brought about a revolution in military music and in orchestras. The ingenious inventor, assisted by Mr Distin, improvised a concert for which Their Majesties exhibited the greatest satisfaction. The king conversed for some time in English with Mr Distin, and congratulated Mr Sax concerning his interesting inventions.”

“Lundi dernier, le roi, la reine, le duc de Nemours et le prince de Joinville ont visité l'Exposition. LL. MM., conduites par le ministre du commerce, ont manifesté le vif désir d'entendre les nouveaux instruments de M. Sax, qui, par les perfectionnements nombreux dont ils ont été l'objet, sont appelés à faire une révolution dans les musiques militaires et dans les orchestres. L'ingénieux inventeur, assisté de M. Distin, a improvisé un concert dont LL. MM. ont témoigné la plus complète satisfaction. Le roi s'est longtemps entretenu en anglais avec M. Distin, et a félicité M. Ad. Sax sur ses intéressantes découvertes.”⁵⁰

Sax was keenly disappointed that the Exposition's judges awarded him a silver rather than a gold medal, yet his instruments attracted considerable attention. An article in *L'Illustration* for June/July 1844 describes the instrument on display.

“We note also the inventions of Mr Sax in [the area of] wind instruments. Mr Sax has improved all the woodwind and brass instruments. He has applied new systems of cylinders to brass instruments without altering their sonority. His exhibit forms a complete military band: bugles à cylindres, trompettes grandes et petites, a new bassoon, flute, bass clarinet, contrabass clarinet, and above all the saxophone, a genuinely new creation, then the saxo tromba, and so forth; cornets, trombones – all can be found there, and in such a fine state that one can say that they are new instruments.”

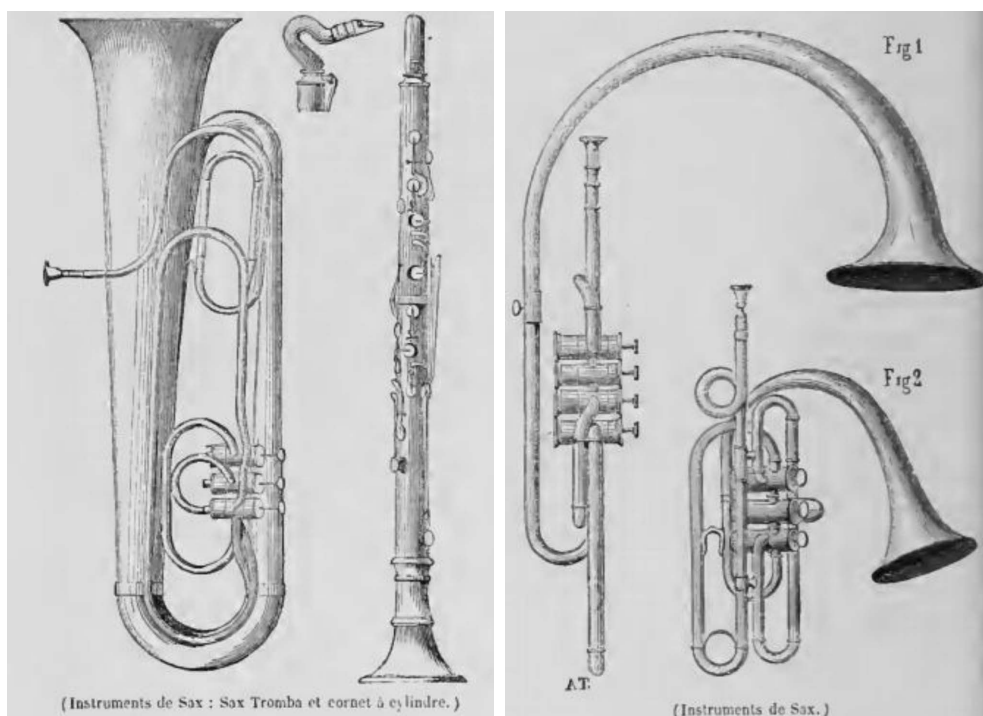
“Signalons aussi les inventions de M. Sax dans les instruments à vent. M. Sax a perfectionné tous les instruments en cuivre et en bois; il a appliqué de nouveaux systèmes de cylindres aux instruments en cuivre sans rien changer à leur sonorité. Son exposition forme une musique militaire complète: bugles à cylindres, trompettes grandes et petites, nouveau basson, flûte, clarinette basse et contre-basse, et

in a concert organised by Berlioz on 6 April at the Opéra Comique (announced in the same issue of the *RCMP*, p. 119); in early May (*ibid.*, No. 18 [5 May 1844], p. 158); in a concert given by the Société libre des beaux-arts on 15 May (*ibid.*, No. 20 [19 May 1844], p. 177); on 18 May (*ibid.*, No. 21 [26 May 1844], p. 183); at Baden in late June (*ibid.*, No. 25 [30 June 1844], p. 219); in Brighton Town Hall, November 1844 (*The Musical World* 19, No. 45 [7 November 1844], p. 367 and *ibid.*, No. 46 [14 November 1844], p. 374); and at Arundel Castle and St. James's Theatre, December 1844 (*ibid.*, No. 51 [19 December 1844], pp. 414f.).

50 *Nouvelles*, in: *RCMP* 11, No. 22 (2 June 1844), p. 195.

principalement le saxophone, véritable création, puis le saxo-tromba, que sais-je, des cornets, des trombones, tout s’y trouve et dans des conditions d’exécution telles qu’on peut dire que ce sont des instruments nouveaux.”⁵¹

Drawings of four of Sax’s instruments accompany the article – probably the first such drawings to be published (see Figures 2 and 3). The original caption for the illustration in Figure 2 is clearly inaccurate, and it is possible that the two captions were inadvertently switched. The bell expansion on the instrument on the left in Figure 2 is more horn-like than tromba-like, so perhaps this illustration was intended to depict a saxhorn or *bugle à cylindres* rather than a saxotromba, but Sax’s notoriously imprecise terminology renders this a moot point. The instrument on the right in Figure 3 was probably intended to represent a *cornet à cylindres*. As to the instrument on the left in Figure 3, its wrap reflects Sax’s desire to eliminate sharp bends in the tubing, but its exact configuration, including the position of the valves, is not found in any other illustrations of Sax’s instruments known to me; it may have been a preliminary design for a saxtuba.⁵²



FIGURES 2 AND 3 Illustration in *L'illustration, journal universel*, No. 71 (June–July 1844), p. 296

- 51 [Anon.]: Exposition des produits d’industries, in: *L'illustration, journal universel* 3, No. 71 (June–July 1844), pp. 294–297, here p. 297.
- 52 I wish to thank Eugenia Mitroulia and Arnold Myers for their assistance on this issue, as with other matters concerning this essay (personal communications, May 2014).

The Distins' success at the 1844 Paris Exposition was described in a report in *The Musical World* (London) for 15 August 1844, signed "From our own Correspondent at Badon Badon [sic]."

"[R]ecently they have had the honour of performing, by special command, before their Majesties King Louis Philippe, the Queen, the Duc de Nemours, the Duc de Amaule, the Prince de Jouville [sic], the Princess Adelaide, and many other distinguished persons. His majesty conversed very affably, in English, with the Distins, and complimented them highly on their performances. He has made them a handsome present in requital for the gratification afforded him. The instruments they now perform on, are of an entire new construction, called the *Saxhorus* [sic]. The Distins are now giving concerts in Germany with great success, and intend proceeding to Russia, returning to England at the commencement of next season."⁵³

Assuming *Saxhorus* to be a typographical error for "Saxhorns", this report is one of the very earliest references to this name for the instruments known earlier as *bugles à cylindres*.

Saxhorns are mentioned again in report of a concert organised by Louis-Antoine Jullien at Covent Garden on 3 December 1844:

"[T]he great attraction of the evening was the Distin family, who have been for the last six months in Paris and Germany, during which time they have lost no opportunity of improving themselves or their instruments. The latter, now used by them, are of silver, and were presented to them by Louis Philippe, in consequence of the pleasure he received from their performance during the late Exposition. Their instruments, termed 'Sax Horns,' were originally invented by M. Sax, of Paris, but have been greatly improved by the Distins [...]."⁵⁴

In addition to the mention of "Sax Horns", two points in this quotation are worthy of further consideration. First, the statement that King Louis Philippe gave the Distins their silver instruments is open to question.⁵⁵ Secondly, the statement that their instruments were "originally invented by M. Sax [...], but have been greatly improved by the Distins" is suspect, since the family did not begin manufacturing instruments until about 1851.⁵⁶ They may, however, have made some minor modifications to their instruments.

The very next week, the *Illustrated London News* reported again on the Distins:

"The first appearance of these highly-gifted gentlemen at M. Jullien's Concerts, was noticed in our journal of last week. They have repeated their performances, with increased effect, during the past week. [...]"

53 *The Musical World* 19, No. 33 (15 August 1844), p. 272.

54 *The Illustrated London News* 5, No. 136 (7 December 1844), p. 365. Reports of the French Industrial Exposition of 1844 in French periodicals of the time mention that the French king honored the Distins with a silver medallion, but say nothing of silver instruments.

55 See Horwood: *Adolphe Sax*, p. 59.

56 See Mitroulia/Myers: *The Distin Family as Instrument Makers and Dealers*, pp. 3 f.

The Distin Family have visited various parts of Scotland, Ireland, and England, and have given upwards of seven hundred concerts. In December, 1843, they proceeded to the continent, and were invited to make a trial of some newly-invented instruments, manufactured by M. Adolphe Sax, in Paris. Upon the introduction of the Distin's improved Sax Horns in Paris, they at once ensured success. [...]

The Distins are at present the only performers on the Sax Horn, which unites the powers of the French horn and those of the cornet-à-piston, but is infinitely superior to both, for it combines the mellowness and sweetness of the former, with all the brilliancy and power of the latter.”⁵⁷

The article is accompanied by an illustration that shows the Distins playing bell-front instruments, as in the Bagniet lithograph. And like the article about the Distins in the same periodical for the previous week, quoted earlier, it suggests that they “improved” Sax's saxhorns.

These reports and a similar one of the Distins playing on saxhorns at Brighton Town Hall on 6 November 1844 lend credence to the hypothesis that they were responsible, at least in part, for the English-sounding name “saxhorn”. It should be noted, however, that Sax and Arban performed with a “Sax horn band” in England under the direction of Henri Laurent around this time, including a concert on 14 October at the Royal Adelaide Gallery.⁵⁸

Concerning the national origin of the term “saxhorn”, in 1896 Henry Distin reported that in 1844 he had heard a French musician play the saxhorn, identified as such on the printed program, on a concert that also included the family brass ensemble. Given what we know of the family's performance schedule for that year, the concert in question must have taken place sometime between early February and midsummer. If this is true, the term “saxhorn” may have been in play prior to the appearance of the report in *The Musical World* quoted above, and if so it must have been French in origin, not English. But considering the lack of corroborating evidence and the late date of Henry Distin's comment, it must be taken with a grain of salt.⁵⁹

The Distin family continued to be involved with Sax and his instruments for many years after 1844. The story of the dust-up between Sax and the Distins in the early months of 1845, their rapprochement, their 1846 business arrangement, and the Distins' manufacturing enterprise has already been told by Adam Carse and by Mitroulia and Myers, so there is no need to recount it here.⁶⁰

57 *The Illustrated London News* 5, No. 137 (14 December 1844), p. 384.

58 *RCMP II*, No. 46 (17 Nov 1844), p. 385. This report states that Sax had just returned from England, where the instruments he imported met with great success. He and Arban played in a concert at the Galerie-Adelaide. He was called to Windsor, where Prince Albert complimented him on his instruments.

59 See Enderby Jackson: *Origin and Promotion of Brass Band Contests*, in: *Musical Opinion and Music Trade Review*, No. 226 (July 1896), p. 674, quoted in Mitroulia: *Adolphe Sax's Brasswind Production*, p. 112.

60 See note 44, above.

Sax's brasswinds in later works by Kastner The splendid scale drawings in Kastner's *Manuel général de musique militaire* (1848)⁶¹ may help to resolve some of the questions concerning Sax's innovations in brasswind instruments. Kastner devotes six plates in this book to the "new instruments of the system of Ad[olphe] Sax"; five of these depict brasswind instruments, and Plates xx, xxii, and xxiii show sixteen different variations of the saxhorn. Some of these instruments are quite similar: the soprano saxhorn in E \flat , No. 1 in Kastner's Plate xxii, for example, apparently differs from the soprano saxhorn in E \flat in Plate xxiii only in its wrap (see Figures 5 and 6). Kastner does not mention or depict any *bugles à cylindres*, because these instruments are now called saxhorns. In describing the *petit saxhorn*, Kastner states, "The saxhorn is an instrument of brass, with a mouthpiece, furnished with *cylindres*. This instrument is the flügelhorn perfected according to the system of Ad[olphe] Sax".⁶² This appears to settle the issue of the relationship between the cylinder bugle and the saxhorn.

The saxotromba, however, is another story. Judging from their respective names, one might expect that the principal difference between the saxhorn family and the saxotromba family would be one of bore dimensions – that is, the saxhorn should be more "horn-like," and hence with a greater proportion of conical tubing and larger expansion in the bell section than the more "trumpet-like" saxotromba. Figures 5/6 and 7 compare Kastner's (and Sax's?) conception of the saxhorn and saxotromba. Judging from these illustrations, the two terms are largely ambiguous as concerns bore and bell expansion. At the bottom of Plate xxi (Figure 7), Kastner has supplied the following legend: "Famille de saxotrombas. Instruments de nouvelles proportions, occupant le milieu, pour la qualité de son, entre le Bugle, l'Ophicleide, et le Cornet, la Trompette et le Trombone. Tous ces instruments ont le même doigté et la même position."⁶³

Mitroulia and Myers have shown that, in general, the saxotromba hardly existed as a distinct instrument, except in the alto size.⁶⁴ Indeed, if we judge from the plates in the *Manuel général*, two instruments in the alto range – *saxotromba en si bémol* contralto (Figure 7, No. 2) and the *saxotromba in fa* (*tons de mi et mi bémol*), "pour faire la partie de cor dans la musique de cavalerie" (saxotromba in F [crooks for E and E \flat], to play the part of

61 Paris: Firmin Didot.

62 Kastner: *Manuel général*, p. 378. "Le saxhorn est un instrument de cuivre, à embouchure en bocal, et muni d'un mécanisme à cylindres. Cet instrument est le flügelhorn perfectionné d'après le système d'Ad. Sax."

63 Kastner: *Manuel général*, Appendix, Plate xxi. "Famille des Saxotrombas. Instruments de proportions nouvelles tenant le milieu, pour la qualité de son, entre le Bugle, l'Ophicleide, et le Cornet, la Trompette et le Trombone. Tous ces instruments ont le même doigté et la même position."

64 Mitroulia/Myers: Adolphe Sax. Visionary or Plagiarist?, pp. 102–104; Mitroulia: Adolphe Sax's Brasswind Production, pp. 234f.

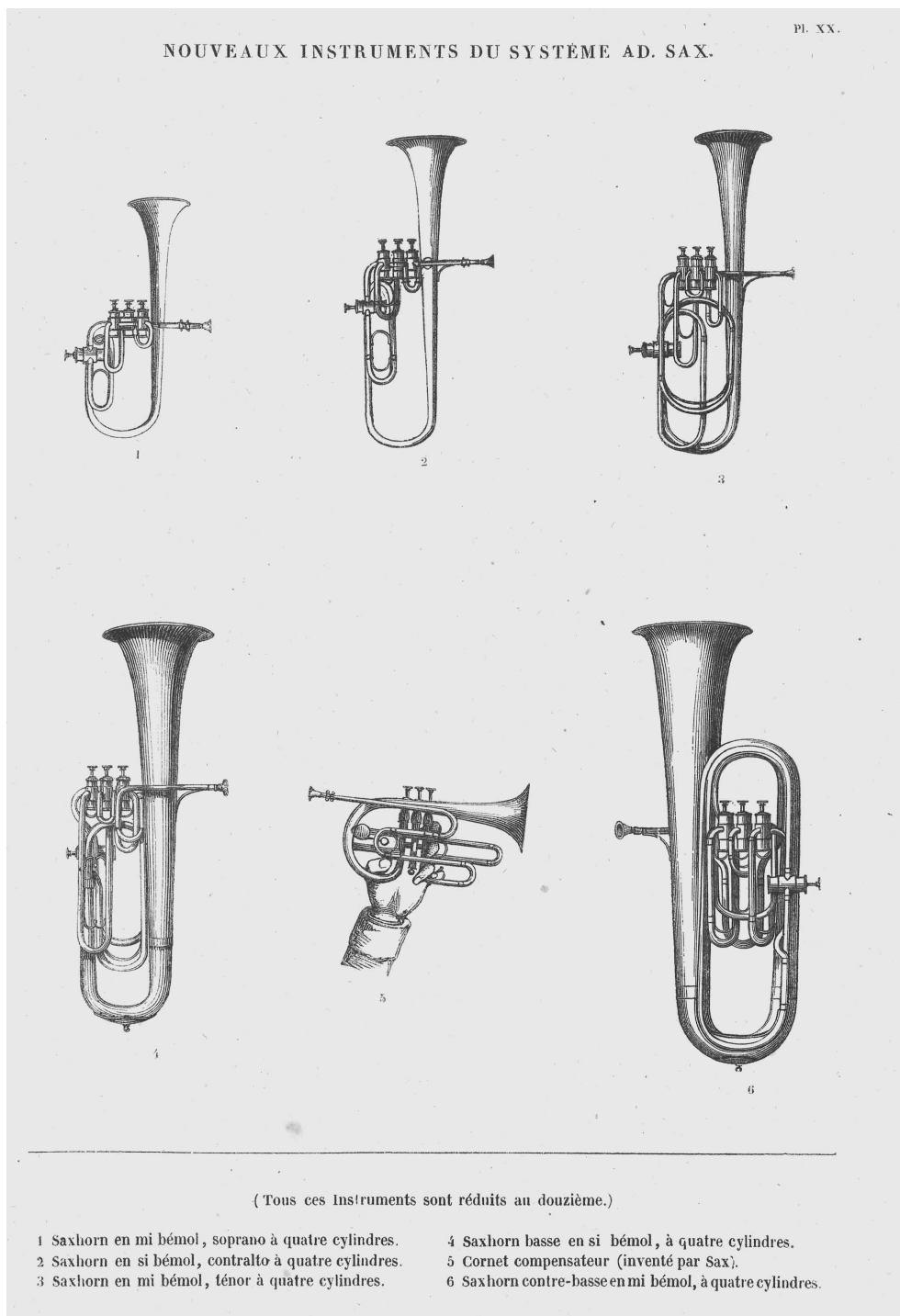


FIGURE 4 Kastner: *Manuel général de musique militaire*, Paris 1848, pl. xx

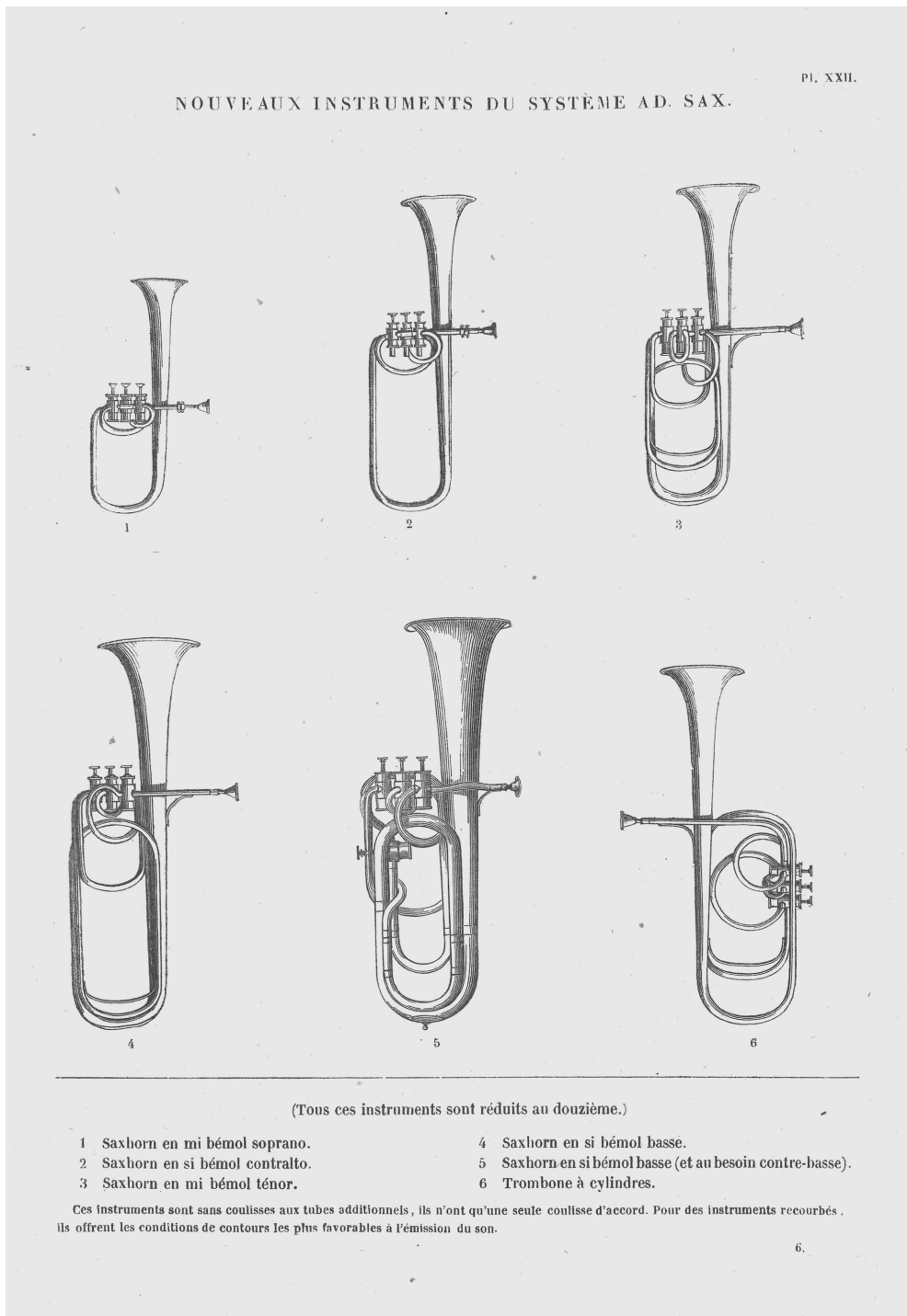


FIGURE 5 Kastner: Manuel général de musique militaire, Paris 1848, pl. xxii

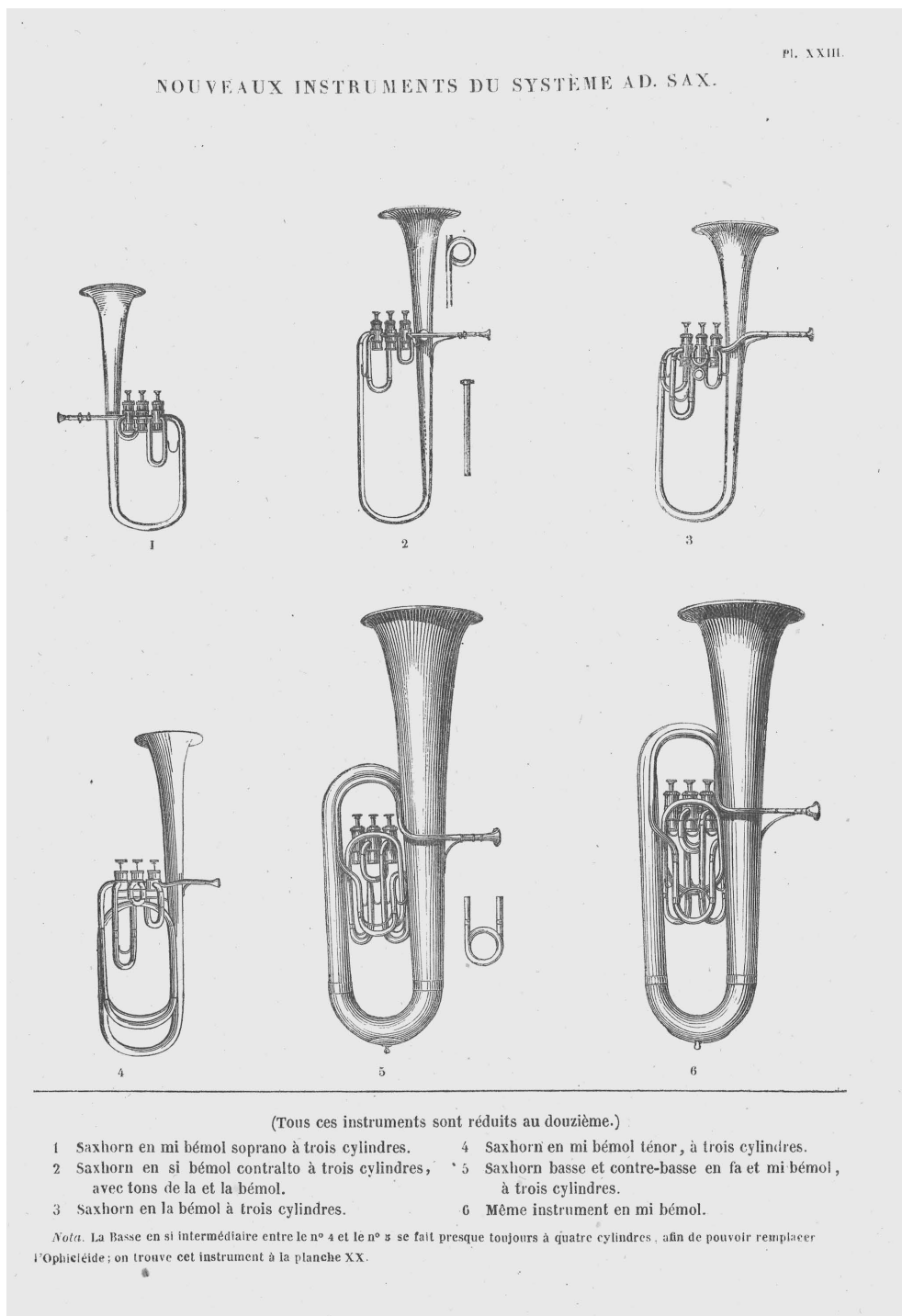


FIGURE 6 Kastner: *Manuel général de musique militaire*, Paris 1848, pl. xxiii

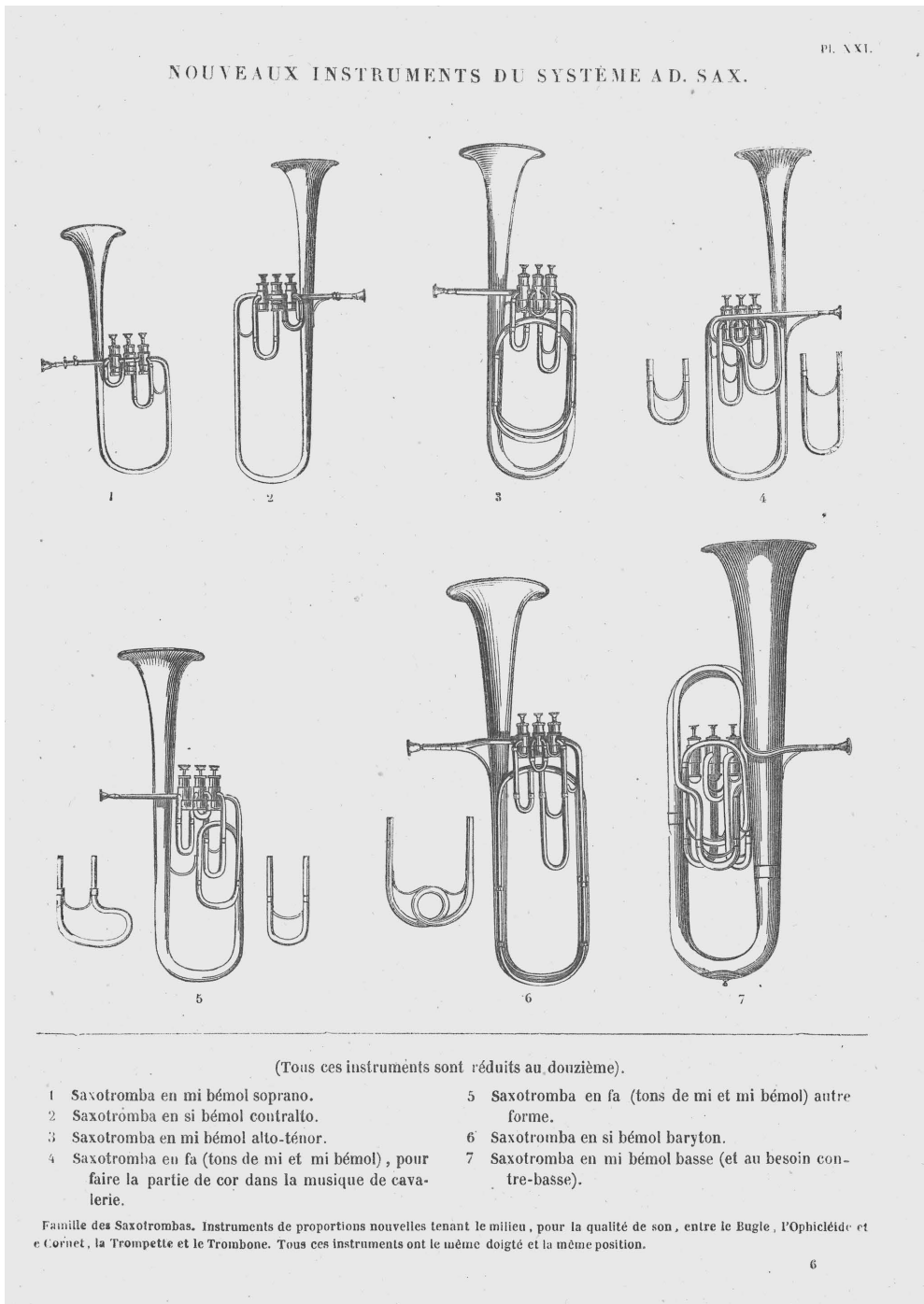


FIGURE 7 Kastner: Manuel général de musique militaire, Paris 1848, pl. XXI

the horn in cavalry music; Figure 7, No. 4) – appear to have the most modest bell expansion of all the instruments in these plates, while three other saxotrombas (Figure 7, Nos. 3, 5 and 7) are scarcely distinguishable in terms of bore profile and bell expansion from many of the saxhorns in other plates (compare with Figures 5 and 6). What, then, happened to the saxotromba? Again, Mitroulia and Myers seem to have found the key: the term “saxotromba” came to indicate the bell-up (upright) form, often with little regard to bore profile or bell expansion.⁶⁵ Plate xxiv, Nos. 6 and 7 (Figure 8) from the *Manuel général* shows two versions of the *nouvelle trompette à cylindres*. No. 6 is the bell-forward, infantry version (*forme d’infanterie*), while No. 7 is the upright form (*forme saxotromba de cavalerie*). No. 8 in Figure 8 is a valve trombone in upright form (*forme saxotromba de cavalerie*). “Saxotromba”, then, is an ambiguous designation: to its maker it sometimes designated a separate instrument, but more often it simply referred to the bell-up form.

The earliest descriptions of the saxotromba, found in the supplements to Kastner’s two treatises on orchestration, do not mention whether the instrument was bell-forward or bell-up. His patent drawing of 1845, however, clearly shows the bell-up form; this contrasts with the instruments in Bagniet’s lithograph of the *Distin* family, which clearly shows the *bugle à cylindres* or saxhorn as a bell-forward instrument – at least at this early date.

Finally, yet another way in which Kastner promoted Sax’s brasswinds after 1845 was in his compositions. He published the earliest solo works for saxhorn and piano, *Adagio et grande polonaise brillante* (1846) and *Fantaisie et variations brillantes* (1847).⁶⁶ Among his more unusual conceptions are his several *livres-partitions*, literally “book-scores”. Most of these are essentially essays – often of a mystical, phenomenological, and/or historical nature – with musical interpolations. One of these, *Les voix de Paris* (also called *Les cris de Paris*), contains three compositions with instruments of Sax. In the “*Pas redoublé*”, subtitled “*Musique d’infanterie*”, we find two *Clarinettes Basses-Sax* in B \flat , *Bassons-Sax*, *Saxophones Sopranos* in B \flat , *Saxophones Altos* in E \flat , *Saxophones Ténors* in B \flat , *Saxophones Barytons* in E \flat , a *Petit Saxhorn* in B \flat , two *Saxhorns Sopranos* in B \flat , two *Sax-Trombas* in E \flat , *Saxhorns Barytons* in B \flat , *Saxhorns Basses* in B \flat , *Saxhorns C[ontre] Basses* in E \flat , and *Saxhorns C[ontre] Basses* in B \flat (see Figure 9). The piece also includes *Cors à Cylindres*, *Cornets à Cylindres* and *Trompettes à cylindres*, in addition to a few more “conventional” instruments. In light of the research of Mitroulia and Myers, it is significant that the only saxotrombas used here are instruments in the alto range.

Another piece from *Les cris de Paris*, “*La Marche*”, subtitled “*Musique de cavalerie*”, employs even more of Sax’s brasswinds. It has parts for *Petit Saxhorn* in B \flat , two *Saxhorns*

65 Mitroulia/Myers: Adolphe Sax. *Visionary or Plagiarist?*, pp. 102–104.

66 Both works published in Paris by Brandus; both dedicated to Arban.

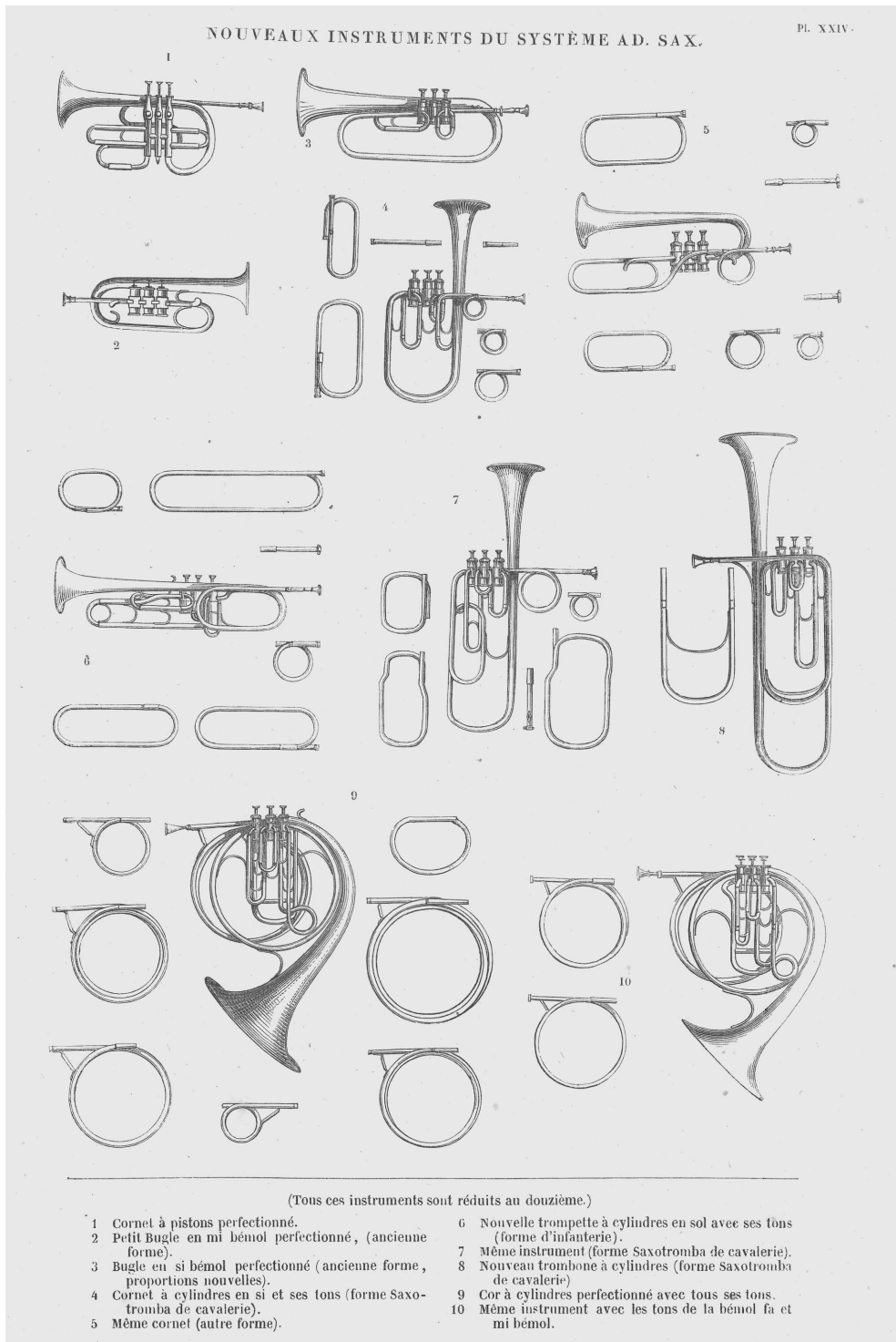


FIGURE 8 Kastner: Manuel général de musique militaire, Paris 1848, pl. xxiv

55

PAS REDOUBLÉ
MUSIQUE D'INFANTERIE (au loin et se rapprochant peu à peu)

(M. 1-104)

Petite Flûte en ré b.
Flûte en mi b.
Hautbois
Petite Clarinette en mi b.
Clarinette Solo en si b.
1^{re} Clarinette en si b.
2^{me} et 3^{me} Clarinettes en si b.
2 Clarinettes Basses-Sax en si b.
Bassons-Sax.
Saxophones Sopranos en si b.
Saxophones Altos en mi b.
Saxophones Ténors en si b.
Saxophones Barytons en mi b.
Petit Saxhorn en mi b.
2 Saxhorns Sopranos en si b.
2 Sax-Trombas en mi b.
Cors à Cylindres en mi b.
Cors à Cylindres en fa.
Cornets à Cylindres en si b.
Trompettes à Cylindres en mi b.
Trombones.
Saxhorns Barytons en si b.
Saxhorns Basses en si b.
Saxhorns C. Basses en mi b.
Saxhorns C. Basses en si b.
Triangle.
Tambour.
Cymbales et Grosse Caisse.

ppp
2^e fois pp

FIGURE 9 Kastner: "Pas redoublé", from *Les voix de Paris* (Paris/Brussels 1857), p. 58. Courtesy of Ignace De Keyser

in E♭, Saxhorn solo in B♭, three premiers Saxhorns sop[ranos] in B♭, three seconds Saxhorns sop[ranos] in B♭, two Saxhorns in A♭, two Saxhorns altos in E♭, Saxhorns Barytons in B♭, four Saxhorns Basses in B♭, two Saxhorns C[ontre] Basses in E♭, and two Saxhorns C[ontre] Basses in B♭, in addition to Cornets à cyl[indres], Trompettes à cyl[indres], Trombone à cyl[indres], in addition to a few more conventional instruments.⁶⁷

Conclusion Adolphe Sax was hardly a shy man, and he knew how to promote his instruments. He had many rivals and detractors in Paris in the early 1840s, but he also had many influential friends, among whom he counted Meyerbeer, Berlioz, Kastner, Spontini, Auber, General Rumigny, the Distin family, and several others. Kastner and the Distins played very significant roles in promoting Sax's brasswinds – Kastner through his treatises and his compositions, and the Distins with their highly successful concerts. Had it not been for them, Sax would have had a more difficult time making a name for himself in the highly competitive musical culture of mid-nineteenth-century Paris.⁶⁸

⁶⁷ I am grateful to Ignace De Keyser for sharing with me the scores to several of Kastner's compositions.

⁶⁸ I wish to thank the following individuals for their assistance in the preparation of this article: Eugenia Mitroulia, Arnold Myers, Albert R. Rice, Robert S. Howe, Ignace De Keyser, Fred L. Hemke, Stephen Cottrell and Charlotte Kolzynski.

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DAS SAXHORN

Adolphe Sax' Blechblasinstrumente im Kontext ihrer
Zeit. Romantic Brass Symposium 3 • Herausgegeben von
Adrian von Steiger, Daniel Allenbach und Martin Skamletz

MUSIKFORSCHUNG DER
HOCHSCHULE DER KÜNSTE BERN

Herausgegeben von Martin Skamletz
und Thomas Gartmann

Band 13



Dieses Buch ist in gedruckter Form im April 2020 in erster Auflage in der Edition Argus in Schliengen/Markgräflerland erschienen. Gestaltet und gesetzt wurde es im Verlag aus der *Seria* und der *SeriaSans*, die von Martin Majoor im Jahre 2000 gezeichnet wurden. Gedruckt wurde es auf Eos, einem holzfreien, säurefreien, chlorfreien und alterungsbeständigen Werkdruckpapier der Papierfabrik Salzer im niederösterreichischen Sankt Pölten. Das Vorsatzpapier *Caribic cherry* wurde von Igepa in Hamburg geliefert. *Rives Tradition*, ein Recyclingpapier mit leichter Filznarbung, das für den Bezug des Umschlags verwendet wurde, stellt die Papierfabrik Arjo Wiggins in Issy-les-Moulineaux bei Paris her. Das Kapitalband mit rot-schwarzer Raupe lieferte die Firma Dr. Günther Kast aus Sonthofen im Oberallgäu, die auf technische Gewebe und Spezialfasererzeugnisse spezialisiert ist. Gedruckt und gebunden wurde das Buch von der Firma Bookstation im bayerischen Anzing. Im Internet finden Sie Informationen über das gesamte Verlagsprogramm unter www.editionargus.de, zum Institut Interpretation der Hochschule der Künste Bern unter www.hkb.bfh.ch/interpretation und www.hkb-interpretation.ch. Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über www.dnb.de abrufbar. © der zeitgleich erschienenen digitalen Version: die Autorinnen und Autoren, 2020. Dieses Werk ist lizenziert unter einer [Creative Commons Namensnennung-Nicht kommerziell 4.0 International](https://creativecommons.org/licenses/by-nc/4.0/) Lizenz (CC BY-NC 4.0). DOI: <https://doi.org/10.26045/kp64-6177> ISBN 978-3-931264-93-2