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The Improvements of Brass Instruments from 1800 to 1850 Including Implications for Their Usage

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The Improvements of Brass Instruments from
1800 to 1850 Including Implications for Their Usage
(TITLE)

BY

Delmar T. Vollrath
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CHAPTER I

INTRODUCTION

The purpose of this study is to examine one phase of the evolution of musical instruments; that of the physical improvements of brass wind instruments from 1800 to 1850, in the hope that a more thorough understanding of the instruments and their background will result. The method used to obtain this information was interviews and reference books pertinent to the study.

The elements in this study include: a brief history of the instrument until this time, how the instrument was used before this time, how the instrument was used before this period, the improvements which have taken place, and how the instrument was used after these improvements were made.

The twentieth century has been called the age of instrumental music, possibly because of the improvement that was made in the early nineteenth century. However, man has had a great desire to produce music from the beginning of time and he has used almost anything which produced sound as a musical instrument. The term "musical instrument" is usually confined to objects that have been made or adopted to serve as music makers, primarily. Such objects have been produced by man since prehistoric times:

bone pipes and flutes have been found in Europe that were used as music makers as early as the paleolithic era. Prehistoric man is believed to have had various types of other instruments, such as rattles, drums, primitive string instruments and other noise makers that he used to produce music.

Whether used to act as warning signals, as religious devices, or purely as expressions of emotional energy, primitive instruments impressed their hearers with the potency of their sound. As man became more intelligent, he also became more interested in producing sound for sound's sake. From this interest the first concept of

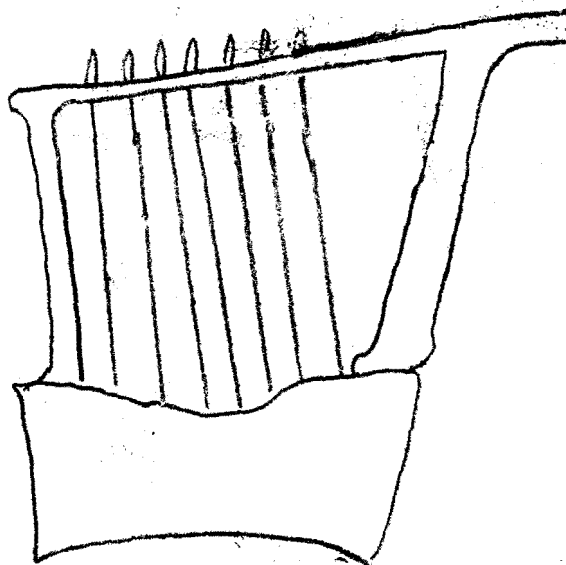


FIGURE 1 Early Sumerian Lyre
(c. 3,000 B. C.)

music was evolved. Musical instruments, in the various forms they have taken in the hands of man, have participated in the evolution of that concept.¹

¹William Mitchell, "Musical Instruments," Collier's Encyclopedia, vol XVII, p. 65.

CHAPTER II

TRUMPET

The trumpet is one of the oldest instruments. Such ancient civilizations as China, Egypt, and Greece possessed the trumpet. Rome adopted it at an early date and it was known as the litus or curved trumpet.

As early as the thirteenth century, the trumpet was used as a means of military signaling and this custom survives today in the use of bugle calls for reveille, taps, assembly, etc. It has been stated in an Italian treatise of the sixteenth century that an army would not attack unless summoned by the sound of a trumpet or drum. During the sixteenth and seventeenth centuries the trumpet was confined to signals and flourishes. The trumpet became associated with military music when used by the cavalry. Instruments, such as bagpipes and fifes, were characteristic of the infantry. From the earliest times until the period of J. S. Bach, (1685-1750) the trumpet was reserved for special purposes and was generally considered an appurtenance of the nobility.²

Trumpets were used constantly during the middle ages, especially during the period of knighthood. As late as the time of Henry VIII of England (1509-1547) there was

²Richard Franko Goldman, The Concert Band, Vol I The Field of Music (New York: Rinehart & Co. Inc., 1946), p. 22.

a royal orchestra consisting of ten trumpets balanced against nine stringed instruments. The popularity of the instrument led to the formation of a trumpeter's guild which accepted members of great ability, and this guild grew to be one of the most important musical unions. It gave impetus to the playing of the instrument, and kept the standards of excellence in performance. This guild existed until the beginning of the nineteenth century; even then it contained several distinguished members. One of the best known was the Duke of Saxe-Weimar, who had to apply in regular form and pass a playing examination on the trumpet just as though he were an unknown, obscure aspirant trying for the honor.

The trumpet differs from the horn in that it is a cylindrical shape rather than conical. The mouthpiece of



Trumpet

FIGURE II Mouthpiece

the trumpet is also different from that of the horn. The trumpet's mouthpiece is a straight cylindrical tube with a shallow hemispherical cup. The difference in the shape of the mouthpiece is of great importance, in that it helps to give the trumpet a tone that is of a martial quality.

The trumpet in C or natural trumpet, was eight feet long, half the length of the horn in low C. Its music was written in C clef and sounded as written. The air column did not vibrate as a whole, in which case it would sound the C two octaves below middle C, but subdivided into halves, thirds, quarters, etc., which gave the higher notes of the harmonic series, because of the shorter dimensions of the column. One of the similarities between the horn and the trumpet is that neither of the instruments could alter their pitch and play in a different key without the use of tuning crooks. The keys obtained by using these crooks were F, E, E flat and D transposing upward and B flat, transposing downward. The reason for this was that all trumpets, except the one in C, are transposing instruments, and all music was written as though it were for the C trumpet. Of course, there were a few other variations, at times, but

these were the most prominent.

In 1608, in his opera Orfeo, Monteverdi called for two violins, two bass viols, ten tenor viols, two viol da gams, a harp, and two guitars. The wind instruments that were used consisted of four trombones, two cornetti, a small flute, a clarion, three trumpets with mutes, three organs, and a harpsicord. The only music they had was a figured bass part from which they improvised.³

As early as the time of Monteverdi, the trumpets of the orchestra were divided, consisting of one clarino, or long instrument, and three larger ones known as the trombe. This distinction was kept until the time of Bach and Handel. The clarino was a long instrument with a small bore, while the trombe was a straight tubed instrument of about six feet. The clarino took the upper and more florid passages and was played by the virtuoso. The bass parts were taken by the trombe and were rarely required to perform above the seventh harmonic.

During the Classical Period, 1750-1820, almost every instrument was being given a new role in the orchestra, and trumpets were relegated to an inferior position. The

³ H. W. Schwartz, The Story of Musical Instruments from Shepard's Pipe to Symphony (Garden City, N. Y. : Doubleday, Doran and Co., 1941), p. 26.

gradual disappearance of the "Clarinblaser," one who played in the extreme upper register and the decline of the trumpet-ers' guild combined to bring about this decadence in trumpet playing. Mozart substituted the clarinet for trumpet parts in Handel's Messiah. Beethoven used trumpets very sparingly, and when he did call for them it was usually in a passage⁴ for full orchestra.

Thomas Harper, an English trumpeter of the early nineteenth century, used a slide trumpet. This consisted of a double joint in the tube so that it could be slightly elongated. The slide was drawn toward the player and was used not only to correct the harmonics, which were out of tune, but also to increase the number of tones possible on the instrument. It could lower any note by a semitone or whole tone; and even though this did not complete the chromatic scale, it added to the trumpet's musical worth.⁵

To overcome limitations of tuning crooks and to bridge the gaps in the natural scale, James Holliday, an Irish band master, invented the Kent or keyed bugle in 1810. This name was given to the instrument in honor of the Duke of Kent, who became very interested in it. However, there is

⁴Arthur Elson, Orchestral Instruments and Their Use (Boston: The Page Co., 1923), pp. 220-225.

⁵Ibid., pp. 228-229.

evidence that keyed bugles had been invented as early as 1770 by Kolbel of St. Petersburg and also by Weidinger of Vienna in 1801. The keyed bugle had five holes in the side which were opened and closed by keys, similar in principle appearance to that of a saxophone. The inventors concluded that they could make the instrument chromatic by the use of this device.

Playing this instrument was somewhat like laying the saxophone, a later invention, but the mouthpiece was of a cup-shape rather than a clarinet type. Immediately this invention was hailed as one likely to change the whole course of music. Now all brass instruments played with a cup-shaped mouthpiece could play music just as a flute or clarinet could. The trumpet and cornet, instead of being used to play a few scattered chords, now could take their place alongside other instruments which had been accepted for orchestra and band for years. Great prophecies were made about the benefits that would come about as a result of the keyed bugle.

The principle of using keys to bridge the gaps in the scale of cup-mouthpiece instruments was found to be more easily adapted to conical-bore instruments than those of a cylindrical-bore such as that of the trumpet. For this reason, the demand for the keyed bugle increased while the keyed cornet became less popular and the keyed trumpet disappeared.⁶

The valve trumpet was invented around 1815 by Blumel of Silesia and Heinrich Stozel of Berlin. It did not gain great prominence until the addition of the third valve by Muller of Mayenne, around 1830. Even with the addition of the third valve and the great prominence this brought to it, the natural trumpet with crooks was included in scores until nearly 1900.

One of the reasons for the use of the simple or natural trumpet and the lack of popularity of the valve trumpet at first was that very little music was written for the valve trumpet. Beethoven, along with some of his contemporaries, ignored it. There are a few rare exceptions, for instance, when a trumpet part during this time could not be played on a simple trumpet with tuning crooks.

⁶Schwartz, op. cit., p. 173.

With Wagner, Berlioz, and Schumann, the new instrument generally was accepted and toward the latter part of the nineteenth century it was no longer necessary for the composer to specify valve trumpet or to distinguish it from the simple trumpet.

With the addition of valves, the trumpet was shortened, also, which made it easier to play but raised its fundamental pitch.⁷ The orchestral trumpet was tuned to F but this instrument disappeared from the orchestra at the end of the nineteenth century because composers used it more and more in its high register. This caused many players to change to a B flat soprano trumpet. This trumpet was usually equipped with a slide change to A or pitched in C with slide changes to B flat and A.⁸

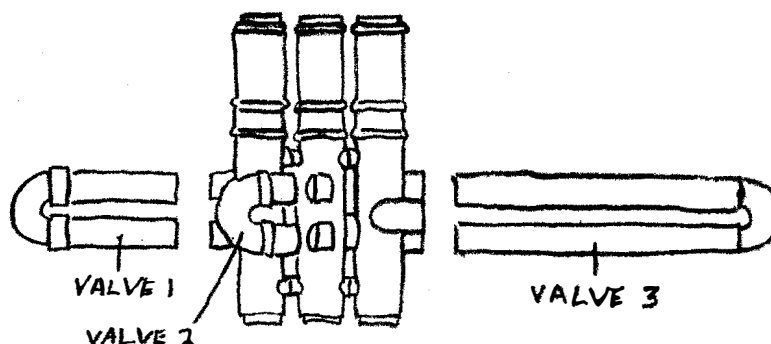


FIGURE III⁹

⁷ Harry Phillips, "The Unique Background of Band Scoring" The Instrumentalist Vol XIX (April, 1965), pp. 66-72.

⁸ Curt Sachs, The History of Musical Instruments, (New York: W. W. Norton and Co., 1940), pp. 433-434.

⁹ Schwartz, loc. cit., p. 174.

With the addition of the third valve by Muller, the valve arrangement looks like that in Figure III. When valve 1, which is like a pump or piston, is depressed, it adds a length of tubing to the main tube, thus lowering any open tone by one whole step. Valve 2, which was Blumel's invention, added a length of tubing which lowered any open pitch a half step. Finally, the third valve, which was added by Muller, lowered any open tone three semitones. Thus, we have the modern arrangement of valves, which makes possible the playing of a chromatic scale.¹⁰

Even though a complete chromatic scale was possible with the addition of a third valve, many valve combinations were out of tune. Various other valve combinations were tried such as adding a fourth, fifth, sixth and at one time, a seventh valve to help correct the intonation problem. The multiple valve trumpets corrected the intonation problem but with the intonation improved, the facility of the player was curtailed. Therefore, the number of valves became limited to the original three and the players are required to learn to compensate for the various valve combinations that were out of tune. More will be said about the invention of valves,

¹⁰Ibid., p. 175.

both piston and rotary in the section on French horns.

Tenor, bass and contrabass trumpets were constructed in the 1820's in Germany but they were discontinued very soon, except for the instrument we refer to as the bass trumpet. This instrument actually is a baritone trumpet in B or C. It was introduced by Richard Wagner in his Ring des Nibelungen in 1876.¹¹

The modern short trumpets, though not so brilliant as the true long or natural trumpets, are the most brilliant instrument in the symphonic band or orchestra today. Having all the advantages of agility and certainty, they can and do play freely in melody throughout their gamut.¹²

With the introduction of valves on all brass instruments a harmonically complete brass choir has been achieved. All notes are now possible on the valved instruments, enabling the brass to play in all keys and modulation presents no problem. The valve action has made it possible to construct all sizes and shapes of chromatic brass instruments.

With the invention of the first valve in 1815, the path towards the eventual brass choir formed by valved instruments was followed fairly rapidly. Wagner and Berlioz were among

¹¹Sachs, loc. cit., p. 434.

¹²R. Donington, The Instruments of Music and Their Use (London: London and Pitman, 1951), p. 105.

the composers who wrote for the valved instruments, and
Wieprecht, who will be mentioned later in this study, as
well as other inventors experimented with valves on the
trumpet as well as other cup-shaped mouthpiece brass
instruments. With people such as these interested in the
future of valved instruments, progress towards the modern
valved brass instruments was assured.

CHAPTER III

CORNET

The cornet, or cornet-A-piston, as we now know it, was developed around 1825 when French makers put valves in the old post horn. The cornet has the same range and pitch as that of a B flat or C trumpet, but its sound is broader, more mellow, and less brilliant than that of the trumpet. Because of this, the Germans have not accepted it for orchestral use. Italian, French, and Russian composers have written for it. As early as 1829, Rossini scored cornet parts in his opera Guillaume Tell. Tchaikowsky wrote for the cornet in his 1812 Overture and Marche Slave.

Some cavalry bands included a cornettino or sopranino cornet in E, which was sometimes popularly called a piston or piccolo.¹³

It did not take long for the cornet to become known outside of France. It reached this country soon after 1830, and before long was being made in London after the French model by Kohler and Charles Fack. Known as the cornopean, stop horn, or small stop trumpet, the new instrument was welcomed by military and brass bands which up till then had been obliged to use the keyed bugle for melody-playing in the soprano register. English cornets

¹³Sachs, op. cit., p. 428.

of this period (1830 to 1850) were made in a similar shape as the earlier French instruments, and in addition they had a clapper key. This was a closed key controlling a hole bored about twelve inches from the bell-mouth; it was worked by one of the fingers of the left hand, and was used to play shakes.

The instrument which had so quickly achieved popularity was, of course, subjected to the attention of many self-styled inventors. Among the cornets made around mid-1800, there are specimens folded in many strange shapes. The bell may point in almost any direction, away from the player, upwards, over the player's head, almost anywhere except in the player's face.¹⁴

The cornet also gained great popularity as a solo instrument during the early twentieth century. This was due, primarily, to such great cornet composers as Clarke, Arban, Smith and countless others.

Cornet solos such as "polkas" and "themes with variations" were very popular because music of this type allowed the player to display his ability, technique and skill with the instrument. The polka was an especially popular rhythm as

¹⁴Adam Carse, Musical Wind Instruments (London: Macmillan and Co., 1939), pp. 315-316.

well as the favorite dance through this period so a polka played on a cornet was doubly appropriate. The artist could use his mastery of the cornet to advantage and the audience enjoyed his performance. Even though the cornet has been used for solo and orchestral work, its main medium has been that of the military band.¹⁵

¹⁵Smith, Harold, Instruments of the Orchestra (New Jersey: RCA Manufacturing Co., 1940), p. 52.

CHAPTER IV

TROMBONE

There are many stories as to the origin of the trombone. One of the most commonly known is that Tyrtæus, a Spartan bard, invented it in 68 B. C. He supposedly obtained his idea from a trumpet with a tuning slide, but none of the ancient stories about the trombone have been verified. The best information obtainable is that the slide principle was invented in northern Italy during the early part of the fourteenth century. No one knows exactly who was responsible for this invention or just how it came about.

The slide trombone came into its own when some unknown trumpeter found out that by pulling out his tuning slide he could lower the pitch a semitone, and the longer the slide, the more tones he was capable of producing. The instrument was introduced into England sometime before the fourteenth century, and the name Sackboute, which is derived from a French word "Saqueboute" which means "pull-push," was given to this instrument.¹⁶

As the instrument was used more and more, the slide was lengthened to include more semitones. By 1511, the trombone was capable of adding five semitones to the natural scale.

¹⁶Schwartz, op. cit., pp. 208-209.

It was some years later, when the sixth semitone was added. Six semitones is still the number of semitones that it is possible to execute in the tenor trombone of today.¹⁷

By the end of the sixteenth century the family of trombones consisted of: Alto—lowest natural note F, with slide drawn out B; Tenor—lowest natural note B flat, with slide drawn out E; Bass—lowest natural note E flat, with slide drawn out A.

A toppelt pusaunen "double trombone," was not actually an octave trombone, but the name meant simply that it was capable of descending beyond "g", as was the ordinary bass trombone.

A treble trombone, an octave higher than the tenor trombone, was added to the list of trombones in the latter part of the seventeenth century, but it was as rare as the octave trombone.

In 1816, Gottfried Weber developed a double slide contra-bass trombone. The tube was folded to present a double tubing exactly the shape and size of the tenor trombone. When he pulled the slide to a normal position, the player extended four branches instead of the usual two, thus lowering the

¹⁷Ibid., p. 211.

tone twice as much.

The true bass trombone has been replaced with a tenor-bass in many bands. This is merely a tenor trombone with a valve, which when engaged, allows the instrument to play a fourth lower. This valve, which is operated by the thumb, was invented by Adolphe Sax.¹⁸

The valve trombone is another type of trombone which uses a series of three piston valves like the trumpet. This instrument has been used, for the most part, in military bands. It is easier to play than the slide trombone and allows the performer to play at a more rapid rate of speed. These advantages, however, are counterbalanced by the inferiority of its tone-color, and it is very seldom used in an orchestra.

The trombone was originally used exclusively in church music. Henry VII used four sackbuts in his band as early as 1495. Henry VIII increased the number of sackbuts from four to ten which would seem to indicate that they were a favorite of his.

During the early sixteenth century the Hans Menschel family of Nuremburg became famous as a source of trombones.

¹⁸Sachs, op. cit., pp. 326-327.

In 1558, a composer named Kruger published a volume of four part chorales for four and six trombones. Kruger was said to have been inspired to write this composition because of the availability of such fine instruments as made by the Menschel family.

Monteverdi also used five trombones in his opera Orfeo. The five trombones were divided into three voices: two alto, two tenor and one bass.¹⁹

Mozart made use of the rich tone-color of the trombone with some impressive chords in his great Requiem. Beethoven was familiar with the instrument, but he did not use it in his early works. He employed it for the first time in his Fifth symphony. Berlioz called for no less than sixteen trombones in his Requiem. He wanted to produce the effect of the day of judgment with their sound.²⁰

Trombones have not changed a great deal since 1600. They are still made with slides and some with valves for those who prefer them. The slide trombone is the only modern wind instrument that can be played in perfect tune. This, along with the tone-color, is why the slide trombone is preferred over valve trombones today.²¹

¹⁹Ibid., p. 211-212.

²⁰Elson, op. cit., pp. 243-245.

²¹Sachs, op. cit., p. 434.

CHAPTER V

HORN

The Hebrew shofar is the oldest type of horn that we know. It was used in religious ceremonies by the Hebrews 6,000 years ago and is still used in connection with Jewish holidays. The shofar is made of a ram's horn and has not been changed in sixty centuries. Instruments similar to the shofar were used in Ethiopia for religious ceremonies and they were called kenets.

The Greeks used a type of horn to announce sacrificial offerings. Alexander the Great used a horn to assemble his troops. Roland, nephew of Charlemagne, also used a horn to signal his uncle for assistance in battle.

The horns rose to the rank of orchestral instruments in France. Because of the prominence that was given to the horn in France, it has become known as the French horn. Originally, the French horn was a hunting horn. In the early fifteenth century it was made of metal and bent into a circular shape. The mouthpiece was deep and funnel shaped much like the horn mouthpieces of today. Because of the shortness of the horn, only a few tones were possible. Its repertoire consisted of several short blasts which

serves as signals. By the seventeenth century the horn had grown in length. It was still made in a curved circular shape but it had been extended until it was bent into a complete circle with over-lapping. The longer length made possible the production of more tones; thus, the instrument was able to increase its repertoire. Short, simple notes in a series were sounded instead of single blasts.

These calls seemed to please the French kings and their nobles, so new calls were added to the old ones. By the end of the eighteenth century, this quest for more musical calls led to the lengthening of the horn until it consisted of three complete circles of tubing. The instrument encircled the body and rested on the shoulder.

The horn impressed certain composers by the time it had become this shape. Lully, an Italian by birth, is given credit for having been the first to write for it. He wrote parts for "trompes de chasse" in his Princess d' Elide, which was performed in Paris in 1664. After the performance, Lully was not pleased with his experiment and did not use the hunting horn again. It was nearly a century later before these instruments became a regular member of the

orchestra. Rameau used two hunting horns in Zoroastre in 1749, and from then on they began to come into their own as an orchestral instrument.²²

The introduction of the horn into the Paris orchestra was credited to the composer Gossec. Gossec composed two arias for Sophia Arnold in honor of her Paris debut. In these arias he also wrote obbligate parts for two horns and clarinets.²³

Even though the horn was introduced into opera in France, it was in Germany that it first attained its prominence as an orchestra instrument. It was known as the "waldhorn" or "forest horn," and was first used in the orchestra by Keiser in his opera Oedipus in 1705. Six years later, two horns became regular instruments in the orchestra of the Royal Theater of Dresden. In 1721, Bach called for two horns in his first Brandenburg Concerto, and the position of the horn was assured.

Handel introduced the horn into England in 1715. Handel, who was chief musician to the Elector of Hanover, had gained permission to visit England for a short period of time. At the end of two years, Handel was still in

²²Schwartz, op. cit., pp. 185-189.

²³Elson, op. cit., p. 211.

England when the Elector was made King of England. Handel then composed his famous Water Music as a means of gaining favor with his former German patron. It was in this series of compositions that Handel introduced the waldhorn. This series of compositions, along with the use of the waldhorn, put Handel back in the good graces of George I. Five years later he used two horns in D in a London performance of Radamisto. From that time on, the horn has been accepted in the orchestra of England.

At the same time that Handel was introducing the horn in England, Scarlatti introduced two horn parts in F in his opera Tigrona, in Italy. He wrote in the upper registers in order to have at his command sufficient notes to compose simple melodies. Later, after he had learned more about the instrument and its use, he wrote harmonies more in the modern style of composing.

The horn of this early period was played bell up. The mouthpiece was horizontal with the mouth; the tubing made several turns and the bell opened straight up. The Germans reversed the position of the bell and turned it downwards, which is its modern position. This was done to subdue the

harsh tone quality of the instrument by stopping the tone with the hand. Mutes made of wood and cardboard were used for this purpose also.²⁴

The natural horn, at this time, was composed of about seven and one half to eight feet of conical brass tubing curved upon itself, with a tapered mouthpiece at its small end and a large bell at the other. Various pitches were obtained by inserting crooks of various lengths into the horn. Some of these crooks were larger than the horn itself, the longest being twelve and one half feet; but, with the use of the crooks came bad intonation.²⁵ Around 1755, Johann Wernern, who was second horn for the Imperial Opera Orchestra of Vienna, used what was called the "improved" horn. It had a total of nine crooks, giving the horn a range from low B flat to high B flat. At one time the number of crooks that were used by one horn player reached the fantastic number of sixteen! Such an instrument could not possibly be played in tune.

In 1753, Hampel, a horn player with the Dresden Orchestra, introduced his celebrated "Invention" or "machine horn." This instrument was devised so that movable slides could be

²⁴Schwartz, op. cit., pp. 189-191.

²⁵Elson, op. cit., p. 211.

inserted into the body of the horn, much like our modern tuning slides. Hampel found that by sticking a ball of wool in the bell that it not only softened the harsh tone of the instrument, but also raised its pitch a semitone. Later, the hand was substituted for a ball of wool. Although this discovery was made as early as 1760, it was not until the nineteenth century that composers began writing regularly for the "hand" horn.

In 1770 Kolbel, a Bohemian horn player at the Chapel Royal of Russia, conceived the idea of placing a key on the bell. By opening this key, the pitch was raised on all open tones by a semitone. By 1801 the number of keys had increased to five, making the horn chromatic, except between its two lowest open tones. A short while later a sixth key was added, thus giving a chromatic scale from low C to the top of the scale. However, with the addition of these keys, only the bell series of notes were of good quality; the others were not clear or resonant.

Horn players intensified the harsh tones that were a result of adding more than the one key Kolbel introduced by removing the bell entirely. This was not

desirable musically, because the tones were harsh, but the practise was adopted for special effects. Mehul uses it in his horn duet in Euphrosyne et Coradin.²⁶

In 1815, Blumel, an oboe player in Silesia, invented the piston valve. The piston has an up-and-down motion. When at rest, the piston disconnects an additional crook and allows the wind to pass directly through the main tube. When the piston is pressed down, this passage is barred and the flow of air is directed through the additional crook before re-entering the main tube, thus lowering all tones a half step. As stated before, the invention was sold to Henrich Stolzel in Berlin. Stolzel added a second valve which lowered all the open tones a whole step. In 1830 Muller of Mayenne added a third valve which operated a third length of tubing and lowered all open tones a step and a half, thus making it possible to play a full chromatic scale.

Blumel was not satisfied with the piston valve, and in 1827 he invented the rotary valve. This valve consisted of a little rotor or drum, which revolved on an axle (See Figure IV). Slots were milled in the side of the rotor so

²⁶ Schwartz, op. cit., pp. 192-194.

that when it turned the air column was switched into valve slides, once again adding various lengths of tubing for lowering open tones. The player does not need to make a rotary movement; he presses a key which is transformed into rotations. The rotary valve is popular in Austria, Germany, and Italy. But in America, the rotary valve is found on the French horn only. The action on the rotary valve is much shorter than that of the piston. The rotary valve is preferred, almost unanimously, by horn players.²⁷

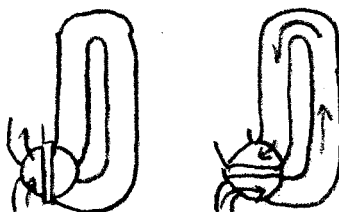


FIGURE IV Rotary Valve in rest and in action.

Wilhelm Wieprecht, in 1830, persuaded the Prussian military authorities to follow his recommendations for the instrumentation of the cavalry and infantry bands. Wieprecht proved the advantage of using valve trumpets and valve horns first. He proved that valve instruments would enable the players to produce all notes chromatically without changing

²⁷ Sachs, op. cit., p. 426.

instruments or having to insert "crooks,". This cavalry band, which consisted of two soprano cornets in E flat, two key bugles in B flat, two alto cornets in E flat, eight trumpets in E flat, two tenor horns in B flat, one bass horn in B flat, three trombones in B flat, made its predecessors obsolete. The trumpets, cornets and horns were all equipped with valves. The success of this band brought a request to reform the infantry bands in the same manner.²⁸

Even though the advantages of the valved horn were obvious, it was not until about 1835 that the valved horn was accepted. It was the custom to use two hand horns with two valve horns and the valve horn still was not accepted. The feeling seemed to be that valve notes were not as good as open notes on the hand horn.

Schumann was one of the first great composers to use the valve horn. He included it in his Third and Fourth Symphonies, for instance. Rossini did a great deal for horn playing by demonstrating the possibilities of the horn as a solo instrument. He experimented with highly florid passages and showed that the instrument was capable

²⁸ Goldman, op. cit., p. 41.

of this type of playing. Berlioz used horns pitched in four different keys, thus creating a greater number of open notes. This was a recommended form of writing at that time. He also advocated the use of hand horns over valve horns, using the latter for first and second parts, and the former for third and fourth parts. It was not until Wagner wrote Lohengrin, in 1848, that he abandoned the hand horn entirely. Wagner also used an instrument called a tuben in the Ride of the Valkries. In fact, he used a quartet of tubens. There was a tenor in B flat and a bass in F. These were made of a long slender tubing and played with a funnel-shaped mouthpiece. Although the instrument responded easily, it was difficult to play in tune, and it did not have the quality of a true French horn. The purpose of the tuben was to bridge the gap between the French horn and the rest of the brass instruments. Wagner's most famous horn passage, though, is that of Siegfried.

The French horn is considered a difficult instrument to play, and for this reason the mellophone is sometimes used as a substitute. Both instruments are pitched in F but the French horn is twice as long as the mellophone. The

latter is about seventy-one inches long, while the French horn is about one hundred and forty seven inches long. The French horn's lowest note is its fundamental pitch. It can only play the entire scale from an octave below middle C upwards, while the C below middle C is the lowest possible note on a mellophone. It cannot play the scale upwards from this low C to middle C but it can play from F sharp and up.

The mellophone will never be a substitute for a French horn, although it is easier to play. The tone quality of a mellophone does not compare with that of a French horn. The large-bore conical shaped tubing of the mellophone lacks the richness of the small, gradually tapering tubing of the French horn. The mouthpiece of the mellophone is longer and is more of a cup shape than that of the funnel-shaped horn mouthpieces. But no instrument can take the place of the horn and players are glad to devote themselves to the task of producing velvety tones.²⁹

²⁹Schwartz, op. cit., pp. 194-206.

CHAPTER VI

TUBA

In 1590, Guillaume of Auxerre invented the serpent, a wind instrument that was about eight feet in length. It was made in a shape that suggested a squirming snake. It flourished for about two hundred years as an important bass instrument. It is known today for its many and varied progeny. Among these are the ophicleides, a family of six; the saxhorns, a family of eight; the saxtrombes, a family of eight; the tubas, a family of nine; and the saxophone, which is also a family of nine.

The serpent was little more than a bass member of the cornetto or zinken family. In England they were called cornettos and were built in three keys; a treble cornetto in F, cornetto in C, and the great cornetto in G. In Germany these instruments were given the name Zinken and were also built in several different keys, one of them being a high soprano in D. It is not known how many different members there were in this original family of instruments.

These instruments were considered trash among the musical instruments. They were made very cheaply and

were noted for their poor quality. They were made of wood and covered with leather. It has been said that anyone with a pocket knife, a pot of glue, and a thin piece of leather could make one. The two sides of the tube were whittled out and stuck together with glue. Afterwards, the tube was covered with the leather to strengthen the wood. When this was completed, holes were bored in the side of the tube and a cup-shaped mouthpiece was turned out of a piece of wood, which completed the instrument. These instruments were of a conical shape and the tube was relatively wide and more rigid than the thin metal of brass instruments. The sound was less brilliant because of this, and because of the lack of brassy brilliancy gave the cornet or cornetto a distinctiveness and precision which enabled it to support the human voice better than any other instrument. Even though these instruments were poorly made, they were still very popular in Europe during the fifteenth and sixteenth century with the military bands and church choirs.

The serpent, as mentioned before, was a tube about eight feet long and conical in shape, but had six finger-holes and was played with a wooden cup-shaped mouthpiece. Later, keys

were added and the mouthpipe and mouthpiece were made of metal. The fundamental pitch of this instrument was about two octaves below middle C. After remaining curved, like a snake, for about two centuries, the serpent finally was changed to a bassoon shape toward the end of the eighteenth century. The instrument became known as the military serpent²⁷ or serpent horn. This later serpent was made from an earlier form by an Italian Musician, Regibe, in 1789. He bent it back into the bassoon like shape, and called it the ophi-baryton, or Russian bassoon.²⁸

Early in the nineteenth century, the metal serpent horn appeared and was known as the serpenicleide or ophicleide, both of which meant "keyed serpent." The earliest of these instruments had seven keys, but later the number was increased to eleven. It was usually pitched in B, two octaves and a semitone below middle C. The number of ophicleides increased until there were six or seven.²⁹ The instrument was invented by Jean Astor of Paris. The name comes from ophis, meaning serpent, and Kleides, meaning keys.³⁰ Handel scored for the serpent in his Water Music and his Fireworks Music. Mendelssohn also wrote for the serpent in his St. Paul. He

²⁷ Ibid., pp. 232-235.

²⁸ Sachs, op. cit., p. 422.

²⁹ Schwartz, op. cit., p. 236.

³⁰ Sachs, op. cit., p. 422.

also wrote many parts for ophicleide. Even Beethoven wrote parts for the serpent. Wagner also wrote for the ophicleide in some of his early works, even though he had a wide choice of cup-mouthpieced basses to choose from. He wrote for it the last time in his opera Rienzi.

Wagner, anxious to obtain a solemn timbre of unfamiliar quality for his Ring des Nibelungen, suggested the construction of an instrument that would be intermediate between a French horn and a tuba. These are the previously mentioned tubens and were of a conical construction, with the shape of an oval tuba, a mouthpiece similar to that of the horn, and four valves, which were sometimes placed so as to be played by the left hand because the instrument had to be fingered by a player who was used to having his right hand free. A "quartet" was composed of two tenors in the size of B flat horns and two basses in the size of F horns.

Wagner's idea, however, has not been imitated. The outstanding post Wagnerian scores using his innovation are Bruckner's Seventh Symphony and Strauss' opera Electra.³¹

It may be of some interest to note that the Boston Symphony has one of two complete sets of these so-called

³¹Sachs, op. cit., p. 432.

Wagnerian tubas in the United States. The other is at the Curtis Institute.

With the invention of the piston valve, few people realized that the ophicleide was on its way to oblivion. There were still many musicians who felt that the keyed serpent was the ultimate in bass instruments; but in 1828, Wilhelm Wieprecht, master of bands for the King of Prussia, produced his family of valve instruments. This family included an E flat cornet and an E flat trumpet, a B flat tenor and a B flat baritone. Later, the bore of the baritone was made larger and it became known in most countries as a bass tuba, while in England it was called an euphonium. This instrument was pitched in B flat, as are our present baritones, but the bore was somewhat larger. Bass tubas were also built in other keys with the bass in F being very popular. There were two varieties built in F, one had a larger bore and was known as the bombardon. The bombardon differed little from the regular bass tuba, except that it was possible to play five notes both higher and lower on it than on the bass tuba.³²

Wieprecht also created an instrument similar to the

³²Schwartz, op. cit., pp. 236-237.

bombardon, which was equipped with five valves and was known as the German bass.³³

In 1800, Alexander Fricot and Jean Astor invented the basshorn. As both of them lived in London, it was called an English basshorn. The basshorn had the bore of a serpent and the shape of a bassoon, plus a wide metallic bell and keys. A cup-shaped mouthpiece was inserted in a crook. In spite of its imperfection, it was used in bands until 1830. Fricot gave it a different name, such as a basse-corn and basse-trompette. Streitwolf, in 1820, came forward with an improved model called the chromatisches basshorn. It had a better bore, two open holes and ten keys, which made it possible to play with ease in all tonalities.³⁴

³³ Hector Berlioz, A Treatise on Modern Instrumentation (2d ed., London: Novello Ewer and Co., 1858), p. 176.

³⁴ Sachs, op. cit., p. 422.

CHAPTER VII

SAXHORNS

In 1843, Adolph Sax, a Franco-Belgian instrument maker in Paris, united the cornets, flugelhorns, alto horns, baritones, basses, etc., under one name, the saxhorns. Sax gave them a uniform model, first of all; they were upright. From the mouthpiece they all ran horizontally forward, then dipped down in one or more coils, and ended in an upright position with the bell on top.³⁵ They had a conical bore of wide taper and a bell shaped mouthpiece. All of the instruments were of the same shape, differing only in size. Due to the lack of uniformity in terminology in Sax's time, it is difficult to describe this family of instruments. Sopranos were referred to as altos, and altos as tenors, tenors as baritones, until one was never sure whether a baritone was an euphonium or a bass.³⁶

All pitches were represented from the *suraigu*, which is an octave above the soprano and pitched in C. The instruments ranged from this high to the "bourdon", an octave below the contrabass, which had an actual length of thirty-six feet and was pitched in BB flat.³⁷ The custom in France was to write all of these instruments from the lowest to the

³⁵Ibid., p. 432.

³⁶Schwartz, op. cit., p. 239.

³⁷Sachs, loc. cit., p. 432.

highest on the "C" clef, as horns are written.³⁸

All of the upright saxhorns were known as tubas. However, it is unusual in America today to call any instrument except a bass a tuba. In fact, tuba has become a synonym for bass. The name tuba actually came from the old Roman instrument which was a straight bugle only three feet long. None of today's tubas even begin to resemble the ancient Roman instrument.

With Sax's organization of instruments and their acceptance in France, Weiprecht had already made progress towards acceptance in Germany. Later, England and Italy accepted Sax's classification. With the invention of the saxhorn, instruments such as the serpent, bombardon, ophicleide, and various other odd tenor, baritone, and bass instruments disappeared.³⁹

Bass and contrabass tubas have been built in both upright form and as a helicon, which comes from the Greek word helikos, meaning coiled. This latter form is thought to have been invented in Russia and was imitated in 1849 by Ignoy Stowasser, in Vienna. It is of a spiral circular form that is wide enough to allow the player to carry the instrument over his shoulder. In the United States, the helicon was built with

³⁸ Berlioz, op. cit., p. 234.

³⁹ Schwartz, op. cit., pp. 240-242.

a moveable bell that is said to have been suggested by the late bandmaster and composer, John Phillip Sousa, and it is called the sousaphone in his honor. Later on the bell-front model was introduced.⁴⁰

Although our family of tubas was organized on the same basis as that of the saxhorn, it is not a direct descendent of the saxhorn, but of the saxtromba. The saxtromba was a family of instruments invented by Sax about eight years after the saxhorn, or around 1850. There were eight members in this family ranging from a soprano in E flat to a contrabass in BB flat. The saxhorns were conical in bore and were played with a deep bell-shaped mouthpiece, as previously stated. The saxtromba, on the other hand, was of smaller tubing and about one third cylindrical and two thirds conical. The mouthpiece was not quite as deep and was shaped more like a bowl. The result was a more solid and brighter tone.

Most European countries preferred the saxhorn because of its more mellow tone. Especially was this true in England and Italy, where conical-bore instruments were and are used almost universally. But in America, the saxtromba family is preferred, or at least our modified version of it is. Our

⁴⁰Sachs, op. cit., pp. 430-431.

American instruments have a larger bore than the original saxtromba and also have a more shallow mouthpiece. However, the fundamental bore construction has been followed. While the saxtromba never gained wide acceptance in Europe, they have come to be America's choice in their slightly modified form.

Nine distinct members of this family were produced in America. The smallest was an E flat cornet, quite a popular instrument at one time, but which has fallen into disfavor. The most popular instrument of this family is the cornet in B flat. Other instruments included in this family are the E flat alto, B flat tenor, B flat baritone, B flat euphonium, B flat bass, E flat bass, and BB flat bass. The B flat tenor and the B flat bass have now become⁴¹ obsolete.

⁴¹ Schwartz, op. cit., pp. 247-248.

CHAPTER VIII

BARITONE AND EUPHONIUM

The baritone in B flat was sometimes called a baritone and sometimes called an euphonium. Often the difference was that of a name, but sometimes there were differences in bores and tapers. Today the word baritone refers to a small bore instrument, while euphonium refers to a large bore instrument, both pitched in B flat. The baritone, having the smaller bore, does not possess the big mellow tone quality produced by the euphonium. The name baritone can be traced easily to the word which is used to classify human voices. Euphonium comes from a Greek word meaning "sweet-sounding," but it was probably stolen directly from another musical instrument which preceded it by two or three generations. This instrument was invented in 1790 by Ernest Choldue, a German. It was called the euphonium and was made of glass plates and rods. The wind euphonium has appropriated the name of that instrument.

While smaller instruments usually had three valves, the euphonium and basses generally had four and sometimes five valves. The reason for adding a fourth valve was to make available the possibility of playing chromatically from the

fundamental throughout the full range of the instrument, which would have been impossible without the addition of the fourth valve. Later, a fifth valve was added, but this valve was not needed to bridge a gap in the scale. It was used to correct the intonation on some of the other valve notes.

The need for both a fourth and fifth valve is readily apparent. Valve slides, which are of a proper length for the middle of the range of the instrument, throw the top of the range flat because the slides are too long; and they throw the bottom of the range sharp because they are too short. Both the fourth and fifth valves are welcome additions, especially to the basses.

Although the fifth valve is rarely found on American basses, the double-belled euphonium usually has a fifth valve, not for the correct intonation, but to control the smaller bell. The instrument usually uses the larger bell but a fifth valve can be operated to bring the small bell into use. The purpose of this smaller bell is for trombone and echo effects.⁴²

⁴²Ibid., pp. 242-247.

CHAPTER IX

SAXOPHONE

The saxophone is a wide metal tube of parabolic bore usually bent in the shape of a tobacco pipe with a key arrangement similar to that of the oboe, and a mouthpiece like that of a clarinet in that it has a single-beating reed, which opens and uses a chamber on the mouthpiece. This instrument, which was invented by accident in 1840, by Adolphe Sax, is a crossbreed of the clarinet and the ophicleide. Sax was interested in what would happen if he played it using a clarinet mouthpiece. The strange blend of brass and reed tone fascinated him. The tone was somewhat brassy, from the brass body, but it also had a reedy tendency from the mouthpiece. Consequently, it did not sound exactly like either instrument, nor did it behave like either instrument. It was especially not like a clarinet. A clarinet has only odd partials in the scale, and this new hybrid had both odd and even partials. Having realized that he had produced an entirely new tonal color, Sax experimented further. During his experiments he produced the instrument we know today as the saxophone.

Sax produced a large family of these instruments,

ranging from a sopranino in F to a subcontrabass in B flat. The principle members of the sax family are as follows: the E flat alto, the E flat tenor, and the E flat baritone. In the United States we have a tenor in C which is commonly called a melody saxophone.

In 1844, Jean-George Kastner introduced a saxophone in his Le Dernier Roi de Juda, and it was in continuous use from that time on, especially in France and Italy. The saxophone has played an important role, in martial music especially, and it was first introduced to the military band in 1845. After its introduction, composers such as Meyerbeer, Strauss, and Ravel wrote for it.⁴³

Ravel uses it very conspicuously in his Bolero where it appears immediately after the statement of the second theme by mated trumpets. Debussy has written an entire composition for it, his Rhapsody for Orchestra and Saxophone.

The outstanding role of the saxophones in modern music has been that of jazz and swing, which started around 1900 in New Orleans.⁴⁴

⁴³Schwartz, op. cit., p. 144.

⁴⁴Sachs, op. cit., p. 416.

CHAPTER X

CONCLUSION

There are other instruments akin to those covered by this study which could be found in the records, catalogues, and patent files of the last century if a search were instituted. Ransacking museums would probably produce other instruments, also. Most of these would fail to establish a claim to any individual existence, however, for the field is limited and there is not room for much variety between the tone quality of the cornet and that of the bugle, whether large or small; nor does the admixture of trumpet, horn, or trombone bore and their characteristic mouthpieces supply sufficient variety to provide very many new and clearly different tone qualities. Diversity of mouthpieces and widths of bore will give a variety of tone quality within a certain radius, but that radius is limited in extent. In the highest register, the gamut of the brass instruments in high E flat, it matters little to the listener whether the instrument be a trumpet, cornet or saxhorn. In the B flat or contralto register, there is room enough for the B flat cornet, the B flat trumpet, or fluglehorn, but there is

little room for anything between them. So it is also in the tenor or E flat register, the baritone and bass registers; instruments which are large-sized cornets or bugles may be admitted, but anything between these two, makes the distinction too fine for ordinary ears, and therefore impractical. The tone-qualities of brass instruments in any one register have too much in common to admit their being split up into infinitely varied shades. Anyone may tinker with the bore or the mouth-piece of a large or small valved instrument, but he who endeavors to invent a new instrument of this type with a bore wider than the trumpet, horn or trombone, will surely find that his instrument has already been invented over and over again.⁴⁵

As a matter of fact, the brass wind instruments, as we know them today, resulted from similar experiments that have been made since the discovery of the pleasing blast that was made by a ram's horn 6,000 years ago. Successful experiments to produce more of the tones of the scale, were made at various times through the century,

⁴⁵Carse, op. cit., pp. 315-316.

but it was not until the nineteenth century that discoveries made possible the reproduction of all tones of the scale. Between 1800 and 1850 different "inventors" refined the instruments that are included in this study. They were built or devised as the need in the band or orchestra arose. There was, seemingly, no intention of developing a homogeneous family. However, through the years, these instruments have evolved into the homogeneous family of brass wind instruments that we know today. Through the inventions and improvisations, improvements and modifications of the brass wind instruments we have more good wind instruments today than ever before.

The description of the twentieth century as "the age of instrumental music" is appropriate. The facility of the instruments today lies in the ability to reproduce all tones in all scales with one or another modern horn. Without the people who wrote for or experimented with the brass wind instruments, there would not be the interest in instrumental music that is present today. Inventors, composers, musicians and manufacturers all working toward better intonation, more tones possible, ability to play

the instrument well, etc., have succeeded in providing the brass winds that are used today in all bands and orchestras.

Modern man is responsive to the sound that is produced by the brass wind instruments just as primitive man was impressed by the fore-runners of the instruments of today. These instruments are still used as warning signals, religious devices, and as a means of expressing emotional energy.

For at least 6,000 years man has responded to the sound of wind instruments. The response today is evident in the care that is exercised in producing the individual parts of the instrument, the precision and craftsmanship required to meet the high standards of the finished product in assembling those parts, and the high incidence of the use of the brass wind instruments by musicians and students. Composers write for all brass instruments which have evolved through the years and musicians become adept at playing each of the brass wind instruments we have today.

With music written for all brass wind instruments and competent musicians playing that music in bands and orchestras

on better musical instruments than were available ever before in history, the twentieth century truly merits the label "the age of instrumental music."

APPENDIX

TABLE OF INVENTIONS

Date	Invention	Inventor
Early 19th Century	Keyed Serpent or Ophicleide	Jean Astor
1800	Basshorn	Alexander Frichot Jean Astor
1801	5th key added	Kolbel
1810	Keyed bugle	James Holliday
1815-1830	Piston valves	Bluhmel, Stotzel, Muller
1816	Double slide contrabass trombone	Gottfried Weber
1820	Chromatisches basshorn	Streitwolf
1825	Cornet developed as we know it now	
1827	Rotary valve	Bluhmel
1828	Family of valved instruments	Weiprecht
1840	Saxophone	Adolphe Sax
1843	Saxhorns	Adolphe Sax
1844	Helicon	Igney Stowasser
1850	Saxtrombe	Adolphe Sax

LIST OF WORKS REFERRED TO IN THIS STUDY

Work	Composer
Orfeo	Monteverde
Tancredi e Clorinda	Monteverde
Messiah	Handel
Ring des Nibelungen	Wagner
Four part chorales	Kruger
Requiem	Mozart
Requiem	Berlioz
Princess d Elide	Lully
Corcaestre	Rameau
Oclovid	Keiser
Brandenburg Concerto	Bach
Water Music	Handel
Raduzisto	Handel
Tigrone	Scarlotti
Euphwayne et Corvelin	Mahul
Schumann's Third Symphony	Schumann
Schumann's Fifth Symphony	Schumann
Ride of the Valkries	Wagner
Seigfried	Wagner
Fireworks Music	Handel
St. Paul	Mendelssohn
Rienzo	Wagner
Electra	Strauss
Guilbaume Tell	Rossini
1812 Overture	Tchaikowsky
Marche Slave	Tchaikowsky
LeDernier Rio de Juda	Jean George Kastner
Bolero	Ravel
Rhapsody for Orchestra and Saxophone	Debussy

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