THE EUPHONIUM: ITS HISTORY, LITERATURE, AND USE IN AMERICAN SCHOOLS

by

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CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS USED

From Beethoven's time the brass wind instrument family has been an accepted medium of musical expression. Because of their brilliant tone quality and tremendous carrying power, the brass winds have been particularly successful in outdoor performance. This attribute has firmly entrenched the brass as the core of the military band.

The euphonium is a regular member of the military band and has filled a unique role, not only on the march but also as a respected ensemble member in concert. Since the early 1900's and the establishment of the instrumental program in the curriculum of the American schools, the euphonium has been utilized in the scores of the larger concert organizations and in the smaller ensembles. Because of its flexible and pleasing tone quality the euphonium has seen extensive service as a solo instrument not only in the band, but also in the recital hall, and on

occasion in the symphony orchestra.

The Problem

Statement of the Problem

The purpose of this study was to: (1) trace the history of the euphonium; (2) describe the present-day euphonium; (3) discuss its use in the American schools; and (4) explore sources of solo literature.

Importance of the Study

Facts regarding the euphonium are scattered. Furthermore readily available data does not agree as to historical events in the evolution of the instrument. Also, nomenclature problems have cast a haze that has blinded many euphonium students. In the Harvard Dictionary of Music Willi Apel wrote about the band instruments:

> A methodical survey of these instruments is extremely difficult, owing to the large variety of types and sizes as well as, particularly, to the utterly confusing terminology. (2:96)

This study is important in that it will attempt to clarify these problems.

Since the so-called "Golden Band Age," the

publicity and the limelight that the euphonium once enjoyed have lessened. To appreciate the euphonium and its music one must know about the background, possibilities, and other pertinent information regarding its character. This study is important in that it is an attempt to bring together information and a representative music literature list that will be useful in the study of this instrument.

Explanation of Terms

Euphonium

The euphonium is a member of the tuba family, which includes the primarily conical bored instruments employing a cupped mouthpiece. The modern definition differentiates between the baritone horn and the euphonium; specifying that the euphonium has a larger bore. For most purposes in this study there will be no need to be restricted to this view. The instrument of importance in this paper, whether it be called a euphonium or baritone, is the baritone-bass voiced instrument of the tuba family.

Golden Band Age or Golden Era

The years from 1875 to 1930 were called the

"Golden Band Age." (54) During this period, the wind band enjoyed great popularity.

Limitations of the Study

This study was limited in the historical section by the conflicting views of various writers. However, the available material concerning the history of the euphonium was compared in order to achieve the highest degree of authenticity. The section on sources of literature was not intended to be complete in its listing, but rather was a representative sampling of worthwhile music for the instrument.

Organization of the Remainder of the Thesis

Chapter II considers the history of the euphonium and the evolution of its name. Description and use of the present-day euphonium are explored in Chapter III. Use of the euphonium in the American schools is studied in Chapter IV. Chapter V discusses usable euphonium solo literature. Chapter VI contains a summary, conclusions, and recommendations.

CHAPTER II

HISTORY OF THE EUPHONIUM

It would be much easier in this study to sketch lightly the historical setting leading to the invention of the euphonium. However, the writer has found that most sources have made this a common practice and therefore a step-wise treatment of the instruments pertinent to the development of the euphonium has been discussed in this paper from the very beginning. This type of historical approach will consolidate information and thus contribute to a logical history of the instrument.

Early Instruments Leading to the Development of the Euphonium

The first musical instruments were probably percussion instruments. Rhythm has often been considered the most primitive facet of music; likewise, historians have found an interesting parallel in that the ingenuity of man

was first focused on rhythm-type instruments. However, music was not the goal of the primitives. Their crude percussive instruments were probably supplied by nature in the form of hollow logs which were used in a utilitarian sense as a means of signalling their fellow tribesmen.

Cank

To exist, man had to struggle constantly in his effort to provide food for himself and his family. The discovery of the first wind instruments no doubt came about accidentally on a hunt. Galpin states:

> One of the earliest forms of lip-voiced instruments is the spiral shell, found as the Cank or conch-trumpet in Asia and as the Biou in Europe. Now, in order to get at the fish concealed within it, it was necessary to break off the tip of the shell and either to push it or blow it out. With the final blast that heralded the meal the vibration of the lips was discovered. (27:214)

The conch-trumpet is still in use and can be heard in Bermuda, where the fish peddlers use it to signal customers of their arrival as they travel from house to house (30:6).

Primitive Animal and Wood Horns

The hunt provided early man with various types of animals possessing horns. It became fashionable to prize certain of these horns as ornaments (16:1). Consequently, the horns were cut from the head and the soft marrow was removed. Then they would be carried about and used for drinking vessels and any other task that might arise. It can easily be seen how a ram's horn eventually found such wide use as a musical instrument.

Another method of wind instrument construction was through the use of wood in the form of hollowed tree branches, or hollow river reeds. It is interesting to note that the first record of trumpet or horn construction describes Gilgamesh, a Sumerian hero of the third or fourth millenium B.C. He made an instrument of wood with an ingenious wooden resonator (like a bell) attached to the end (27:215). Reed type trumpets still exist in the form of the Abyssinian malakat and other Asian specimens (27:215).

Lur

A step beyond the previously mentioned early types were the lurs of the Bronze Age (1500 B.C.). The lur is one of the earliest known metal horns. These instruments were discovered in the lands of the Nordic people and seem to be the sole evidence of their musical activity during the pre-Christian era. The tone of the lur has been described as "rough and blatant." (2:412)

Shofar and Chatzotzerot

In regard to the history of the euphonium; the most important early instrument of the aforementioned types is the animal horn. The Jewish people from early times have used the rams horn in their ceremonies. This ancient instrument is called the shofar. The first mention of the shofar is in the Scriptures, the book of Exodus, Chapter 19, verses 13, 16, and 19. The term used here in the King James Version is trumpet, which shows the common error many translators and writers have fallen into in describing certain instruments. It is important that differentiation is shown between the primarily conical bore instruments and those instruments

of cylindrical bore. Since the shofar is conical; the term "horn" might be a more accurate translation. This would save the reader from confusing the ram's horn with the silver trumpet or chatzotzerot which is first mentioned in Numbers 10:2.

> And the Lord spake unto Moses, saying, make thee two trumpets of silver; of a whole piece shalt thou make them: that thou mayest use them for the calling of the assembly, and for the journeying of the camps.

Josephus gives a description of these trumpets:

> In length a little short of a cubit, it is a narrow tube, slightly thicker than a flute, with a mouthpiece wide enough to admit the breath and a bell-shaped extremity such as trumpets have. (57:461, Vol. IV)

Whether the trumpet Josephus describes is one of his day or of earlier vintage is unknown; however, it is probable that little change had taken place between the earlier chatzotzerot (1300 B.C.) of Moses time and the one of Josephus description (20 A.D.) (50:8).

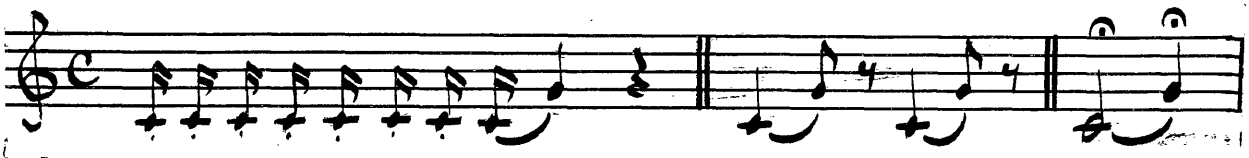
Numbers 10:1-10 contains not only instruction for the making of trumpets, but also exact commands as to their use. It seems that these instruments were used mainly for signal purposes. Also the shofar and chatzotzerot were to be blown on special occasions such as

beginnings of months, and at sacrificial burnt offerings and peace offerings (52:7). In all the instruction given in the books of Numbers and Leviticus, there does not seem to be any evidence that these two wind instruments were used for much more than signalling. One verse, Numbers 29:1 "a day of the blowing of the trumpet (horn)," is the only indication that the instruments might be used for musical purposes.

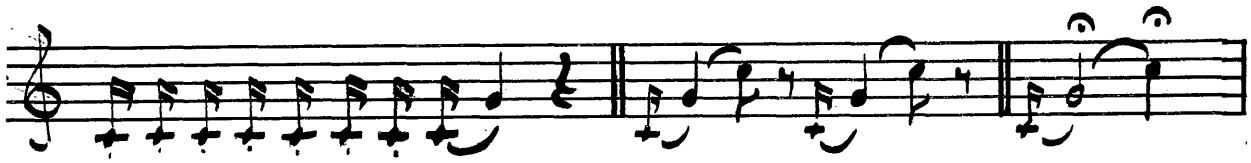
The signals blown on the shofar are said to be very much the same today as those used three thousand years ago (23:294). This can be illustrated by the fact that the Spanish and Portuguese Jews, whose liturgy is called the Separdic Liturgy, differs from the liturgy of the German and Polish Jews. Yet, the shofar signals are very similar. This fact furnishes proof that the signals were kept intact from the time prior to the settlement of the Jews in the Spanish Peninsula, which took place during the Mohammedan conquest (23:295). It is easy to see how the signals could be passed down from generation to generation with little change, when one realizes that they were simple and that they were strictly prescribed and adhered to in the liturgical service of the

various synagogues. The following are examples of the two aforementioned groups:

Signals of the German Jews



Signals of the Separdic Synagogues



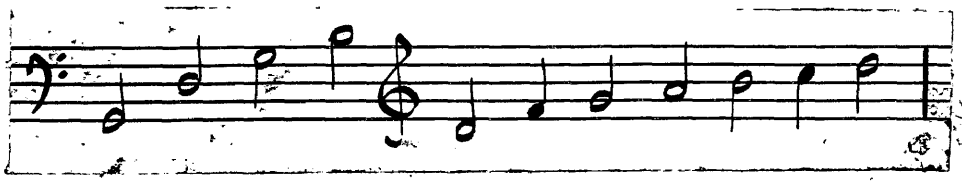
The pedal tone can be played but is hardly audible. The second, third, and sometimes the fourth partials are the tones commonly used in blowing the shofar.

Salpinx

Other cupped mouthpiece wind instruments of antiquity include various extinct specimens made of ivory and of brass. The Greeks had a trumpet called the salpinx made of ivory sections held together by brass rings. The only existing specimen is in the Museum of Fine Arts in Boston. The curator, L. D. Caskey, dates it in the second half of the fifth century B.C. (53:146)

Lituus, Tuba and Buccina

The Romans utilized three brass instruments for military purposes: the lituus, tuba, and buccina. The lituus is a cavalry horn with a long, slender tube curved at the bell end to make the instrument appear as the letter J. Its tone is shrieking in nature (53:146). The Roman tuba was similar to the lituus except that it was straight. Roman writers attribute the tuba with a raucous, rude, and horrible sound (53:146). The third Roman instrument of note is the buccina, which was curved like a figure G to compensate for its length. It had a wooden crossbar which rested on the left shoulder and was held with the left hand while the right hand pressed the mouthpiece to the lips (2:100). The oldest known specimen was found in the Pompeii excavations and is dated to the first century B.C. It is now preserved in the National Museum in Naples, Italy. A reproduction may be seen at the Museum of Fine Arts in Boston (9:174). Hipkins indicates that the original buccina at Naples is in G and is capable of sounding the following tones: (35:87)



Dark notes out of tune

If Hipkins' data is true, the buccina is really quite an advanced instrument in comparison with the other instruments discussed thus far. It would seem that some person would have shortly improved on this ancient instrument. It was nearly fifteen hundred years later that an instrument was made that improved upon the buccina.

Up to this time, the only tones any single instrument was capable of producing were limited to the harmonic series, the key or fundamental of which was dependent upon the length of the instrument tube. By overblowing and closing the opening of the lips, notes above the fundamental could be sounded. Naturally, this caused considerable limitation as to the complexity of the music performed. Of the instruments mentioned so far only the buccina was capable of producing more than four or five tones of the harmonic series. It seems that musicians and instrument makers had not discovered the principle of making and playing instruments capable of producing the

notes in the upper limits of the harmonic series, where scalewise passages would be possible. It could be that musicians of the time realized the potentialities of the upper portions of the harmonic series, but felt that surely there must be a better and easier method of producing a scale. A more plausible answer is that musical development in general did not warrant other than the most elementary style of instrumental technique. Whatever the reason, advances were being made with the reed instruments in the form of tone holes that altered the pitch. Double and single reed instruments had long utilized the tone hole principle for pitch alteration. The silver pipes of Ur, dating from 2800 B.C., are the earliest specimens of a civilized wind instrument and these pipes had several tone holes (5:199).

Cornett

About 700 A.D. in medieval Persia, holes were bored in the side of an animal horn with a cupped mouthpiece. This made it possible for the pitch to be altered and thus the instrument was able to produce a crude sort of scale (53:324). This type of instrument became popular

in Europe where it was constructed by sawing a piece of wood in half, hollowing it, boring the finger holes, and then gluing it back together again. On many existing specimens there is a leather covering, and most of them included a separate mouthpiece (2:188). In its ordinary form this cupped mouthpiece instrument was known variously as the cornett, zink, cornetto, and cornet-á-bouquin. Eventually the cornett was made in different sizes so that a whole family of homogeneous instruments resulted. In addition to the normal cornett in a, there existed a small soprano size called the cornettino, or kleines zink, pitched in e'. A tenor size pitched in d was called the grosser zink or corone. There was also a cornett in straight form, without a separate mouthpiece, called the gerader zink, cornetto diritto, stiller zink, or cornetto muto, because of its soft sound (2:188). Finally a bass cornett was constructed. This instrument was called the serpent and will be discussed in detail later.

The most commonly used cornett was about one and three-quarter feet in length (43:343). Although it was usually constructed of wood, occasionally ivory specimens have been found and rarely some of metal (2:188). The

cornett had a very agreeable sound and blended well with strings and the human voice. It is for this reason and the fact that a scale of semitones was possible, that the cornett became a very popular instrument in Europe and Britain.

The cornett was used in the most difficult and rapid passages and could be played very softly so that it was no louder than a flute. Mersenne says regarding the cornett:

> Many remarks can be made on this instrument, which are not common to the others, one of which is that some are such masters of the use and practice of them that they produce all sorts of tones by blowing through the end C, with which they imitate the soft flute: and the other consists of the dispensing of the wind, which they blow so softly and manage so dextrously that they sound a song of 80 measures without drawing another breath, the experience of Mr. Quiclet, musician to the King, has revealed to many. (43:346)

Before the cornett is discussed further, it is important that the general historical developments of music are briefly traced, that the cornett may be understood in its proper setting.

A noteworthy point of departure might well be with the liturgical music of the early Christians. Plainsong or Gregorian chant, as it has been called, originated

in the psalm singing of the Jewish synagogue. Gregorian chant was in its early form a distinct, unaccompanied style of singing with one note to each syllable of the scriptural text. In the fourth century Ambrose, Bishop of Milan used his influence to inaugurate the use of religious songs or hymns. The lack of an adequate system of musical notation made it difficult to spread Christian music in an organized manner. However Pope Gregory I succeeded in standardizing the liturgy and his name has since been associated with the music of the church.

From Celtic lands, where instruments were especially used, came influences that affected the Christian practices of the continent. These so called "pagan customs" were outlawed by the church and consequently fell into the hands of the outcasts of society the wandering minstrels or vagabonds. The "goliards" as they were sometimes called used instruments in combination including bagpipes, hurdy-gurdy, horn, drum, etc. Eventually some of the secular tunes found use in the plainsong.

In the ninth century polyphony or part singing was introduced in North-Western Europe. For the first time the attempt was made to unite two melodic lines, so

that they would be pleasing when sung together. By 1200 A.D., only three centuries after its beginnings, polyphony was so advanced as to offer any composer ample opportunity to express his musical ideas. It is possible that wind instruments were used extensively to accompany the singers, for there is a miniature from the so-called Utrecht Psalter of the ninth century showing musicians singing, with others playing horns, while one plays the organ (51:18). One can see that demands would shortly call for instrumentalists to accompany singing on a wide scale. The Troubadours and Minnesingers nearly always had one or two instrumentalists accompanying their songs.

Finally the instrumentalists began to emancipate themselves from the vocalists and by 1600 A.D. separate forms for instruments alone were well established. The "last straw," so to speak, in the emancipation of the instrumental music from the vocal, came in the second half of the sixteenth century when orchestration and instrumentation first came into sharp focus. Composers began to write in detail which instruments were to be used. Minute instructions are given in Marrino Trojano's account

of the wedding ceremonies when Duke William V. of Bavaria married Princess Renate of Lorraine in 1568. At the table, the court orchestra performed a six-part motet of Orlando di Lasso with five cornetts and two trombones. Then, during the seventh course, twelve musicians formed three groups; one had four gamba players, the second four recorders, and the third had a bassoon, flute, pipe, and a cornett. This account shows an increased interest in color, instrumentation, and blend of timbre as an essential part of music (53:298).

In Germany, from the fourteenth to the seventeenth century, there existed a branch of music which had no connection with the vocal. Tower Music consisted of brass ensembles employing zinken, natural horns, and trombones. In many medieval and renaissance towns of Germany, tower musicians performed at official functions which included: playing concerts from the town tower at designated hours, taking part in religious and municipal ceremonies, playing for town dances, and giving warning against attack and fire (59:16). Such players were much respected, often included with the nobility in social functions.

A final point in confirmation of the advent of instrumental music is the publication of various source

books dealing with instruments. Some of the more important are: Sebastian Virdungs' Music Germanized and Abstracted, published in 1511; Martin Sores' German Instrumental Music, which comprises a method of learning to play on various wind instruments based on the art of singing, and how to play organs, harps, lutes, viols, and all instruments and strings according to the correct tablature. This was published under his scholarly name of Martin Agricola. In 1618 Praetorius published his monumental work, Syntagmatis Musici, Volume two of Organographia; finally Father Marin Mersenne published in 1636 and 1637 A.D. his Harmonie Universelle (53:299-301).

The foregoing brief history gives ample background and reason for the rapid rise in popularity of cupped mouthpiece wind instruments such as the cornett, horn, and trombone families. Beside the already enumerated instances regarding the use of the cornett, the following accounts are an indication of its widespread use during the Renaissance and Baroque eras.

One of the earliest mentions of the cornett in English literature is in Octavian Imperator, a poem of the fourteenth century. It reads as follows:

Ther myghte men here menetralsye
Trumpys, taborns, and cornettys crye. (28:191)

Bonatus, a musician, was attached by the King to the train of his daughter Margaret, Queen of Scotland. Record is given that one day in 1503 he was asked to play on his cornett in the royal chamber. Another instance involved a list of officers appointed to the Canterbury Cathedral in 1532, where two cornett players were listed (28:191).

Henry the VIII made special provision for the use of cornetts in the statutes, which he granted to various ecclesiastical bodies at the Reformation. In 1547 when he died, King Henry left a collection of three hundred and eighty-one instruments, five of which were cornetts (53:302-303).

Of interest is the fact that cornetts are called for in England's earliest tragedy, Gorboduc (28:191).

In 1582 the orchestra of the Berlin court possessed seventy-two instruments, nine of which were cornetts. Sachs gives a list of these instruments: it is significant to note the larger number of wind instruments in comparison with the string instruments (53:303).

24 flutes	3 trombones
17 reed pipes	7 viols
9 cornetts	4 virginals
7 organs	1 harp

Italian composers Striggio and Cortessia in 1565 called for cornetts to augment their odd assortment of twenty-four instruments used to accompany light plays (55:162).

According to Galpin, Charles III, Duke of Lorraine, in 1604 sent his cornett player Jean Presse, to England to look for instruments and players. Presse secured two cornett players, John Adson and William Burt, among others (28:192). (The British had the world's best instrumentalists, according to their own historians.)

Monteverde's Orfeo score called for two cornetts, along with one small clarion, three trumpets, and four trombones (55:162).

In most of the large cathedrals the cornett was employed along with the sackbut to support the voices of the singers (28:192).

William Child was appointed as cornett player in the King's music in 1660, a post which he held until 1684. It was during Child's time that the cornett lost its

popularity in England, and it appeared officially for the last time at the coronation of James II. In 1662 Evelyn wrote in his diary, "now no more heard the cornett which gave life to the organ. That instrument is quite left off on which the English were so skillful." (28:192)

Some have concluded that the reason for the decline of the cornett was due to the great difficulty in blowing the instrument and the fact that the hautbois or oboe was taking its place. Lord North said,

> Nothing comes so near or rather imitates so much an excellent voice as a Cornett pipe; but the labor of the lips is too great and it is seldom well sounded.

And, according to the Edinburgh Town Council Register of 1696, the cornett was superseded by the oboe (28:193).

However, the story on the Continent was much different. The cornett lived on. It found a place in Bach's chorales and in Gluck's operas. Handel scored for the cornett in his opera Tamerlano. When he presented this opera in England, the cornett was already obsolete and was replaced by clarinets (28:193).

Since the cornett was a Stadtpfeifer instrument, Bach used it only in his last period at Leipzig after 1723. Bach used the cornett in eleven of his cantatas.

It was almost always used to support the sopranos in the choral melody in association with three trombones on the lower parts. The cornett had displaced the descant trombone, because of its more brilliant and effective tone (57:38). One must not confuse the cornett with the trumpet, for which Bach wrote such brilliant parts in the Brandenburg Concertos.

One of the last appearances of the cornett in Germany is in the score of Gluck's opera Orfeo. Terry states that the cornett survived in Germany after it had passed from use in other countries; but it barely lasted to the dawn of the nineteenth century (57:37).

Up to the end of the sixteenth century no cupped mouthpiece wind bass had found extensive use. The cornett, trumpet, horn, and trombone were finding their way as useful musical media, but a useful bass instrument in this family had not been constructed. Throughout the Middle Ages there had been attempts at establishing such instrument as the great bass recorder, gross doppel quint, and octave bass sackbut (19:109). Also the ancient cup-mouthpiece Roman buccina had found very limited use.

Serpent

The first cupped mouthpiece bass of any importance was the serpent. Adam Carse cites von Gontershausen as authority for the statement that the serpent was invented by Edme Guillaume, of Auxerre in France about 1590 (13:17). Actually Guillaume cannot be given much credit for his invention because the serpent was merely a large eight-foot cornett, of conical bore, made of wood and covered with leather. Some existing specimens are made entirely of brass (19:111).

The serpent found more use in France than it did in any other country, although it was used to some extent in most of Europe. The French called the English serpent the serpent d église because of the awkward vertical manner in which it was held. In France the instrument was easier to hold and was called serpent militaire or serpent d'harmonie (26:287).

The serpent was keyless and was provided with six or eight laterally pierced tone-holes. Later experimental models acquired numerous keys, so that the position of the finger holes could be corrected and therefore the intonation was slightly improved (26:287). By overblowing and

with the help of the six finger-holes a range of two and one-half octaves and more were possible (29:148). Others say the serpent of the early nineteenth century had a compass of three octaves from C to c^2. The actual range would be one step below the aforementioned because the serpent is usually a transposing instrument in the key of B^b.

The main use of the serpent, like that of the cornett, was to support the singers in the choir. The cornett doubled the soprano line and the serpent the bass. Its use, however, went beyond the ecclesiastical realm, into the concert hall. There the serpent enjoyed a somewhat extensive following as a wind bass up to the early nineteenth century.

The tone of the serpent has been described in both favorable and unfavorable light. One historian indicates that the tone is "peculiarly mellow" and also very powerful. When played by a boy it could be heard above a full male choir (19:110). Mersenne lauds the serpent as being capable of accompanying twenty of the most powerful singers, and yet playing the most delicate types of chamber music (43:348). Berlioz, on the

other hand, did not share any enthusiasm for the serpent. He says:

> The essentially barbarous quality of tone which distinguishes this instrument would have suited better the rites of the sanguinary Druidical worship those of the Catholic religion: wherein it always figures as a monument of the want of intelligence, and of the coarseness in sentiment and taste which, from time immemorial, have marked in our temples the applications of Musical Art to Divine Service. Exception must be made in favor of cases, where the serpent is employed, in masses for the dead, to double the terrible plain-chant of the Dies Irae. Its frigid and abominable blaring doubtless then befits the occasion; it seems invested with a kind of lugubrious poetry, when accompanying words expressive of all the horrors of death, and the vengeance of a jealous God. It would be no less well placed in profane compositions, if ideas of the same nature had to be expressed; but then only. It mingles well, moreover, with the other timbres of orchestra and voices. (8:177)

Some notable works which are scored for the serpent include: Handel's Water Music (1715) and Fireworks Music (1749); Rossini's opera Siege of Corinth (1826); Mendelssohn's A Calm Sea and Prosperous Voyage (1828) and his oratorio St. Paul (1836); Wagner's opera Rienzi (1842); and Verdi's Sicilian Vespers (1855). Other composers such as Auber and Bennett have also scored for the serpent.

Mechanical variations of the serpent were

experimented with, such as constructing the serpent a fifth lower in pitch. Also a contra-bass serpent was made, and in 1828 Coegget produced a ophimonocleide which was a kind of serpent with only one key but produced a complete chromatic scale (27:225-26). Yet, none of these instruments was found to be of practical use and they remain as museum relics. Finally, by the mid 1800's, even the ordinary serpent gave way to its successors and became another museum novelty.

Russian Bassoon

An Italian musician, Regibo of Lille, France, is credited with being the first to change the serpent shape by bending it back on itself in the form of a bassoon (53:422). Regibo did this in 1789, and the newly shaped instrument was variously called the serpent droit, ophibaryton, or Russian bassoon (27:226). Actually, the Russian bassoon never took the place of the serpent, but it was an intermediate step towards the creation of another instrument, the basshorn.

Basshorn

Two men have been credited with the invention of the basshorn, Alexandre Frichot, a Frenchman, and J. Astor an English instrument maker (53:422). The basshorn had the bore of a serpent and the shape of a bassoon. It should not be confused with our modern day basshorn or tuba, and there is no relation historically or technically to the bassoon.

The basshorn utilized a cup-shaped mouthpiece and the pitch was varied in the same manner as the Russian bassoon by finger holes. Frichot gave different names to later improved models. These names were the cause of confusion among historians. He called them the basse-Cor, and basse-trompette. Streitwolf of Gottingen, in 1820, brought out the most improved model called the chromatisches basshorn, which had a better bore, two open holes and ten keys, making it possible to play easily in all keys (53:422).

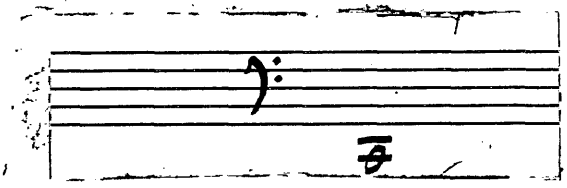
Mendelssohn scored for the basshorn in his Funeral March for Burgmuller (1836); also, Spohr's Ninth Symphony has a basshorn part. Around 1830 the basshorn was superseded by the ophicleide.

Ophicleide

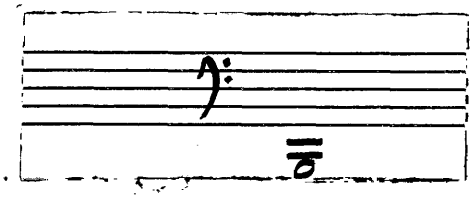
The ophicleide was a type of keyed serpent. In literal Greek translation, the term has a dual meaning. It refers to "serpent" and "key," and hence is a somewhat valid description of the instrument. However, the form was not like the original serpent. The ophicleide, rather, had a folded-back tube and looked more like its immediate predecessor, the basshorn. The ophicleide followed the serpent as a significant step in the evolutional history of the cupped mouthpiece wind basses. Historians generally agree that Halary of Paris invented the ophicleide in 1817. In its mature form the ophicleide had eleven keys (27:226). Its bore was conical like that of the serpent, and it was constructed of metal. The ophicleide varied its pitch by the use of successively placed large keys similar to the klappenhorn or cor-à-clefs, a soprano bugle. The series of holes were spaced so that successive lengths of the tube were cut off with each open hole and thus the pitch was raised (26: 173). A peculiar aspect of this principle involved the key nearest the bell, which was always open and would close only when compressed by the fingers. The full length of

the tube could be utilized only when this key was closed, and therefore the key technique was somewhat irregular.

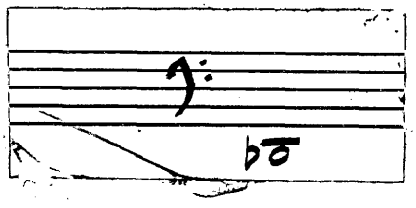
Assuming that an ophicleide in G is used, without any of the keys a player could blow the harmonic series from the second partial upwards.



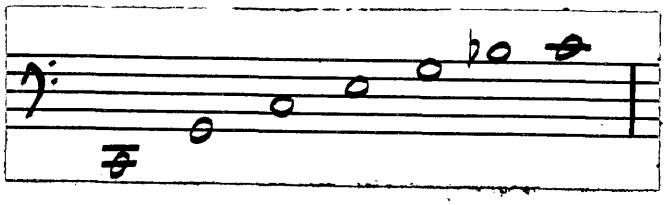
By closing the first key the pitch would be lowered one-half step to the lowest note of the ophicleides' range.



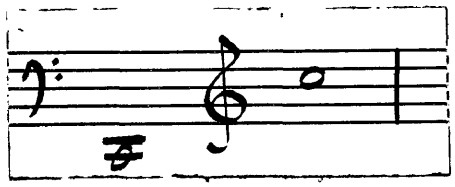
Compressing the second key opens the second vent and raises the pitch one-half step; and so on until all seven keys have been used.



The following partials of the harmonic series are obtainable.



The range of the C ophicleide is three octaves, with c' being the extreme for the high range (26:174).



The ophicleide has been described as being able to produce a tone with the slightest effort and was noted for its easy response (26:174). As a legato playing instrument, it has no peer, not even among the modern brasses. The objection against the ophicleide was that it was out of tune in the higher register. In fact Forsythe indicates that all the harmonics beyond the first three tube lengths were of faulty intonation. A partial remedy to this defect was the reason for the open first key.

Even with its faults, the ophicleide found recognition as the chief wind bass in most military bands and orchestras. In France it was scored for by nearly every composer from Spontini to Meyerbeer (26:174).

Spontini's Olympia (1817) included it; Mendelssohns' Midsummer Night's Dream (1817) has a famous "clown" passage for the ophicleide. Also the oratorio Elijah (1846) is scored for it. Wagner wrote a part for the ophicleide in Rienzi (1842). Berlioz, even though he criticized it, scored for two ophicleides in the Amen Chorus of Faust.

Now that the ophicleide is obsolete, other instruments such as the tuba substitute for it. However, some parts completely lose the point intended by the composer when taken by other instruments. Maybe it is because of this that instrument manufacturers in France, even to recent years, have listed the ophicleide in their catalogues.

Valve Development

Prior to the consideration of the tuba family, which followed the ophicleide, it is important that this discussion retrogress to emphasize another development in the historical study of the euphonium. This development concerns the various means that have been used to alter pitch in tubed wind instruments. It need not be confined

to bass instruments alone for the principle and inventions relevant to other winds, have had due effect upon the bass family.

To properly understand this fact of the discussion; it is necessary to consider the acoustical principle involved. If a tube with a mouthpiece is blown upon with the lips so that the air column within is caused to vibrate; various tones can be produced by altering the speed of the air, the pressure, and opening of the lips. The air column can be varied only to produce certain well defined intervals on any given length of tubing. It is impossible to produce any tones between these intervals. If the length of tube is altered, then different tones can be sounded, but their intervals to each other are relatively the same as they were before. The series of notes produced on any given length of tubing is called the harmonic series. The harmonic series is important, for it is the fundamental principle of tone production upon which all modern day brass instruments are built.

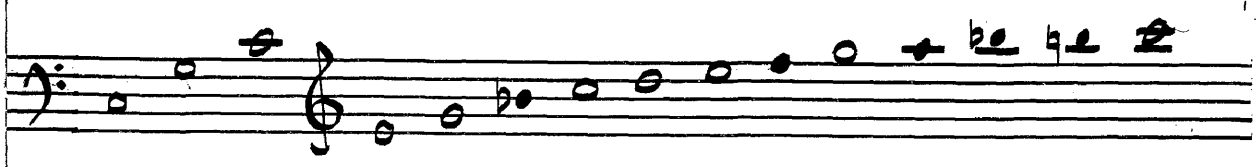
Already mentioned is the lateral tone hole system of altering the pitch. This principle is employed on woodwinds and the cornett family. This need not be

discussed at length here, because it has been amply covered previously in the paper.

The idea that finally proved itself with the cupped mouthpiece brasses was the principle whereby the entire harmonic series was raised or lowered by shortening or lengthening a tube that was closed except for the bell and mouthpiece end. This can be visualized in an easy manner by observing the simple construction of the slide trombone.

Most of the discussion of the development of the valve will concern the trumpet and French horn.

Both the trumpet and French horn have seen popular use in the field, and out of doors to sound the hunting calls or to signal the militia. Up to the early seventeenth century these instruments seldom saw use in the concert hall because of the limited number of tones which they could produce. The old hunting horn or military trumpet had only eleven good and four poor quality notes. The following illustration will show the tones that a natural trumpet or horn in C would be capable of sounding. The dark notes are of poor intonation.



Composers were reluctant to write for such limited instruments; however, around 1618, the use of crooks increased the possibilities of the trumpet and horn (26: 73).

Crooks are merely pieces of coiled tubing which extend the length of the instrument when inserted in the small or mouthpiece end. These coils were called krummbogen by the Germans and corps de rechange, by the French. Tyrtaens, the Spartan bard, who lived around 700 B.C. is said to have utilized the crook principle to augment the playing range of his horn (16:21). Crooks were first used generally on trumpets and then later on the horns. As the call came for the horns and trumpets to play in additional keys, more crooks were constructed. Some players would carry as many as fifteen different crooks and merely change them to put the instrument into the key the composer desired. The generally used crooks for the horn were in the following keys: Bb alto, A alto, Ab, G, F, E, Eb, D, C, and Bb bass (16:21). Of course the

use of crooks would make the horn a transposing instrument, in that it would sound lower than the parts actually written.

During the time of Bach and Handel, the trumpet and horn were essentially like the instruments discussed above. Performers developed their embouchure and became surprisingly agile and competent on these crude instruments. However, Terry says: "It may be doubted whether Bach ever heard his scores interpreted with even approximate excellence. How much more fortunate was Handel in London!" (57:18) It was the practice of the time to play in the higher register of the instrument and thus the tones of the upper portion of the harmonic series were produced, making it possible to play limited scale-like passages and melodies.

Hempel of Dresden invented a new horn called the inventionshorn in 1753. This horn enabled the performer to tune his horn in the middle of the tubing instead of the mouthpiece end and cut down on the number of crooks he was obliged to carry. Even with the tuning slide method of the inventionshorn a better technique of pitch variation had to be found.

In 1754 Hempel found that the pitch of the horn could be altered a semitone if his hand was inserted half-way into the bell, and by placing his hand fully into the bell, the pitch could be lowered a full step (26:76). Thus without the change of crooks, the hornist was now able to lower the harmonic series a half or full step, depending upon what was required. Some writers credit the hand stopping technique for bringing the bell of the horn down from the bell up position. Others say that the bell was brought down, because of the horn's somewhat loud and coarse tone in the upright position. It is easy to see how both of these techniques would soften the horn's tone to a certain extent. In fact the muffled effect produced by stopped tones gave an uneven balance to the horn's scale and for this reason the hand horn was musically unsatisfactory. The technic of changing pitch in the above manner was of little consequence in the development of the valve except that it spurred men to look for some other means of pitch alteration.

Kolbel of St. Petersburg introduced an appliance in 1760 that wrongly influenced the trend of thinking regarding cupped mouthpieced instruments for over fifty

years. The contribution of Kolbel was a closed key placed near the bell of a horn, which upon opening, shortened the air column and therefore raised the pitch a semitone (53:422). Kolbel's invention was called the amorschall. By 1801 Weidinger of Vienna had added four or five more keys and eventually in the early part of the nineteenth century, a sixth key was added (19:16). Soon all the cupped mouthpiece instruments except for the trombone, had keys and were chromatic. Even though the ophicleide found its way into the orchestra, the keyed horn and trumpet were never really accepted by orchestral composers, but became widely used in military bands. Keyed instruments were generally unacceptable because of their inherent bad tone quality and intonation.

Another experimental attempt at making a chromatic horn was initiated by Dikhuth of Mannheim in 1812. He made a horn with a slide attached to it in the same manner as the trombone (27:228). The invention may have been suggested by Hyde's slide trumpet of 1808, however, neither instrument was generally accepted and the valved instruments soon took over.

The most effective system yet devised to make

cupped mouthpiece instruments chromatic. is to construct the instrument in such a way that several harmonic series can be produced on one instrument without resorting to tone holes in one form or another. Preliminary to this, several inventions combining two or more separate sets of tubing in different keys found nominal acceptance. The more than one horn principle was an important step towards the ideal instrument, because it provided the all important valve mechanism which revolutionized brass wind instruments around the world.

The first record of inventive genius utilizing the proven valve system of tonal alteration is that regarding Charles Clagget, an Irishman. In 1788 Clagget obtained a British patent for combining two horns, with a rotary type valve between. One horn was in D and the other in Eb. In Musical Phaenomena Clagget has this to say regarding his instrument:

> The invention consists in the unison of two trumpets or French horns, which are removed from each other in pitch, by what is commonly called a semitone, by which means we command all the keys required, minor as well as major. . . . Hitherto we could only hear certain notes, full and perfect from them; and when times and melodies have been attempted it was by a vile method of thrusting the hand into the bell of the horn which produced such heterogeneous sounds, some perfectly

> clear and charming, others buffed or muffled as rendered it impossible almost to believe sounds, so unconnected could be produced from the same instrument. . . . (16:46)

Whether Clagget's instrument was put to much use is unknown, however, a demonstration was given in the form of a concert at Bath Pump Room (13:208). Daubeny says:

> Dr. Burney thought highly of the invention, but feared that such innovations were too far in advance of the times, a surmise which subsequent experience proved to have been well founded. (19: 16)

There is no record of Clagget's improving upon his revolutionary invention; it remained for others to develop this innovation.

The first known example of valve construction on the continent is by Kerner of Vienna, who in 1806 made a valved trumpet (27:231). Most writers do not recognize Kerner however, and even Clagget has not received the credit that has been heaped upon Blumel and Stolzel.

In 1813 an oboist, Fredrich Blumel, a Silesian, conceived an idea similar to Clagget. A compressed piston valve was used to divert the air stream from the normal tubing into an extra length of tube that lowered the pitch; when the valve was released a spring would restore it to its ordinary position. Carse cites Kastner and his

Manuel Général de Musique Militaire as authority that Blumel sold his invention to Stolzel, a native of Breslau (13:209). Coar in his comprehensive book The French Horn has this to say:

> In an article in the Allgemeine Musikalische Zeitung (Leipzig, May 1815) by G. B. Bierey of Breslau, Heinrich Stolzel of Ples is named as the inventor of a device by which the chromatic scale of about three octaves could be played on a horn without 'stopping.' Another rather elusive article, Wichtige verbesserung der Waldhorn (November 1817) by Friedrich Schneider credits Stolzel with the invention of the valve but does not make clear the exact nature of it. However the writer seems to suggest some kind of piston mechanism which when depressed was restored to its original position by means of a spring. (16:48)

Whether it was Blumel or Stolzel who applied the valve to an instrument is confused in history. Through their collaboration, however, a crude two valve trumpet was made by 1815 (19:17). In Wilhelm Wieprecht's letters, published in 1845 in the Berliner Musikalische Zeitung; he states that Stolzel brought a three valve horn to Berlin in 1816 or 1817, claiming to have invented it and having secured a Prussian patent for it (16:48). Whether Wieprecht remembered his dates correctly is open to question, for Carse cites 1818 as the date Blumel received a ten year patent for his valved invention (13:414).

Blumel was an avid experimenter and even though some of his inventions were rejected he continued to work on improvements to his earlier inventions. By 1827 he invented a valve which is called konischen drehbuchsenventil (16:49). Galpin refers to this as the rotary valve (27:231). Coar does not agree that this term refers to the rotary valve (16:49). It would seem that the rotary action is so similar in principle to the invention that Clagget brought out in 1788, that he ought to get credit for it.

Other inventors besides Blumel and Stolzel worked on improvements for brass instruments. In England John Shaw patented his "transverse spring slides" in 1824 (27:231). This mechanism worked much like our modern-day compensating trigger. When the push rod was depressed a "U" shaped tube was extended much like a slide on a trombone. When released a spring would pull the "U" tube back in closed position again. A similar action was claimed to have been invented by Uhlmann in 1830 (16:49). It was called the Wienerventil or Vienna valve and was really no more than the "transverse spring slide" mechanism as originally invented by Shaw.

It is claimed that the third valve was added to instruments in 1830 by C. A. Müller of Mainz (16:50). This seems untrue in light of Wieprecht's letters describing Blumel's three valved horn of 1817. Also Carse indicates that Labbaye of Paris applied for a patent in 1827 of a three valve trumpet (13:70).

Wieprecht and Moritz invented the Berliner-Pumpen valve in 1835 (27:232). This valve was short and very large in diameter, with the main tubing entering and leaving the casing at right angles to the other tubing. This valve was quite popular for some years, but eventually became obsolete because of its somewhat slow and bulky action. There is some dispute as to the type of action involved in this valve. Some claim it used a rotary valve principle, others maintain it was a piston action valve. An improvement upon the Berliner-Pumpen was initiated in 1839 by Perinet of Paris (27:232). He lightened the action and placed the valve tube openings so that they ran parallel to the main tube, which is essentially the same principle used today in valve manufacture.

A unique approach to the valve problem was made by Shaw in 1835 in the form of a patented disc-valve action (27:232). The discs were made in pairs, with one being attached to the additional tubing, and the other revolving under action of a finger lever. Halary, the French maker, later adopted this device, because it did away with the sharp bends and angles which had been characteristic of many valve mechanisms to this time. The disc-valve had one inherent problem which finally led to its downfall. The discs were difficult to keep close enough together to prevent the air from leaking and when kept tight the discs would bind, making it impossible to keep the action fast enough for playing purposes.

The final experiments that took place in the evolution of the piston valve occurred in France and England. In 1859 the French maker, Besson, constructed an instrument with direct passages that included the same diameter bore throughout the valve ports (27:232). In London, Distin, the celebrated musician, gave the finishing touch by using a tube with the ports soldered into it to produce a valve that was lightweight and gave a light fast action which has since become general (27:232).

Valved instruments soon found their way into the musical organizations of Europe after they had been invented. Bands of the Jäger Guards in Prussia received their first valved horns in 1825, and valved trumpets in 1828 (36:33). By 1826 valved instruments were known in Paris, and by 1830 they were becoming known and manufactured in most European countries (13:414). Germany was the first country to generally accept the new valved instruments. Berlioz reported that horns and trumpets with rotary valves were found in all the most important orchestras along with the valved tuba (13:416). Some of the other countries were more reticent to accept the new inventions. Berlioz and Kastner tried to sell the French on the merits of the valve mechanism, but it was some ten years before the conservative musicians of Paris and other centers accepted the new innovations.

In many places the new instruments were considered as novelties and little serious thought was given to them as regular members of the standing musical organizations. In Vienna as early as 1827 the Lewy brothers played duets on valved horns. Their performances were considered a novelty, but they helped to start the revolution that

changed the wind band. Little record has been found regarding the advent of the valve in Italy, but some surviving instruments made by Pelitti of Milan suggest that the valve had reached there soon after 1830 (13:417). Musicians in England were somewhat slow in learning about the valve as applied to instruments, even though Clagget was one of the first to invent a type of valve. Instrument makers in London made valve instruments during the 1830's. However, in 1837 a Mr. Perry played a solo on a valved horn at a concert for a literary and scientific institution; his exhibition was received as a complete novelty to the musicians present (13:417).

Eventually, the fact that very difficult passages were negotiated in an easier manner by the musicians possessing the valved instruments forced the others to seriously consider the merits of the newcomer, and the valve became the foundation for a complete musical revolution in regard to the concept and capabilities of the cupped mouthpiece brass winds.

When makers had learned how to make valves, they applied the system to every type of brass instrument in existence and even invented some new ones. From 1825 to

1850 a bewildering variety of new instruments were invented. They were made singly, in families, and in all keys and registers. The new instruments added a galaxy of new and odd terminology to the already confusing list of musical instruments. It is this period that gave birth to the tuba family which included the euphonium.

The Tuba Family

The Bass Tuba and Euphonium

The valved tuba was the first bass instrument to follow the ophicleide. A musician of importance involved in the invention of the tuba family is Wilhelm Wieprecht. He not only invented various instruments but also instituted great reforms in the wind bands, that eventually revolutionized the concepts of military music around the world.

Wilhelm Wieprecht.--Wieprecht came from a musical family. His father was regimental trumpeter in the Prussian Army and he had four uncles employed as musicians. Young Wilhelm learned to play the violin and clarinet at an early age, and in 1822 when twenty years

old he took up the trombone. When fourteen years of age he quit school and performed with his father for four years. In 1824 Wieprecht went to Berlin and there for the first time heard an Infantry Band in concert. The band had a few valved brass instruments that gave Wieprecht imaginative ideas regarding the possibilities of the wind band. He decided then and there to devote his life to the improvement of "military music" as it was called. He soon joined the Infantry Band as a civilian (36:18).

Major Von Barner was director of the band and was enthusiastic over Wieprecht's ideas and gave them his support. Wieprecht's first composition for the group proposed new instrumentation and was written and performed in 1828. In 1829 King Wilhelm III heard the band and was so pleased that he ordered Wieprecht to improve the Regimental Bands at Potsdam. Wieprecht designated the following instrumentation for his first piece: (36:22)

1--High B^b Trumpet (valves)
2--Klappenhorn (keys)
1--Alt. Trumpet in E^b (3 valves)
2--Ten. horns in B^b (3 valves)
1--Ten. bass horn in B^b (3 valves)
4--Trumpets in E^b (2 valves)
2--Bass trombones (slide)

In this instrumentation is one of the very first recorded instances of an instrument that fits the description of the euphonium. It is impossible to categorically say the tenor bass horn with three valves is a euphonium, because no description or further information is given regarding the instrument. Farmer claims this instrument to be a euphonium and further credits Wieprecht with inventing it along with two other instruments in the group, the E^b trumpet and the B^b tenor horn (24:103).

By 1835 Wieprecht along with Moritz of Berlin had completed the valved brass family by invention of the bass tuba. Wieprecht's new instruments added so much to the musical possibilities of the band that he was appointed Musikdirektor of the combined bands of the Prussian Guard-Corps in 1838. All the Prussian bands were reorganized and fitted with valved instruments and became respected as the best bands in the world. It is interesting to note in an instrumentalist chart of 1860 that the baritone-tuba is said to be identical to the euphonium (36:56-57).

Although Wieprecht had great talent for organization, his inventive genius was lacking in that he did not

understand the principles of acoustics, for his instruments did not possess the full tone quality of later instruments. It remained for the engineering genius of Adolphe Sax to really bring wind instruments into their own.

Adolphe Sax.--Adolphe Sax has been credited as inventor of many new instrumental mechanisms that have done much to improve their musical capabilities.

Sax was born in Dinnant, Belgium in 1814 and was apprentice to his father, Charles Joseph, an instrument maker. During his early years he demonstrated great skill as an instrument maker and while in his early twenties improved the bass clarinet. The improved instrument was given recognition by Berlioz, Habeneck, and others.

In 1842 Sax moved his shop to Paris and started to make instruments. By this time he was well known in all the music centers of Europe. Sax always managed to find friends, yet as one biographer states:

> Sax--like Beaumarchais in the 18th century, like Whistler in the later 19th century--had exceptional gifts for the gentle art of making enemies. It would be too easy to accuse fate: when during a long lifetime a man is constantly involved in the same kind of turmoil, the natural conclusion is that he is himself to be held

> responsible for most of his trouble. A disposition inherent to his character led Sax to clash with his fellowmen. (39:11)

It may be because of Sax's personality problems that so many of his inventions were contested in court. Another viewpoint is that Sax's genius lay not in original ideas but in improving upon the ideas of others and because of this other instrument makers felt he had stolen from them. Whatever the source of the problem, Sax was in continual legal trouble and the Paris courts were still working on suits against him at the time of his death in 1894.

Oscar Comettant, Sax's biographer, lists no fewer than thirty-five inventions by Sax (17:522-523). Of these some of the outstanding were:

1. New bass clarinet
2. Different system of adding tube length through cylinders.
3. New fingering system
4. Saxhorn family
5. New port system
6. Saxophone family

Of this group the Saxhorn family is important in the evolution of the euphonium. This group consisted of the following instruments: (15:124)

1. E^b Sopranino Saxhorn
2. B^b Soprano Saxhorn

3. E^b Alto Saxhorn
4. B^b Baritone Saxhorn
5. B^b Bass Saxhorn
6. E^b Bass Saxhorn
7. BB^b Bass Saxhorn

These instruments all have primarily conical bores and were usually made in upright form, although Sax made a few to be played horizontally as is the cornet.

When Wieprecht and other Germans found that Sax had attached his name to this family of instruments they became furious. They said that he had no right to claim the Saxhorn family as original inventions, for the Prussian bands had been using virtually the same valved instruments for years.

The Germans were quite right, they had been using similar instruments from three to five years, for Sax did not patent his until 1845. However, Sax must have been working on his horns in 1843. Berlioz throws light on Sax's progress in his articles in the Journal des Débats. In a trip to Germany during the spring of 1843, Berlioz' wrote a series of eleven articles entitled "Voyage Musical en Allemagne" in which he observed. (39:16, 18)

> October 8, 1843--Berlin
> . . . Adolphe Sax is at present constructing large and small trumpets with cylinders, in every possible tonality. . . .

> Our military bands have not as yet trumpets with cylinders nor bass-tubas (the finest of the bass instruments). The construction on a large scale of said instruments will become imperative to put the French military bands on the level of those of Prussia and Austria. . . .
>
> November 8, 1843--Berlin
> The bass-tuba, invented and advocated in Prussia by Wieprecht, is also manufactured in Paris now by Adolphe Sax.

It is easy to see how Wieprecht might feel Sax had stolen his ideas. It was inevitable that these two men should meet and discuss their differences. This event took place in the summer of 1845 at Coblenz where many distinguished musicians had come to assist at a court concert. On the morning of the concert Wieprecht called on Liszt at the Coblenz hotel. When he entered Liszt's apartment he found Liszt, Sax, Lefebre, and others present. The following two descriptions of what took place are given by Wieprecht himself, and by Fiorentino, a correspondent of the Paris "Constitutionnel."

The following is a brief translation by Leon Kochnitzky: (39:23-24)

> 'When I entered the room,' writes Wieprecht, 'Liszt took me in his arms and clasped my hand in the real German manner. His first words were: 'Wieprecht, Sax has just arrived.' Whereupon he introduced me to him. . . . It seemed that we had

> nothing better to do than to compare our respective instruments, and let the audience decide. . . .'

Wieprecht ends by trying to distinguish between improvement and invention.

> Let us hope that Sir Sax will not weaken the eminent services he has rendered to the cause of art, by a petty 'amour-propre' which would incite him to claim as an invention what is merely an improvement. . . .

This is Fiorentino's version:

> . . . the two antagonists advanced toward each other smilingly holding their hands. After a moment, I heard Sax say:
>
> 'Really, do you know anything about my instruments?'
>
> 'I know everything,' answered Mr. Wieprecht modestly.
>
> 'The saxophone also?'
>
> '<u>Ja wohl</u>.'
>
> 'And my bass-clarinet?'
>
> '<u>Ja</u>.'
>
> 'And could you play on it?'
>
> '<u>Ja</u>.'
>
> Sax went to fetch his clarinet and handed it to Wieprecht. The latter took hold of it gingerly, like a recruit grasping a rifle by the butt. Then he did his best to sound a few notes. After two or three unsuccessful attempts, he was obliged to concede that he knew nothing about the clarinet,

> less about the saxhorn; and as for the saxophone, that was a complete mystery. He frankly acknowledged the facts and apologized profusely. He ended by inviting Sax to come and hear the Prussian instruments in a large hall nearby, and asked him to try out his own instruments in the presence of a few military musicians. And very courteously he invited both Liszt and myself to assist at this interesting challenge.
>
> The Prussian musicians began. Then Sax and Arban in their turn played on the saxhorns and the clarinet. I shall never forget the envious and covetous looks that those men cast on the new instruments. . . .
>
> As to Mr. Wieprecht, he could not hide his enthusiasm. Embracing his rival, he vowed he would come to see Sax in his Paris workshop to make amends.
>
> Upon this I said to Liszt: 'I thought you told me Sax and Wieprecht were not on good terms. And now you see the 'Tuba' and the 'Saxophone' going off arm in arm?'
>
> Liszt smiled and answered: 'I fear they won't remain in tune very long.'

It is of interest to note that Sax's colleague mentioned in the preceding paragraph is the famous Joseph Arban known for his performing ability and for his famous method originally written for cornet (3).

Liszt was right, for Wieprecht eventually sued Sax and lost in the French courts (6:960). It probably is not wise to contend that either one of these men was the sole contributor to the invention of the euphonium, for

both played their part in the evolution of the instrument. Wieprecht first established it as a useful instrument and Sax improved it by taking abrupt twists and turns out of the tubing, improving the valve system, and standardizing the fingering (19:17). The fact that there was considerable difference between the quality of many of the French instruments and those of the Germans is seen in a statement by Allen Dodworth, a bandmaster of New York, who gave the following interesting opinion of wind instrument makers in his Brass Band School (1853):

> The French band instrument makers have a deservedly high reputation, but they do not all make good ones. The Germans have a decidedly bad reputation, but they do not all make bad ones. . . . (61:261)

Because of the improvements Sax made, he has gained a great deal of fame and in some cases writers have credited him with the invention of the bass tuba family and also other instruments which evidence seems to indicate were invented by others. As quoted by Karl Geiringer, Adam Carse relates, ". . . when the Italian maker Pelitti was asked if he made Sax's instruments at Milan, he replied: 'It is Sax who is making my instruments in Paris.'" (29: 236). And so numerous makers claim invention of the

euphonium. Another is Sommer or Weimar who claims to have invented the euphonium in the 1840's (29:234).

These points are a small sample of testimony indicating the large variety of similar instruments that were being constructed by craftsmen all over Europe around the middle of the nineteenth century. Many times these instrument makers would attempt to make a newly designed instrument and find when finished that another maker across the continent had made one almost identical.

Of course makers used different terminology in naming their various new instrumental creations, and thus arises another source of confusion regarding the subject.

However, whether an instrument was called a tenor bass horn with pistons, or euphonium, or B^{b} bass saxhorn, or baritone bugle with pistons, there was really no more difference in the tone quality or basic acoustical design than there is today between the various models and makes of any common named instrument. The important factor is that differently named instruments be voiced the same for use in instrumental organizations. This was realized by Fétis, a musician who wrote the "Report for the Exposition of 1867" where the instrument manufacturers of the time

exhibited their instruments. Fétis reported:

> Whatever name be given to the instrument, the form is of little importance; the instruments with wide tubes with pistons belong to a natural classification; soprano, alto, bass, etc., it is of very little importance therefore that the bass is named euphonium, the contra bass helicon, etc. . . . . (49:354)

The Euphonium During the "Golden Band Age"

This discussion deals with historical implications which have fallen during a time that has often been called the "Golden Band Age." The reason for calling this period the "Golden Band Age" is that the quality of music produced by the wind bands of the day greatly improved because of the new inventions, instruments, and the reorganization instituted by Wieprecht. The band became very popular and gained considerable respect as a medium of musical expression.

Wieprecht's reorganization in Prussia set the example for other nations and soon the artistic standard was raised throughout Europe. Belgium was first to follow in 1846, then France in 1854 and England in 1857 (24:108, 111, 116). Although some of the saxhorns were dropped from the instrumentation in some countries the

euphonium was always considered an essential instrument and has been used to this day.

In general the trend in numerical strength was toward greater numbers. Wieprecht's band of 1845 had twenty woodwinds and nineteen brasses, one of which was a euphonium. The Grenadier Guards Band of England (1888) had twenty-eight woodwinds and twenty-eight brasses including four euphoniums. John Philip Sousa started a new trend of increasing the woodwinds and decreasing the brasses. His 1892 professional band had twenty-seven woodwinds and nineteen brass including two euphoniums.

In America the "Golden Band Age" was marked by the organization of professional and amateur bands across the entire continent. Huge crowds flocked to hear the great bands of the time. It was in this setting that the euphonium became established as a solo instrument.

One of the first recorded instances of the euphonium being used in America is in an illustration of the Boston Brass Band in 1851 (54:42).

Patrick S. Gilmore organized a large band in 1864 that included ninety euphoniums (54:51). The earliest available record of a euphonium soloist is that of Harry

Whittier, a member of the Gilmore Band of 1888 (54:200). This date seems rather late for it follows the invention of the euphonium by sixty years. There must have been other soloists in America before Whittier, for in Europe the Distin family as early as 1845 helped Sax sell his saxhorns by giving public concerts in the form of solos and ensemble numbers that amazed their audiences (17:36).

Soloists to follow Whittier were numerous. H. W. Schwartz in his book, Bands of America mentions many musicians who performed with the popular bands of the day. The following list includes many of these pioneers:

Sousa Band: Michael Raffayolo (1890), Simone Mantia, John Perfetto, Pasquale Funaro, Joseph DeLuca, A. J. Garing

Liberati Band: Erminio Giannone (1893), Philip Cincione, Pasquale Funaro, Joseph DeLuca, Salvator Florio, Armando Manzi

Conway Band: Pedro Lazano, Joseph DeLuca

Pryor Band: Simone Mantia, Ollie May

Innes Band: Harry Whittier

Creatore Band: Louis Castellucci

Other euphonium soloists of later fame include Karl King of the Fort Dodge, Iowa band; Leonard Falcone of Michigan State University; Harold Brasch, former

soloist with the United States Navy Band; and Robert Marsteller of the Los Angeles Philharmonic Orchestra.

Although the "Golden Band Age" was a stimulus for greater music participation in America, it tended to develop a false sense of musical standards in the American public. In England the critics as early as 1851 bemoaned the type of music that most bands were performing. The following is a comment in the London Times appearing after a concert at Chelsea in June, 1851.

> The execution of their pieces was so admirable, the ensemble so good, and the energy and decision of the conductors so remarkable, that the unequivocal satisfaction of the auditors was not to be wondered at. We only regretted that with such splendid means so little of real musical importance was effected. The overture to 'Euryanthe' alone among the fourteen pieces presented was worthy of consideration as an artistic performance. Our military bands have reached a very high degree of perfection in regard to the mere talent of execution; but in other respects they have done little or nothing to assist the progress of the art. If the bandmasters who train them so zealously and well would endeavor to instill into them some notion of true music, instead of confining them almost wholly to the most ephemeral productions, their influence would be highly beneficial. (24:125-126)

The independent business bands of Gilmore, Liberati, Brooke, Innes, Sousa, Creatore, Pryor, Conway, Kryl, and Sweet had to pay their own way. They did not have the

financial support the military bands had and for this reason they sometimes resorted to the most trite and gaudy type of exhibitions. Some of these organizations performed music selections at formal concerts that were little better than circus music, while others occasionally gave programs of outstanding musical value.

The first music written and published for euphonium came from this period. Soloists vied to outdo each other in virtuoso display of technic. Popular folk tunes of the day were arranged in the form of theme and variations, with each variation building up in speed and intensity, finally finishing in a pyrotechnic display on a cadenza or a coda. It is unfortunate that the so-called "foundation" for the euphonium literature and style of playing came from this era. However, the instrument became popular through the manifestations of the "Golden Band Age" performers who marked an era and fulfilled their destiny.

Modern Era

A new kind of concert band has taken the place left by the "Golden Age" bands of the past. A new concept

in sound and type of music performed has gained enthusiastic acceptance in America. The trends of the modern era have been brought into sharp focus primarily by music educators. However, school men must give credit to Dr. Edwin Franko Goldman as a moving force in the transition to the new era. Since 1912 the Goldman Band has been comprised of the finest musicians and has been devoted to the performance of the very best in music. Dr. Goldman and his son Richard Franko have set forth the principles which govern the band and the music they play in two books: The Concert Band and The Band's Music. These writings have been instrumental in spreading the gospel of the new era.

Many music educators have long lamented the influence the "Golden Band Age" has had on education. For many years following the first world war the majority of published music available came from the pen of men directly connected with the "Golden Age" bands. Naturally a student fed on these materials would develop a false sense of values in regard to music. Through various organizations such as the Music Educators National Conference, efforts have been put forth to influence teachers toward worthy

goals in music. Lists of selected music have been circulated and composers and arrangers of distinction have been commissioned to provide good music for the schools. Contest-festivals were organized and have been helpful to teachers by providing constructive criticism as given by a panel of experts. The situation today in school music is one of complete contrast compared to a few years ago. One might say that the "modern era" has truly been ushered in.

The role of the euphonium has changed to some extent just as has the concept regarding the band. Composers and arrangers of the "modern era" have been more judicious in writing parts for the euphonium. The trite countermelody so typical of the "Golden Band Age" is seldom heard any more. In purchasing an instrument euphoniumists now place priority on the instrument's intonation qualities and character of tone, instead of choosing one because it has lightning valve action, regardless of its other attributes. A school soloist today may very well be performing Barat's Andante ed Allegro instead of Tramp, Tramp, Tramp with variations. However, this is not the place to describe the modern day euphonium or its

literature for these aspects are dealt with in subsequent chapters.

In summarizing, it is important to realize that the attitude toward the euphonium changed with the advent of the "modern era," even though the instrument has remained much the same since its invention in the first half of the nineteenth century.

CHAPTER III

DESCRIPTION OF THE PRESENT DAY EUPHONIUM

Classification

The euphonium as a musical instrument may be classified by several systems. The Chinese have long had the system of classing instruments according to the material of which they are made. Of the eight classes--skin, stone, metal, clay, silk, wood, bamboo, and gourd--it can be seen that the euphonium would fit in the metal class. This method of classification makes little sense when considered by a musician who is interested primarily in the way the sound is produced.

Another method of classification was devised and followed by the Greeks, Romans, and Hebrews. It consisted of separating all instruments into three main classes: wind instruments, stringed instruments, and percussion instruments. The euphonium would fall into the wind classification.

A more scientific approach to classification was adopted in 1877 by the Conservatoire Royal de Musique in Brussels. Instruments were divided into four categories:

I. Autophones--self-vibrators

II. Membranophones--skin-vibrators

III. Chordophones--string-vibrators

IV. Aerophones--wind-vibrators

These classes were further subdivided into (1) sub-class, the principle of sound production; (2) Division, the manner of application (direct or through mechanism); (3) Subdivision, the particular form of construction employed; (4) Section; and (5) Subsection (27:30). With this method in mind the euphonium would be classed as follows:

Euphonium--CLASS IV--Aerophonic instruments

Sub-class	Division	Subdivision	Section
Lip-voiced	Direct	Conical tube	with valves

The euphonium may also be classified according to bore shape in relation to length of tubing. According to Forsyth the euphonium fits in the German classification of "whole-tube" instruments, which means that it can produce the first or fundamental note of the harmonic

series (26:86). The other grouping, "half-tube" instruments, includes the trumpet and horn, which can play down through the entire second partial of any given valve combination. However, this classification system is not entirely true because there are trumpet players that are able to produce the fundamental of the harmonic series by means of their well trained embouchure. The "whole-tube" and "half-tube" system is worthy of mention because it has been found to be true that conical instruments with rather large bores in relation to their tube length can easily produce the first fundamental. The "half-tube" instruments, on the other hand, produce the first fundamental only with extreme effort upon the part of the performer. This fact is one basis for classifying the euphonium with the bass-tubas, and is important to consider in tracing the history of the instrument.

Physical Properties

Shape

The shape of any instrument can vary almost as much as there are numbers of instrument makers. This

discussion will not attempt to describe in detail all the various ramifications involved in making one euphonium appear different from another. There are several basically varying structures that will occupy our attention.

American manufacturers have usually built a rectangular shaped instrument. By this is meant, that from the bell back, the tube is folded in four places forming a rectangular enclosure with the valves and other tubing within the folded area. Good instrument designers try to stay away from abrupt twists and bends in the tubing, because of the acoustical problems which they cause. Because of the aforementioned reason the corner folds are well rounded and care is taken not to put any unnecessary twists or bends into the instrument.

There are some European makers who make an oval shaped euphonium. It is similar appearing in many respects to the rectangular model except that the tube leading to the bell is bent into an oval. The object of this type of euphonium is to do away with as many angles as possible. It is a matter of opinion as to which shape is the superior. The rectangular model seems to be most

popular.

The direction of the bell is considered quite important by many authorities. Some claim that the upright bell, which points straight up, is the only type of bell that gives a true euphonium tone. Others maintain that the bell angle makes no difference as to the tone quality. However, there are other qualities to consider in appraising the bell angle. These are its effect on intonation, and its effect on so-called "tone direction." One instrument designer suggests that the intonation of large bore instruments such as the euphonium and tuba is very sensitive to bends near the bell end of the instrument (71). When a bend is placed near the bell, as in a bell front instrument, the over-all length of the tube must be slightly altered to keep the instrument exactly in key.

Of more concern to performers and especially directors is the directional property seemingly given to the tone by the bell. The writer has had recording sessions ruined by bell front euphoniums which in volume sounded far above the rest of the ensemble. This tone sounded as if their bell were no more than a few inches

from the microphone. It is possible that upright euphoniums would sound much the same way. F. C. Draper, designing engineer of Besson and Company made an interesting study in regard to tone projection. His conclusions are as follows:

> It does appear to be a popular impression amongst musicians that wind blown instruments have some directional property, and that upright bell instruments propagate the sound waves upwards, whereas the forward pointing bells propagate the sound waves forward.
>
> This is quite an erroneous impression, and is probably formed from knowledge that loud speakers, particularly of the horn type, have quite definite directional properties. . . .
>
> A horn can be designed to have directional properties, but this can only be achieved by avoiding points of resonance, which would make it exceedingly difficult to pitch on any particular note, would have no property of amplifying the sound wave, and any note produced would be relatively weak.
>
> An instrument can be designed to have clearly defined resonant properties which makes it relatively easy to pitch on any note which corresponds to the resonant frequency of the horn (that is a harmonic scale), and to obtain considerable amplification of the sound enabling a note of suitable intensity to be sounded at this frequency.
>
> An instrument with such properties, however, can have no directional properties whatsoever. (65:1, 3)

It would seem that Mr. Draper's conclusions are a little strong, for every person the writer has interviewed in regard to the problem, testifies that the bell angle definitely tends to directionally influence the sound of the tone.

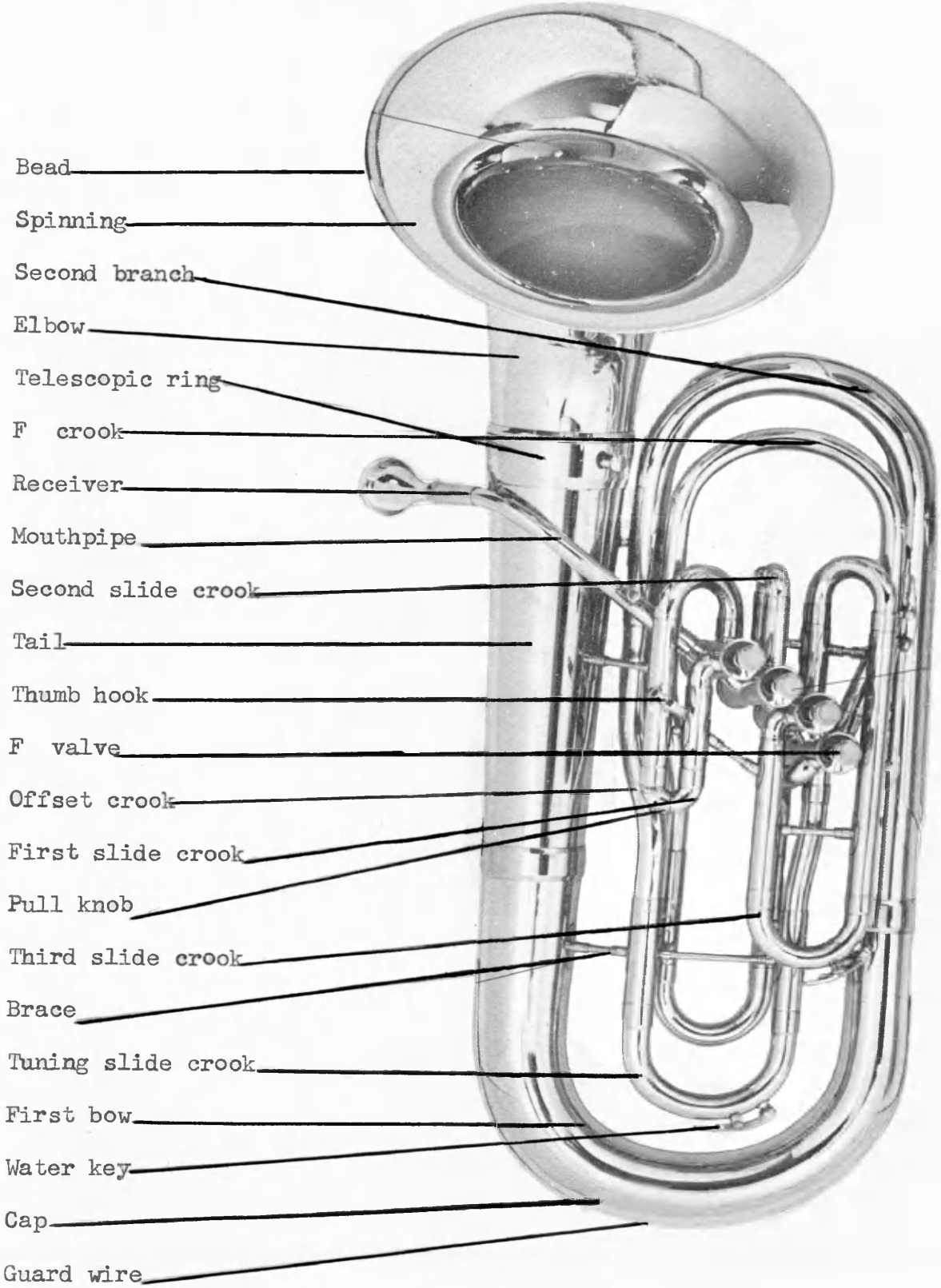
Because of the general opinion that the bell influences the tone, euphonium players have preferences in regard to the shape of the bell. Most manufacturers make a variety of bells in order to cater to the varied tastes of their customers. In America where the rectangular shaped instrument is almost exclusively used, it is possible to buy this model with the following bell shapes:

1. Fixed upright bell model.
2. Fixed bell-front model.
3. Adjustable upright bell model.
4. Adjustable bell-front model.

Variations of the aforementioned bells are available. Some musicians prefer fixed bells that do not have a telescopic ring at the base of the bell, but rather have the bell in one piece from the elbow section to the flange before the first bow (see Figure 1). The reason for this preference is that musicians feel the extra metal used in the telescopic ring has a tendency to dampen the

FIGURE 1

Euphonium Four Valve, Adjustable Bell Front



vibrating air column and therefore muffle the tone.

The bead is another physical characteristic of the bell that has become a point of discussion among performers. Most manufacturers roll the outer edge of the bell, which is then called the bead. Usually a length of wire is placed within the bead and is fastened secure by soft solder. Many professionals have definite preferences in regard to the bead, claiming that the tone can be affected by the bead, or lack of bead; or the wire or lack of wire; and the solder or lack of solder. The main point of controversy centers around the use of solder on the bead following the insertion of the wire. It is the usual practice of manufacturers to solder the wire in place so that no subsidiary vibration will develop when the euphonium is blown. Some claim the solder tends to dampen the tone quality, and when they choose an instrument they specify that the wire be secured in place by an extra tight beading process. Even then there is chance of the wire causing a buzzing sound when the instrument is blown. With the previously mentioned points in mind a prospective buyer can choose any of the following variations in regard to the bead:

1. No bead
2. Bead without the wire (soldered or unsoldered)
3. Bead with wire (soldered or unsoldered)

Thus far we have discussed bell angles in relation to the rectangular shaped euphonium. The oval-shaped euphonium is another matter, and usually has only one type of bell; that being a semi-bellfront model. Any other type of bell defeats the original purpose of the oval shaped instrument.

Some euphoniums have a second smaller bell. The amateur musician many times assumes that the second bell marks the difference between a baritone and a euphonium, with the euphonium possessing the second bell. This assumption is not true, even though in many cases it may be a euphonium possessing the second bell. It is also possible for a baritone to have a second bell. This is not the place to discuss the differences between a baritone and euphonium, for they will be amplified upon elsewhere in this paper, but the second bell will be discussed briefly. As far back as the mid 1800's Adolphe Sax had made baritones and basses with a double bell (15:129). The smaller bell is designed to give the player the added

facility of producing a contrasting tone somewhat like a trombone or cylindrical bored instrument. During the late nineteenth and early twentieth century the second bell was in vogue and many euphoniums and baritones were manufactured with them. Today only a few companies include any mention in their catalogues regarding the second bell; and most manufacturers will only make one under custom order.

Metals

The metal used to make euphoniums is an alloy of approximately 70 per cent copper and 30 per cent zinc. This alloy is commonly called yellow brass and is used in making nine out of every ten brass instruments manufactured today (71).

Another type of brass alloy is called "red brass" or "copper brass." This alloy has a higher concentration of copper (approximately 80 per cent) to zinc (20 per cent). Although it is doubtful that "copper brass" is of any musical advantage, it is useful as a decorative feature.

A third alloy is called "nickel silver." It is

gleaming white in appearance, almost like a mirror; and is composed of nickel, copper, and zinc. "Nickel silver" has found more use than the "copper brass" alloy and has been employed entirely in the making of many instruments. Also the "nickel silver" alloy is used extensively to trim "yellow brass" instruments; making a beautiful gold and silver combination.

The most expensive and seldom used metal is sterling silver. Makers have on occasion constructed entire instruments out of sterling silver, however, the general rule has been to only use it as a trim and in some cases make the bell of sterling silver. It seems almost impossible to imagine the cost of an entire sterling silver cupped mouthpiece instrument. Morley-Pegge quotes the London critic W. T. Parke in his early nineteenth century review of two horn players possessing sterling silver instruments:

> Two new French horn players, Messrs. Palsa and Thurshmit, who had only played previously at the Anacreontic Society, made their first appearance in public in a concertante for that instrument. The most striking part of their exhibition was their horns, which were made of silver. (46:125)

Of the four types of alloys, the "yellow brass" is usually used in the manufacture of the euphonium. The

writer has never seen a "copper brass" euphonium or one of sterling silver. There are numerous "nickel silver" models in use, many of them made by various European makers. Often a "yellow brass" euphonium has "nickel silver" trim which enhances its appearance.

Metal thickness is considered an important influence upon brass instrument resonance. Early instrument makers realized this and constantly experimented with different metal thicknesses in order to improve their instruments. Figure 2 shows the comparative thickness measurements of four different instruments. The measurements were taken to the nearest thousandths of an inch. There is a difference of only .004 inch in comparing the thinnest metal to the thickest in the four euphoniums. An instrument as large as the euphonium must of necessity be limited as to the minimum thickness of the brass. The reason the Mirafone can utilize .018 inch thick metal as compared to .024 inch for the Conn, is because the Mirafone is smaller than the other instruments and a lighter metal will suffice to support itself under ordinary circumstances. Resonance is in reality an amplification of the original vibrating air column by another vibrating

FIGURE 2

MEASUREMENT COMPARISONS OF FOUR
BARITONES OR EUPHONIUMS

	Mirafone	Olds	Conn	Besson
	Semi-bell front	Bell front Adjustable	Four valve Bell front Adjustable	Four valve Bell front Adjustable
Instrument Weight	7 lbs.	8 1/2 lbs.	9 lbs.	11 lbs.
Metal Type	Brass	Brass	Brass	Brass
Metal Thickness	.018	.023	.024	.023
Valve Length	Rotary	4 5/16"	4 1/2"	5 3/4"
Valve Diameter		.839	.830	.925
Bore Diameters				
1. At mouthpiece	.470	.403	.415	.469
2. Before first valve	.547	.561	.561	.575
3. At distal end of tuning slide	.646	.680	.722	.763
4. Bell	10 1/2"	11 3/8"	11"	12"
Tube Length Comparison				
1. Mouthpiece end to first valve	17 1/2"	9 1/2"	10"	9"
2. First valve to distal end of tuning slide	8 1/2"	11"	12"	15"
3. At distal end of tuning slide	78 1/2"	84 1/4"	83 1/4"	83"
4. Total	104 1/2"	104 3/4"	105 1/4"	107"

body. It seems that metal which is too heavy or thick does not properly reinforce the original vibration. Thinner metal will tend to vibrate and thus cooperate with the original vibration, the auxiliary vibration adding body to the tone. A point can be reached where metal can be too thin and instead of cooperating with the original vibrating air column, will fight it by vibrating at different frequencies that cause the tone to be thin in quality. It can be seen that the problem before instrument makers is to find the type and thickness of metal that will fit the specifications of the instrument and will meet the optimum acoustical requirements.

Metal Finishes

Various finishes have been used for brass instruments. Although some musicians may claim certain musical advantages in one finish over another, their viewpoint certainly has never been proven. Finishes that are available include clear lacquer, silver plate, and gold plate.

The lacquer finish is probably the most popular. Lacquer is not a durable finish and musicians giving their

instrument constant use find that the lacquer soon wears off and must be replaced. "Yellow brass," "copper brass," and "nickel silver" metals are commonly finished with lacquer, while silver plate and gold plate are applied usually over "yellow brass" metal only. Plated finishes are very durable as compared to lacquer and with reasonable care will last many years without showing signs of wear.

Euphoniums are usually finished with clear lacquer. In some instances the lacquer is dark copper in color and darkens the yellow brass to appear golden copper in tint.

Silver plate is also used on many euphoniums and was especially popular during the "Golden Band Age." Gold plate, on the other hand, is quite rare. Occasionally gold plated models will show up, most of them being an old vintage instrument of the past.

Bore

The bore of any brass wind instrument can be classified in two general ways: conical or tapered bore, and cylindrical bore. Conical bore is confined to those

places in the tube where there is flare as in a cone. Areas where the tube remains constant in diameter as in a cylinder is called cylindrical. There are exceptions to the above categories as when slight constrictions or expansions are purposely placed in tubing to vary either a perfect cylindrical or conical bore. Manufacturers change the bore diameter in certain places to slightly alter the pitch for better intonation.

According to the measurements which are listed in Figure 2, the relationship in length of conical bore to cylindrical bore can easily be figured. The overall length averages about 106 inches, with approximately 12 inches of cylindrical tubing. Conical bore then, accounts for about 89 per cent of the total tubing used for the open tones of the instrument. It is commonly assumed that the instruments of primarily conical bore such as the cornets, French horns, baritones or euphoniums, and bass tubas utilize as much conical bore in their makeup as is possible. Naturally, it is difficult to construct instruments with evenly flaring conical bore at the point of the valves and valve slides or crooks. For this reason cylindrical tubing is found throughout the

valves and their respective crooks.

The shape of the tube especially near the bell exerts a tremendous influence on the tone color of brass instruments. The length of the Bb French horn tube is very nearly the same as the euphonium and yet the tones of the two instruments vary considerably in color. One of the main reasons for the qualitative difference between the French horn tone and the euphonium tone is the pronounced difference in the shape of the enlarged section of their bells. Even when comparing like instruments the qualitative differences in their respective tones can usually be traced to variations in bell design. It seems that there would be an optimum increase rate of diameter along the tuba axis. This rate of increase in diameter is called flare coefficient. Dr. E. G. Richardson, a noted acoustical authority, holds that taper of brass instruments follows an exponential law (18:215). Manufacturers do not agree on this viewpoint and each designer has set up his own flare coefficient based upon experimental data rather than from purely theoretical consideration.

The effect of the terminal flare of the bell can

be generally expressed in two or three ways. A slow flaring taper produces a dark colored tone in comparison with a taper of quick flare, which tends to make the tone bright in character and of penetrating quality. The euphonium bell flare is medium in amount of taper per length of tubing as compared to the trombone taper which is quite abrupt; or compared to the tube which is very gradual. The euphonium tone fits approximately half way between the dark quality of the tuba tone and the more strident tone of the trombone. Variation of bore taper among different euphoniums gives prospective buyers the choice of instruments varying from dark to somewhat bright in tone quality.

Since the bore size is the prime factor in differentiating between the modern connotation of the euphonium and baritone horn it is important that the difference between these two instruments be discussed here. Historically speaking it makes little sense to attempt to differentiate one from the other and claim that one evolved from one instrument and the other from another. However, not long after the invention ofthe baritone or euphonium, whichever you want to call it,

there was a trend especially in England and France to separate the smaller bored instrument from the larger and use it on a separate part in bands. From 1860 to 1898 British bands such as the Grenadier Guards had two parts, one designated for the baritone and one for the euphonium (14:9). The French continue this practice to this day, while the British around 1900 did away with the baritone part and used the euphonium, finding that the large bored instrument was capable of all that the small could do and more.

The question often arises: If the difference between the baritone and euphonium is a matter of bore diameter, at what point of measurement does one differentiate between these two instruments? This question is impossible to answer categorically. The bores of the instruments compared in Figure 2 vary considerably in diameter at the point of cylindrical tubing. This measurement is the part labeled "before valve," and varies from .470 inch for the Mirafone to the Besson's .575 inch. According to the given formula the Besson can be called a true euphonium and the Mirafone a baritone. But what of the Olds and Conn? These instruments both

have bore diameters of .561 inch, approximately half way between the other two. The Conn and Olds are instruments of American manufacture and are typical of the trend designers in this country have taken to make the bore a compromise between the large diameter of the euphonium and the small diameter of the baritone. American companies market this type of instrument under either name, depending on which one meets their fancy. Usually the American manufacturers call their instrument the baritone even though the bore more approaches the euphonium than it does its smaller counterpart. The reason for this preference in naming is probably a matter of simplicity and tradition.

Mouthpiece

It would be misleading to suggest that the instrument proper is the only factor in giving instruments the tone quality they possess. The mouthpiece shape has a decided influence upon the tone color. A shallow cup-shaped mouthpiece tends to color the tone towards the bright side of the spectrum, while a deep conical mouthpiece has a reverse effect, causing a dark colored tone. Another effect of the shape of the cup is to vary the

facility with which tones in the high and low registers may be produced. A shallow mouthpiece makes the high range much easier to produce, while the deep mouthpiece favors the low register. It is interesting to note that the aforementioned principles were common knowledge among musicians during Bach's time. The natural trumpet Bach used was played in the upper register and players used a mouthpiece with a shallow cup to facilitate the execution of this difficult range (27:228).

In some of Bach's chorales a corno da tirarsi is called for and the instrument seems to be nonexistent for no specimens have ever been found. It has been suggested that the zug-trompete or slide trumpet was also used as a corno da tirarsi or slide horn by merely changing the shallow mouthpiece to one of a deep conical shape (57:36). However, even though this theory is open to question, it is reasonable in that the principle involved is valid. Instrument makers realize the importance of a mouthpiece that fits the instrument not only physically, but as far as tonal concept is concerned. Also, the mouthpiece must be comfortable to the performer, fitting his embouchure so to speak. These two reasons are the basis for a

multitude of varied mouthpiece shapes that are available to musicians.

Vincent Bach, long an artist craftsman in instrument and mouthpiece manufacturing has this to say regarding the mouthpiece:

> A mouthpiece consists of the rim, cup, the throat, and the back-bore. Bringing these various components into proper relationship constitutes the art of superior mouthpiece production. (4:26)

The Bach Company offers forty different mouthpiece models that would be usable for the euphonium. These range from the large 26.26 mm cup diameter, to the 23.92 mm diameter. Also many of the diameters are available in five different cup depths ranging from very shallow to medium deep. The rim too, comes in an assortment of shapes and widths. Of the forty models only a few are recommended for the euphonium, because they lend themselves better to the characteristic tone of the instrument. All the models recommended for the euphonium have a deep bored cup which produces a full tone of mellow timbre.

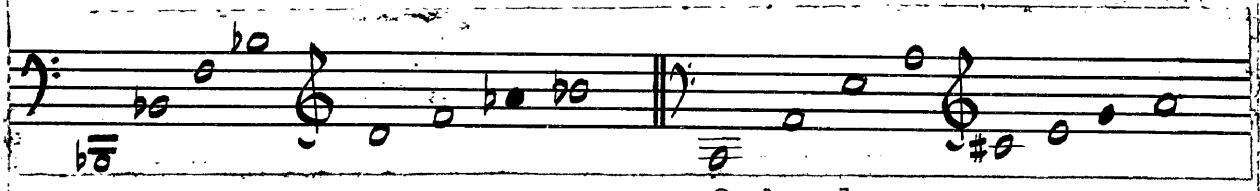
Acoustical Properties

To this point it has been impossible to write concerning the euphonium without alluding to acoustics in some way or another. This section, it is hoped, will make the story more complete by setting forth basic principles regarding tone production and variation.

The euphonium like other cupped mouthpiece instruments is an open pipe instrument. By this is meant that the tuba is open at both ends. Tone is produced by setting the air column within the tube in motion through the vibration of the lips or some other mechanical means. A given length of pipe will produce the harmonic series from the fundamental up by increasing the speed of vibration through added lip tension and pressure. By altering the length of pipe, an entirely different harmonic series is produced. Increasing the length lowers the harmonic series and shortening it raises the series.

The following illustration will serve to demonstrate the method of tonal variation on a standard B^b euphonium. The first series is produced without any valves down while the second valve opens approximately 7 inches of tubing and lowers the pitch one semi-tone.

Dark notes are of poor quality and intonation.

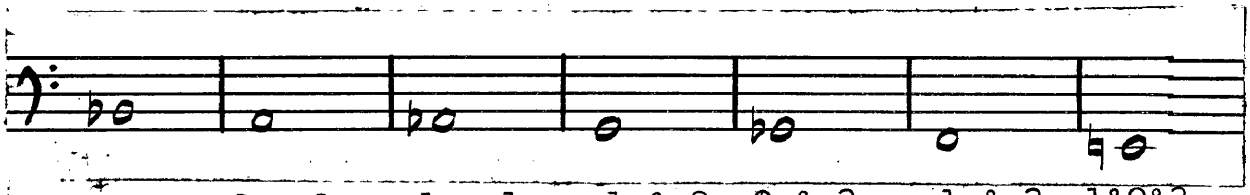


Open 2nd valve

The process of adding tubing and consequently lowering the harmonic series by half steps is shown in the following illustration using the second partial because of its place in the practical range of a three valved euphonium.

Approximate length of tubing the various valves open when compressed:

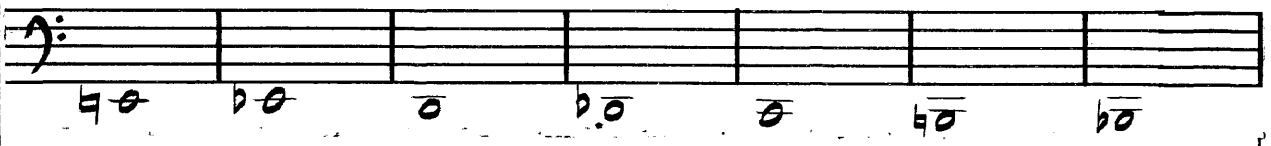
First valve	14 inches
Second valve	7 inches
Third valve	22 1/2 inches



Open	2 valve lowers pitch 1/2 tone	1 valve lowers pitch 1 tone	1 & 2 valves lowers pitch 1 1/2 tones	2 & 3 valves lowers pitch 2 tones	1 & 3 valves lowers pitch 2 1/2 tones or 4th	1&2&3 valves lowers pitch 3 tones or 2 & 4

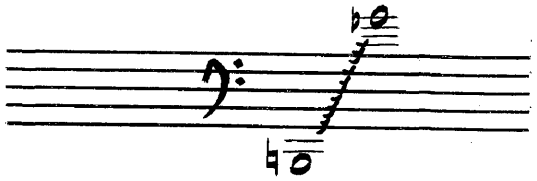
This gives the euphonium the following practical range:

With the fourth valve an extra 40 1/2 inches of tubing can be added, putting the instrument in F making it capable of filling in the notes between the low E and the fundamental B flat. The primary valve in the fourth valve is its use as an alternate choice for other fingerings for added facility and better intonation.



2 + 4 1 + 4 1, 2,+ 4 2, 3,+4 1, 3,+4 1, 2, 3, + 4

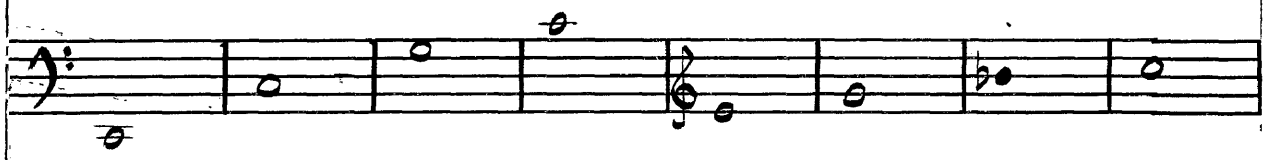
Actually it is possible to sound the fundamental a full octave below the notes just given except for the final B^{b}. It would not be right to add these fundamental tones to the practical euphonium range, however, in some cases they may be used in actual musical practice. Assuming these notes usable in certain circumstances, the range of the euphonium would lack only a half-step of being four octaves.



Even though the preceding illustration indicates an instrument possessing a chromatic range of almost four octaves, three of which are considered practical, there are certain inherent problems in the acoustical principles upon which most euphoniums are built. First of all, the harmonic series does not agree intonation-wise with the tempered scale. Secondly, the valves when used in combination do not open up enough tubing to lower the pitch the required amount for accurate intonation.

The tones of the harmonic series as sounded by cupped mouthpiece wind instruments generally correspond in pitch to just or natural intonation. When compared to the same notes of the keyboard instruments which are turned according to the tempered scale, there is an apparent discrepancy in some of the various partials. On any given length of tubing, a wind instrumentalist, then, has intonation problems when performing according to standards of tempered pitch. However, Dr. Kent, research designing engineer at G. C. Conn, Ltd., takes another approach to the problem. He contends that brass instruments may just as readily be constructed to conform to tempered pitch standards as they are to just pitch (38:4). Dr. Kent may

right in his conclusion; for if manufacturers want to tamper with the bore by constricting it in certain places and expanding it in others, compromises are possible that favor certain notes to the exclusion of others and thus tempered pitch is the general outcome. Most authorities agree, however, that a tube constructed by cylindrical tubing of evenly flaring taper causes an instrument to conform closely to just intonation standards. The following chart shows a comparison between just intonation and that of the even tempered scale (60:10). It is evident that on some tones, pitch discrepancy causes a cupped mouthpiece instrument performer considerable intonation problems.



vib/sec --Tempered pitch:							
65.4	130.8	196.0	261.6	329.6	392.0	466.2	523.2
Natural pitch (just):							
65.4	130.8	196.2	261.6	327.0	392.4	457.8	523.2

The second and by far the greater of the two problems concerning intonation, is that valves when used in combination do not open up enough tubing to lower the

pitch the required amount for accurate intonation. For instance, the second valve when used by itself is in tune except for a few rarely used notes. The first valve is in tune except for a few notes, and accurately opens enough tubing to lower the pitch one full step. When valves one and two are used to lower the pitch one and one-half steps; the combined lengths of pipe of the two valves do not quite equal the length required for the accurate lowering of pitch one and one-half steps. The intonation discrepancy becomes worse when valves one and three are used in combination and is an even greater problem when all three valves are used to lower the pitch. The result is: valves one and two in combination slightly sharp, valves one and three quite sharp, and valves one, two, and three in combination very sharp.

The question often arises: why not make the third valve tubing long enough to put the one and three combination in tune? This is impossible because then the two and three combination is very flat. In many cases the third valve tubing is a compromise between the length needed for the one and three combination and that needed for two and three. Thus two and three would be flat and one

and three sharp.

The reason for the above mentioned problem might be explained by referring to the trombone. When the slide is drawn out to lower the pitch one-half step, it is drawn out approximately three inches. To lower the pitch one full tone, the slide is drawn a full six and one-half inches, which means the tubing required to lower the pitch one full step is more than double that required for only a semi-tone digression. This increase in that amount of tubing required for successive chromatic steps downward becomes more and more pronounced with each step. One can readily see the problems a brass valved instrument manufacturer would have in constructing an instrument that is relatively in tune.

There are various ways of coping with the intonation problem. One is to ignore it as a manufacturing problem and place it in the hands of the performer, who must lip the bad notes to improve the intonation. Of course this approach has its drawbacks. Another method previously alluded to, is to constrict or expand the bore in certain places to alter the pitch of certain tones. Manufacturers are very careful of this method because in

helping one note, others in turn can be hurt. Some instrument makers have placed triggers on the first, third, or the tuning crook. It is possible on sharp tones to compress the trigger, which in turn extends the slide to bring an extra length of tubing into play, thus lowering the pitch. Some tuning slide mechanisms are fitted so that they can be utilized to either lower or raise the pitch. The euphonium is the only instrument the writer has seen with the main tuning slide pitch compensator. Another method of producing better intonation is by employing an automatic compensating system of some type or another. These systems automatically open extra tubing when it is required and are used primarily on the larger valved instruments such as the euphonium and bass tuba. The best known systems are the Boosey Automatic, the Besson Register, Transpositers, and Enharmonic systems; and the Rudall-Carti-Klussman system patented in 1903. The Boosey Automatic system is still used with the Besson Euphonium.

Tone Quality

Regarding the saxhorns, Berlioz said: "Their sound is round, pure, full, equal, resounding, and of perfect homogeneousness throughout the extent of the scale." (8:30) This statement may also be applied to the euphonium. The large proportion of conical bore along with a deep mouthpiece gives the characteristic mellowness of tone the euphonium possesses. Especially with a fourth valve to enhance the lower tones, the euphonium enjoys a fullness and richness throughout its entire range. In comparing the tone quality of the euphonium with other brasses, the French horn, trombone and bass tuba might be used as points of comparison. If a trombone type mouthpiece is used the euphonium tone sounds somewhat between the dark full teutonic quality of the French horn and the noble brilliance of the trombone. However, a euphonium fitted with a deep conical bore mouthpiece tends to sound between the dark tuba quality and the brighter quality of the trombone.

In wind music scores the euphonium part is related to the bass tuba much in the same way the cello and string bass parts are related to each other. In this role the

euphonium plays the bass line while the tuba functions as a contra-bass. The euphonium and trombone are many times used together for passages calling for power and breadth of tone. Also low clarinets and saxophones when supported by the euphonium give a full quality to a passage (40:63).

Most solo passages can easily be negotiated on the euphonium and its beautiful tone lends itself well to transcriptions direct from cello, viola, or bassoon music. Vocal arias and countermelodies are also types of music for which the euphonium is well suited.

Choosing a Euphonium

The novice often becomes confused when trying to select an instrument for purchase among the many and varied models on the market. For this reason the following check list is given to help in the selection of a good euphonium. If possible a competent performer should try the instrument for intonation, response, and tone quality.

Musical Qualities

1. Intonation should be relatively accurate (check harmonic series and valve combinations).

2. Easy response

3. Characteristic tone quality

4. Homogeneous tone throughout entire range.

Physical Qualities

1. Proper weight (not too heavy)

2. Proper bore diameter (not too large or small)

3. Even finish (no lacquer runs)

4. Well braced

5. Smooth working valves

6. Carefully fitted slides

7. Mouthpiece of medium dimensions

8. Guarantee of workmanship (manufactured by reputable firm).

CHAPTER IV

THE EUPHONIUM IN THE AMERICAN SCHOOLS

Although it is not the purpose of this chapter to trace the development of instrumental music in the schools of America, it would make the subsequent discussion more meaningful if a brief résumé is first given showing the evolution of instrumental music in the school curriculum.

The History of Instrumental Music in the American Schools

Up to 1900 music activity in the majority of American schools centered around vocal music which found its way into the school curriculum as early as 1838 through impetus from the old church singing school (50:5). Around 1900 instrumental music in the form of orchestras began to be introduced into the schools as an extra-curricular activity. Will Earhart was a leader in this phase of music and first organized a school orchestra in

Richmond, Indiana, in 1898 (50:5). It was not long before orchestras were organized in high schools and grade schools all over America and by 1930 over 150,000 instrumental organizations were functioning in public schools alone (48:11).

The band did not receive recognition in the school program until the time of World War I. Prescott and Chidester cite Victor Grabel as the first organizer of a public school band in Richland Center, Wisconsin in 1916 (50:6-7). The army bands developed during the war greatly influenced the school band movement, and from 1917 on a tremendous increase in the number of school bands came about.

Other factors to firmly entrench instrumental music as a part of the school curriculum were:

1. Free class instruction
2. The Music Educators National Conference
3. The contest movement

Even though instrumental music, like the other areas of music, is usually considered an elective, there are many eminent educators who feel music warrants a place as a required subject. It is entirely possible in the

near future that music will take a place beside mathematics, history and other so-called "essential" subjects in the American school curriculum.

The School Orchestra

The euphonium is not a regular member of the orchestra and therefore few symphonic scores contain a euphonium part. Nevertheless, some well-known composers have scored a part for the instrument on occasion. These include: Richard Strauss, Berlioz, Wagner, Elgar, Holst, Ravel, and Stravinsky. In many scores the part is indicated "tenor tuba." Most of the symphonic works written by the aforementioned composers are very difficult and would be out of the realm of the ordinary school orchestra.

Occasionally a director may find himself without the necessary complement of trombones and will need to find another instrument to substitute. The euphonium undoubtedly will come closer to matching the trombone tone quality and range than any other instrument. However, other than in a substitute role the euphonium is not utilized in the orchestral program of most schools.

In some organizations with limited instrumentation the euphonium might substitute for other instruments, such as the cello and bassoon.

The Concert Band

The concert band has come to enjoy a place of respect as a medium of music in the education program. This is important because student interest has always been high in regard to the band. In the words of Dykema and Gehrkens, "The band . . ., probably interests more students than any other musical organization." (21: 140)

The brass section occupies a position of importance in the band; in fact, many authorities cite the brass as the real core of the band. The role of the euphonium within the brass section is a major factor in making this instrument so interesting to students. The interesting part scored for the euphonium is one factor in keeping euphonium players at a low drop-out rate in comparison to students on other instruments.

The Marching Band

In general the goal of the marching band is a service goal. The band is called upon to lend color and atmosphere to certain athletic and military events while building up the reputation and dignity of the school it represents.

The responsibility of the brasses becomes more apparent in the marching band. Usually the brass section is increased in size and in some bands the woodwinds are left out altogether. The reason for this is seen when one views the large stadiums some bands are required to fill with music during half-time shows. Also, it is easier to produce good tone quality on the brass instruments during the march than on the woodwinds.

The euphonium ordinarily is placed in one of the front three ranks in the marching band. For the out-of-doors the score is often simplified and consolidated so that there is more doubling of parts, giving the band a more solid sound. Many times the euphonium is either doubled with the trombone, or with the saxophone, or horns to bolster the harmonic background.

In choosing a euphonium suitable for the marching

band it is important that one of heavy weight not be chosen, or the player will tire easily.

The Euphonium in the Brass Choir

In America the brass choir is made up of the cupped mouthpiece instruments ordinarily found in a band, with the addition of percussion as required. Not many years ago it was difficult to find much worthwhile repertoire published for the brass choir. Modern composers have enthusiastically recognized the possibilities of the unique and interesting sonorities possible with this group and have composed some excellent music for it.

This type of ensemble makes it imperative for the euphonium player as well as other members to visualize his own characteristic tone quality in relation to others in the group. The teacher has more opportunity to work with each student on an individual basis and the musicianship of the brass choir is raised along with the other organizations the students play in.

The Euphonium in the Small Ensemble

The experience gained through participation in small ensemble groups is of vital importance to the music program as a whole and to participating students.

It is in small ensemble activities that the individual pupil learns to the fullest extent the responsibilities of a musician.

Theodore F. Norman says:

> One of the most interesting recent developments in school music is the emphasis being placed upon chamber music. . . . In the chamber music group . . . each individual is vitally important. For the student, the music holds a greater significance. The slightest weakness becomes apparent, and without earnest effort on the part of each one there is the ever-present possibility of endangering the artistic performance of the entire group. Niceties of phrasing, proper blending of parts, delicacy of and the correction of faulty habits become a very real obligation to each individual member. (48:130)

The standard brass sextet includes the euphonium as a member and has enjoyed the popularity of composers and performers in recent years. Also, the euphonium has been included in many quartet scores when two trumpets and horn are also called for. In fact in most of the ensemble scores "trombone or baritone" (euphonium) is the

designation given at the head of the score. Music publishers such as Robert King have provided instrumentalists with a wealth of literature suitable for all types of occasions (67). Participation in chamber music is worthy of thoughtful and serious consideration for the serious euphonium player.

CHAPTER V

SOLO LITERATURE FOR THE EUPHONIUM

Solos for the euphonium must of necessity come from many sources, as original music for the instrument has not been written in great quantities. However, before we explore the various sources of music it might be well to enumerate some of the criteria used in selecting music.

Evaluation Criteria

Factors to consider in the selection of music fall into two categories: (a) Technical and (b) Other considerations. The following lists are helpful in choosing solos suitable for the euphonium and have been obtained from the book by Norman (48:195-197).

a. Technical Considerations:

1. Does the solo follow the rules of harmony?

2. Does the solo follow the rules of counterpoint?

3. Does the solo follow the rules of form?

b. Other Considerations:

1. Is the music uplifting and of genuine value?

2. Does the solo produce a good general effect?

3. Is the solo interesting melodically, harmonically, and rhythmically?

4. Does it seem to have balance and proportion?

5. Does it have basic unity and cohesion?

6. Is it edited well?

7. Is it the proper grade of difficulty?

8. Is the music suitable for the occasion?

9. Does the solo fit the character of the instrument?

10. Is the accompaniment suited and musical?

Original Compositions

Most of the music in this category was composed during the "Golden Band Age." Even during this age euphonium soloists seldom played selections originally composed for the instrument. Joseph DeLuca, of the Sousa band wrote a few solos that he performed with the band.

Probably the best known of his solos is "Beautiful Colorado," which he performed all over the world. The serious euphoniumist is usually not satisfied with the music passed down from the "Golden era;" for it is characterized by a trite and gaudy style meant to bring applause and wonder from the "musical" layman. About the only original composition of any serious consequence written originally for the euphonium is "Fantasia de Concertino" by Boccalari.

Transcriptions

By far the majority of music that is published today for the euphonium is a transcription of one type or another. Transcriptions may be divided into several categories: transcriptions from other brass instruments, from woodwind music, transcriptions from stringed instrument music, and from vocal music.

From Other Brass Instruments

This category is at present the most rewarding source of music for the euphonium. Literally hundreds of worthwhile solos are available by turning to trumpet and

trombone literature. In most cases trombone and trumpet solos are readily adaptable to the euphonium. Of course, the euphonium player must be capable of reading both treble and bass clef notation.

In some cases trumpet music may not be effective because of the fact that the euphonium sounds the solo line an octave lower which may destroy the intended effect of the piano and solo voicing. Trombone solos with glissando effects, too, may not be suitable for the euphonium.

The euphoniumist must not overlook French horn and tuba solos as a source of valuable music, even though the music of these instruments is in many cases not effective for the euphonium.

From Woodwind Music

Most woodwind music will not suitably work for the euphonium because of range problems. However, bassoon music is always a good source to explore. The Mozart concerto in B^{b} makes a good euphonium solo. Also bass clarinet, tenor, and baritone saxophone music will on occasion suit the euphonium.

From Stringed Instrument Music

One must not discount the stringed instruments in looking for suitable music. Often this music is overlooked by wind instrumentalists when trying to locate good solo music. Violin and bass viol music are often far out of range for many wind instruments, but the viola, viola da gamba and cello music constitute a large selection of worthwhile solos that in many cases are playable and highly effective on the euphonium. String music from the Baroque period is usually more feasible for the euphonium than that of later origin. This is due to the constricted range utilized by the performers of the time.

Noteworthy examples of music written for stringed instruments that might be used for the euphonium, include the sonatas for cello by Vivaldi and Corelli; the Adagio from the Haydn cello concerto; and the viola da gamba sonatas of Bach.

The writer cannot overemphasize the importance of string music as a fine source of solos for all wind instruments. Selections without number are available to all diligent enough to spend time looking at string literature.

From Vocal Music

Opera and the oratorios also provide music that is very effective for both secular and sacred use. Although the recitative, in most cases, is unsuitable for the wind instrument, the aria can be used in an extraordinarily effective solo. Vocal music is a good source from the standpoint of range. Very seldom does the range problem present itself as an unsurmountable obstacle.

Bach's cantatas, and modern day vocal anthems make good sources of sacred music. The art songs of Schubert and others constitute a repertoire of good recital literature that will not be soon exhausted.

In choosing vocal music the performer must be careful not to select compositions that rely heavily on the text for their success; for, when performed by an instrument, the selection will usually lack the vitality needed to put it across.

Lists of Selected Music

The writer has prepared a list of music usable for the euphonium which appears in the appendix. This list is by no means comprehensive, but rather a representative sampling of serious music suitable for recital and other purposes. Other lists that contain a wealth of serious literature for the euphonium are: Selective Music Lists of Instrumental and Vocal Solos published by the National Interscholastic Music Activities Commission; and Selected Wind and Percussion Materials published by the State University of Iowa Department of Music.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

It was the purpose of this study to discuss the euphonium in regard to its history, present day description, use in the American schools, and sources of solo literature.

The historical aspects were traced showing the evolution of the euphonium from the time of antiquity when cupped mouthpiece instruments existed in the form of crude animal horns and hollow wooden tubes. The cank, malakat, and shofar were described along with early metal instruments such as the lur, chatzotzerat, salpinx, lituus, Roman tuba, and buccine. The cornett followed the crude animal and wooden instruments and was different in that holes bored in the sides enabled it to play scalewise melodies.

The bass cornett or serpent became the first cupped mouthpiece bass instrument and enjoyed popularity in both the church and the concert hall. Variations of the serpent with keys were called the basshorn and Russian bassoon. Then came the ophicleide, a further development of the serpent.

Another important factor in the development of the euphonium was the invention of the valve. The valve as was first applied to wind instruments eventually came about through the use of various relatively unsuccessful devices such as tone holes, crooks, and keys. The first recorded use of the proven valve system of tonal alteration is that regarding Charles Clagget's invention of 1788. In 1806 a valved trumpet was introduced by Kerner of Vienna. However, Blumel and Stölzel are credited as the inventors of the valve in 1815 by most writers. Following this, many varied alterations of the same basic idea were introduced in succession. These included the rotary valve, transverse spring slide, the disc-valve action, Berliner-Pumpen and Perinet's improvement. Finally Besson's and Distin's improvements of 1859 resulted in the modern piston valve. It was not long

until music organizations throughout Europe included valved instruments of all sizes, keys, and descriptions. It was during this period that the euphonium came into being.

The valved tuba was the first bass instrument to follow the ophicleide. Wilhelm Wieprecht, a German musician, invented tubas in several keys and sizes. Wieprecht was so enthusiastic over the valved instruments, that he proposed an entirely new instrumentation for the military band. Kalkbrenner, Wieprecht's biographer, states that Wieprecht's first composition called for several of his new instruments among which was the three valved tenor bass horn in B^b. Farmer claims this instrument to be the euphonium, invented by Wieprecht himself.

Adolphe Sax was important in his contributions to the euphonium. Although it would be inaccurate to credit Sax with the invention of the euphonium, he certainly played an important part in improving upon the basic idea presented by Wieprecht. Sax constructed an entire family of valved instruments ranging from the small E^b sopranino saxhorn to the BB^b bass saxhorn. Historians agree that Sax's instruments were superior in quality to others of

the time. Sax was an expert in workmanship. His saxhorns were made without the abrupt twists and turns that had characterized many other brass instruments and for this reason his instruments were hailed throughout Europe and America.

Claims to the invention of the euphonium were made by others such as the Italian Pellitti and Sommer of Weimar. However, terminology seemed to be the stumbling block in making claims. This was realized by Fétis, a musician who wrote the "Report for the Exposition of 1867," where the instrument manufacturers of the times exhibited their instruments. Fétis reported:

> Whatever name be given to the instrument, the form is of little importance; the instruments with wide tubes with pistons belong to a natural classification; soprano, alto, bass, etc., it is of very little importance therefore that the bass is named euphonium, the contra bass helicon, etc. . . . . (49:354)

The "Golden Age" band was discussed in relation to the role of the euphonium during the period. It was during this time that the foundation style and literature for the euphonium came into being. Unfortunately, emphasis was placed upon display rather than upon other more solid musical values. The modern era has brought

about a new concept in terms of sound, style, and literature performed. Music educators have done much to raise musical standards in schools throughout America. The euphonium as a physical entity changed little, but the attitude toward its music and style of performance changed along with the advent of the modern era.

The description of the present-day euphonium included discussion of: classification, shape, manufacturing methods, bell tone relationships, metals, finishes, bore, mouthpieces, acoustics, tone quality, and choosing an instrument. In brief, the euphonium tube is approximately nine feet in length, with another twenty-eight inches added with an F valve attachment. The German "whole-tube" bore classification includes the euphonium because of its greater amount of conical bore in comparison to cylindrical bore, and the fact that it can easily produce the fundamental tone of the harmonic series. The valve mechanism varies the pitch on the euphonium in the same manner as the valves of the trumpet or other common valved instruments. The euphonium is not acoustically perfect. It has certain intonation problems due to discrepancies between the pitch given by the natural harmonic

series and that of the tempered scale. Also, valve combinations cause poor intonation. Manufacturers try to solve these problems by variation in the bore diameter at certain places and also by compensating systems.

Since 1900 instrumental music has enjoyed a place in the curriculum of American schools. Following the first world war, school bands were organized by the thousands throughout America. Naturally the euphonium was included in both the concert band and marching band. However, the school orchestra has found little occasion to use the euphonium. This is undoubtedly due to the extreme difficulty of the few works that are scored for a euphonium. Strauss, Berlioz and others have written for the instrument, but only the most accomplished groups are able to adequately perform the music and thus most school orchestras use a euphonium only as a substitute for other instruments.

Music for brass ensembles large and small have through the years included the euphonium as a vital member. Recently, well-known and qualified composers have recognized the unique possibilities inherent in the brass group and have written outstanding compositions for

it. In school work, the brass choir and smaller ensembles afford the student and teacher the opportunity to work on a more individual basis for a more thorough training in technic and musicianship.

The euphonium does not have an extensive original solo literature. Virtually no compositions of real value have been written for this instrument. To find solo music of value, the euphonium player must turn to vocal music and music of other wind and stringed instruments.

Conclusions and Recommendations

Because of the obscure and somewhat tainted background of the euphonium, this instrument has not received just recognition. Composers of stature have rarely recognized its possibilities as a solo instrument. This may have come about because of the euphonium's close affinity to the trombone in terms of tone quality. However, composers have not realized the more agile and flexible character of the euphonium as compared to the trombone, nor the possibilities in use of the extended range through the easily produced pedal tones. This along

with the beauty of the euphonium tone is more than just reason for the following recommendations:

1. It is recommended that musicians who teach or play the euphonium use their influence to remove the stigma attached to this instrument. This might be brought about in part by using music of value for teaching and performing purposes, and by using a judicious style of playing.

2. It is recommended and urged that many new and original solos and ensembles be written by good composers for this instrument.

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A P P E N D I X

EUPHONIUM SOLOS WITH PIANO ACCOMPANIMENT

Title	Composer	Publisher	Grade
Allegro de Concert	Cools	Alfred	V
Andante for Trombone	Tcherepnin	Boosey & Hawkes	IV
Ballade	Bozza	Baron	V-VI
Ballade	F. Martin	Universal	V
Blue Bells of Scotland	Pryor	C. Fischer	V-VI
By the Sea (Am Meer)	Schubert	C. Fischer	I-II
Choral Varié	Boutry	Leduc	IV
Concertino	David-Mueller	Boston Music	III-IV
Concertino	Sachse	Cundy Bettoney	V-VI
Concertino D'Hiver	Associated	Milhaud	V-VI
Concertino No. 1	Klengel-Falcone	Belwin	V-VI
Concerto	Magnan	Cundy Bettoney	IV
Concerto	Rimsky-Korsakov	Hofmeister, Leeds	V
Concerto for Trombone & Orch.	G. Jacob	Williams Ltd.	VI
Concerto No. 2	Blazhevich-LaFosse	Cundy Bettoney	V-VI
Concerto Piece No. 5	Blazhevich	Leeds	V
Cortège	Beaucamp	Leduc	V
Crusader, The	Pinard	Fischer	II-III
Fantasia di Concertino	Boccalari	Fischer	VI
Fantasie Concertante	Weber-Hoch	Fischer	V
Fantasy	Creston	G. Schirmer	V-VI
First Solo de Concert	Combelle	Alfred	V-VI
Granada	Lara	So. Music Pub. Co.	III-IV
If Thou Be Near	Bach-Fitzgerald	Ricordi	I-II
In Rank and File	Clarke	Fischer	I-II
Konzert No. 2	Alchausky	International	V-VI
Morceau Symphonique	Gaubert	Andraud	V-VI
Morceau Symphonique	Guilmant	Andraud; Remick	V-VI
Ostinato	Reutter	Leduc	IV
Pièce Concertante	Rousseau	Cundy Bettoney	V
Pièce en mi Bémol	Ropartz	Evette Schaeffer	V
Piece in E^b	Busser	Barnhouse	V-VI
Piece in Mi^b	Barat	Baron	V-VI

Title	Composer	Publisher	Grade
Prélude et Allegro	Bozza	Leduc	V
Recitative and Prayer	Berlioz	Mercury	III-IV
Six Sonatas	Galliard	Mercury	V-VI
Sonata	McKay	Remick	V-VI
Sonata in E^b	Sanders	Remick	I-II
Suite for Trombone or Baritone	Beach	Associated	IV
Suite, Opus 22	Jorgensen	Hansen	III-IV
Symphony for Trombone & Orch.	Bloch	Broude	VI
Twelve Easy Classics	Mullins (arr.)	Remick	I-II