A 21st Century Investigation of the Historical, Musical and Acoustical Contexts of a 19th Century Comic Opera

_Schermania in America_ , Composed by Dr. Gabriel Miesse, Jr.

A dissertation presented to

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This dissertation titled
A 21st Century Investigation of the Historical, Musical and Acoustical Contexts of
a 19th Century Comic Opera

_Schermania in America_, Composed by Dr. Gabriel Miesse, Jr.

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ABSTRACT

CAROL A. ABBOTT, Ph.D., June 2011, Individual Interdisciplinary Program

A 21st Century Investigation of the Historical, Musical and Acoustical Contexts of a 19th Century Comic Opera Schermania in America, Composed by Dr. Gabriel Miesse, Jr.

Director of Dissertation: Martin E. Kordesch

A four-act comic opera created in 1892 by a local physician-artist-composer was discovered intact in 2006 in Lancaster, Ohio. The context of this opera is explored in a number of different areas. Popular culture and musical theatre history as aspects of life in Victorian America will set the stage for a chronology of the history of the city of Lancaster. This city has a rich background as an early frontier town in Ohio and its founding through the time of the composition of the opera spans just less than 90 years. Many examples from period sources are used to illustrate that Lancaster was not isolated and its citizens had access to cultural experiences on a national level.

A careful examination of the surviving documents comprising this opera is recounted, and indications of collaboration between the composer and the librettist (his cousin) are described. The music is examined by reviewing some specific examples from the scores and determining their structure and harmonies. General characteristics and style of the orchestration and of the vocal parts are also given.

A 19th century concept that open notes of cornets sound better than notes requiring the use of valves is defined through contemporary examples. This idea is further specified by a presentation of acoustic principles governing sound production in brass instruments. The basis for measuring the property of input impedance to be used as a qualitative comparison for open and valved notes is explained. Finally, a simple
measurement technique is refined and used to obtain impedance data for a number of 19th century cornets. The characteristics and results of these measurements are presented in a number of different graphical formats and some suggestions for further experiments are made.

Approved: ________________________________________________________________

Martin E. Kordesch
Professor of Physics and Astronomy
Rediscovery of the complete music score for a comic opera that had lain dormant for more than 100 years inspired many more questions than simply “What is this?.” From the first delicate opening of the pages and sight-reading at the piano, these questions led this author on a journey of the exploration of context in many subjects and in many levels. The interdisciplinary nature of that exploration allowed freedom from the sometimes narrow approaches often dictated by specialization.

The historical context of Victorian popular culture uncovered a connection between *Schermania* and another American musical theatre work of the day. A search for the local context of the creation of *Schermania* revealed how quickly history can be revised or lost entirely without a guardian for the legacy. *Schermania*’s music was composed by a multi-talented individual but remained accessible within the context of accepted practices of form and harmony. The composer’s choices of instruments motivated a study of the acoustics of those instruments of the 19th century using 21st century tools and technology. More than an exposition of the work, this dissertation is a revelation of the contexts which allowed its creation.
DEDICATION

This dissertation is dedicated to Ralph Van Gundy, the great-great-grandson of Schermania’s composer, Dr. Gabriel Miesse, Jr. Ralph heard Dr. Miesse’s plea made over one hundred years ago to "keep sacred the whole score of my operetta” as though the words were meant for him. Without his interest and understanding, Schermania would have been lost, and this dissertation would not have been possible.
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Ralph Van Gundy, great, great grandson of the composer, preserved the original music scores, libretti and plot synopsis as they were re-discovered during times of family transition. He graciously allowed access to these materials during the Lancaster Festival Music Heritage Project of 2006. Ralph willingly shared family history and granted numerous requests by the author for additional access to the original documents.

The Fairfield Heritage Association of Lancaster: Joyce Harvey, Association President during the Music Heritage project, Karen Smith for local history insight, enthusiasm, and connections, and Diane Eversole, for asking the question. The Lancaster Festival: Executive Director Lou Ross, for including the Music Heritage project in the 2006 Festival; Artistic Director Gary Sheldon, for reading the scores with comments about the compositions and for presenting the Act II duet in a 2006 Festival performance.

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In a haunting plea that survived and transcended more than a century, composer Gabriel Miesse created a feeling of just how important and valuable his work was to himself and to his family. The subject of this study is the work referred to above, which has been preserved within the Miesse family and its descendants.
Rediscovery of an unknown four-act opera score and libretto in 2006, in Lancaster, Ohio, written by someone who lived and died more than 100 years before, provokes interesting questions. Who was the man who wrote it, how did his life and the society and culture of his time lead him to think he should or could create such a work, and what were his personal motives? What is the quality or musicality of the work, and how might it be received by audiences, both in its own time, and today?

To answer to these questions, one must understand the context in which Dr. Gabriel Miesse’s work was created. Chapter 1 begins with an overview of the Victorian era in the United States. Elements of popular culture that were widespread during that era are reviewed. The chapter concludes with an abridged history of musical theatre in America, with attention focused on those productions that may have had or are known to have had specific influence on the style and content of Schermania in America. In the second chapter, a brief history of Lancaster, Ohio, is given. This is the town in which the composer lived most of his adult life and where he composed the music for Schermania. Miesse lived and worked in a city which was not isolated on the frontier, but growing and changing with the times. He had exposure to culture on a national scale, and would likely have believed he was a part of and could contribute to that culture. Victorian values and characteristics that were a part of everyday life for the city and citizens of Lancaster will also be described, as well as how the changes of modernization were manifested in Lancaster. The chapter concludes with the composer’s biography, including his domestic, musical, and political activities in Lancaster.

Beginning with a list of the surviving original documents, Chapter 3 explores the plot of the opera and factors which may have influenced its creators. The Miesse family’s
German heritage provided resource and reason for the use of German-American characters and dialect. Although the work stands on its own in comparison to similar works of the late 19th century, its existence as a burlesque of another popular American comic opera is detailed. Both the original and topical materials, used in either passing references or as major plot elements, are identified.

The purpose of Chapter 4 is to examine the music of Schermania. Examples of structure, form, and harmony are discussed. Miesse’s style is found to conform to standard cadence patterns and he uses normal chord progressions. Instrumentation and characteristics of the orchestration are described as they are used for late 19th century musical instruments. Some instrument parts are found to be often doubling various vocal lines. The characteristics of the vocal music are also discussed, including voice-leading, ranges, and syllable assignments. Throughout this chapter, examples from the score are used to illustrate each feature.

The final two chapters focus on a very specific detail of acoustic performance of the cornets that Miesse included in his score. In chapter 5, the 19th century concept that valved notes had a poorer sound quality than open notes is described with examples of writings by period authors. The background in acoustics needed to understand how this concept can be measured and qualitatively verified is reviewed and major design elements of brass instruments in general and cornets in particular are given. These topics have been well studied and documented by a number of researchers in the field of musical acoustics. Chapter 6 reviews the theory of acoustics that forms a basis for measuring instrument characteristics and describes the equipment and technique used to perform these measurements. The measurement technique developed for this study
is relatively inexpensive, portable, and achieves the accuracy necessary to evaluate the input impedance measurements of a number of 19th century cornets. Lastly, the experimental measurement results are described and used in a partially successful attempt to verify the assessment of acoustics differences between open notes and valved notes.
CHAPTER 1 – NATIONAL CULTURAL CONTEXT

Victorian America

The Victorian era takes its name, and its boundaries, from the period of the rule of England’s Queen Victoria, 1837 through 1901. Historian Daniel Walker Howe’s Victorian America lists the era’s most notable manifestations in America as “industrialization, knowledge explosion, immigration and vast population growth, urbanization, geographical expansion, changing race relationships, and the greatest armed conflict on American soil.” Howe also describes the conflict between culture and society during this time: If culture is defined as “an emerging system of beliefs, attitudes and techniques... finding expression in innumerable activities that people learn...” and society is defined as “a structure of relationships among people,” then culture and society were at odds during the Victorian Era. As the culture absorbed the physical changes and modernization of everyday life, society’s relationships could not always keep up. However, Victorians were very concerned with their own culture and national identity even during these changing times.

Victorian culture may be defined by a value system of hard work, postponed gratification, sexual repression, self-improvement, sobriety, compulsiveness and competitiveness, and order in the individual and order in society. Time had a high value, and saving time was important. Victorians were self-righteous and, although aware of other cultures, sought converts to their way wherever they could: People must be “persuaded” to behave according to these cultural values. The era was the culmination of a long-developing process of modernization.
As the 19th century began, new communities were being carved out of the forest of the "Western" frontier of Ohio and other northwest territories. The strength of these sometimes isolated communities is described by Robert H. Weibe in *The Search for Order*:

“Weak communication severely restricted the interaction among these islands and dispersed the power to form opinion and enact public policy. Education, both formal and informal, inhibited specialization and discouraged the accumulation of knowledge. The heart of American democracy was local autonomy. ... The health of the nineteenth century community depended upon ... its ability to manage the lives of its members, and the belief among its members that the community had such powers.” 7

The same factors which made these communities strong also led to difficulties on a national level in giving order to the changes that were occurring: Institutional authority was distributed, lacking a center, and oriented to local community life. Meaning was found on the local level for government, professions, education, church and family, and in how they fit together, and how they affected the immediate surroundings. People felt that they had control over their destiny. Individuals with the desire could enter professions such as law, medicine, education, or the church with little or no formal education, merely by studying on their own or under the guidance of an established practitioner. 8

Improvements in technology and transportation were driving the changes which began to affect Victorian society. Workers had to become interchangeable specialists instead of skilled artisans to succeed in the new industrial age. People began to identify more with their professions and lives, governed by regulation and bureaucracy of an urban-industrial world, than with their family relationships and their reputation in the community. The generalist was becoming something of an oddity. As America urbanized,
and small town people moved to cities, they were initially unable to understand the larger impersonal world of the city by applying customs of the personal society which they had known “back home.” Society developed and evolved in the natural progression of what German sociologist Ferdinand Tönnies describes as a change from *gemeinschaft* (community) to *gesellschaft* (society): Evolution from a natural organic existence which develops from the proximity of like individuals and their struggles to a more structured existence based on conscious consideration of ends and purposes.\(^9\)

**Popular Culture**

The culture of the Victorian Era in America defined many different aspects of life. As with any age, some elements of culture are produced for and used by different groups within society. It is possible to classify aspects of culture into many levels, but here only two will be used. Elite, or high culture, is that produced for the rich, which draws upon the most valuable resources and most talented people. This is compared to and can be juxtaposed with popular culture: that produced for profit, appealing to the largest, middle portion of society. Elements of popular culture appeal to a mass audience, but also have to “pander to the lowest common denominator.”\(^{10}\) Popular culture can be criticized by elites as dangerous to the survival of serious culture, because the very act of popularizing something changes or weakens it. However, popular culture can also offer a gateway for marginalized outsiders such as immigrants to become part of society.\(^{11}\)

Popular culture is often criticized by advocates of high culture as being destructive to society, and dangerous to high culture for several reasons. Because popular culture has to appeal to a wide audience, its products become homogeneous,
and the creator is reduced to a mere assembly worker, while high culture allows for heterogeneous output and creation for its own sake. Innovation is therefore more common and more successful in high culture. Popular culture may borrow works from high culture, and in modifying them to appeal to the wider audience, make them less acceptable to high culture. Creators in high culture may be lured away by the economic benefits of popular culture.

Popular culture can also be criticized by its effect on its audience: It takes the place of real, personal interactions and increases individual isolation. Popular culture’s effect on society as a whole can make people susceptible to mass-persuasion. However, advocates of high culture may be expressing these responses because they are dissatisfied with the quality of the products of mass culture, or fear a loss of prestige from a society where creators and practitioners of high culture hold themselves as elites, above the masses. Much of this criticism of popular culture is based on a traditional, European model of society, with its nobility and court-structured support of artists. The idea that American popular cultural creators are producing something of less quality or less value is often not validated by economic realities.12

The judgment of whether a cultural product is good often depends on the culture it was produced for, and the cultural level of the person doing the judging. The enlightened thinkers of elite culture, using their own values, will not recognize the value of works produced for popular culture. However, the large popular culture audience will prefer and patronize those products which are deemed unworthy by high culture. The judgment of elite culture will have very little correlation with economic success in popular culture. Theatre owner William Dunlap, who built the Park Street Theatre in
New York City in 1798, found that he had to offer “trashy” amusements to get people to attend.  

An example of the prejudices between high culture and popular culture can be found in a discussion entitled *A Plea for Operetta*, a part of Walter Eaton’s book on the American Stage: Grand opera is a presentation where all of the dialogue and story are sung, in a language other than English, typically written by European composers. The productions can be very ornate and complex, and last for hours. It is considered to be a component of high culture through tradition, and perhaps because of the language barrier and the high admission prices needed to make a production profitable. Eaton says “Grand Opera is a foreign product, thriving on a lavish scale in America (New York) because of its social aspect ... and social backing.” Operetta, or light opera, is much more a commercial success because it appeals to typical American taste and habit, satisfying a craving for “the pleasant ministrations of music and rhythm.” The music is more accessible, plots are often convoluted and farcical, and musical numbers are usually separated by spoken dialogue. However, almost all successful operettas of the 19th century were written by non-Americans such as the English team of William Gilbert and Arthur Sullivan, the Viennese Johan Strauss II, or the Frenchman Jacques Offenbach.

Eaton goes on to say that both the “heedless patrons of musical comedy (and the) patrons of grand opera and countless symphony concerts” need a better developed musical taste in order to appreciate all types of music. He laments the lack of quality American efforts at musical comedy as the result of judgments of the elite culture that grand opera or symphonic music is better, merely because it is written for
those purposes. This attitude turns native composers away from what might be an expression of their natural talents towards futile attempts resulting in unproduced grand opera or unappreciated symphonies.\textsuperscript{17}

Because it is the part of popular culture which focused on leisure and entertainment that Miesse’s efforts at creating \textit{Schermania} were designed to accommodate, it may be useful to review the forms and history of popular culture in America, particularly those which satisfied or developed American tastes and habits.

In pre-Revolutionary America, a popular form of reading material was the “chapbook”, which was a small volume printed on low grade paper, containing standard fables and stories, usually intended for the low end of society. This form of printed material generally died out in the early 1800’s with the beginnings of the industrial revolution. But, the readership that it developed paved the way for the reading public of the next centuries. Some of the typical story forms have retained popularity to the present day: frontier adventures, chronicles of crime, or tales of rags to riches.\textsuperscript{18} Many of the stories attempted to teach moral lessons, as well as to be entertaining. By the early 19\textsuperscript{th} century, newspapers had become very common and accessible, and often published novels in installments, which became the foundation for the popular dime novel. These were produced for a national audience in inexpensive forms. Initial stories were about frontier life, and are believed to have been fairly accurate, but many stories probably degenerated into sensationalized versions of reality in an effort to increase and promote readership.\textsuperscript{19}

One particular form of popular culture which combined printed versions with live entertainment was the presentation of the collection of works by William Shakespeare.
He was the most popular author in colonial and frontier America. In the 19th Century, many parodies or “burlesque” treatments of Shakespeare plays were popular, using puns or dialects, and the productions were intended as comedies. Shakespeare quotes were also invoked in other forms of entertainment such as minstrel shows. Plays were produced in every theatre, and readings were given in remote towns. Often, plays were turned into variety performances, with singing or gymnastic acts included. The timeless plots of these stories became part of the national consciousness.20

By far the most popular form of public entertainment in the 19th century was the minstrel show. In its developed form, the minstrel show consisted of white actors performing in “blackface” make-up, in a series of standard, sometimes exaggerated routines. The actual beginnings of the minstrel show are not clear. There were entr’-act characters and blackface performers in melodramas in the early 19th century. After the depression of the 1830’s, members of a new working class forming at the beginnings of the industrial revolution began to seek images of themselves on stage. This need created several frontier-type caricatures, but blackface is the one that lasted and developed. Blackface may also have deeper cultural roots as the “mark” of the lowest class of laborer doing the back breaking work of canal building, where workers were “marked” for running away.

The minstrel routines developed, and became a vivid, though of questionable accuracy, portrayal of the life of black Americans after the 1830’s. The minstrel show grew to be the most popular form of entertainment across the country by mid-century, often as a thinly veiled form of social commentary. The standard form which developed included three parts: an introduction of comedy with singing and dancing; then a variety
section; and concluded with a one-act play which commonly consisted of a story about plantation life, with slapstick comedy and a silly conclusion. Minstrel shows could often have a melancholy side, demonstrated by songs which eventually became part of American folk-music such as Stephen Foster’s *Old Folks At Home*, or *Hard Times Come Again No More*. The enormous popularity of minstrel shows was fed by many touring companies, and often supplemented by local groups producing their own shows.21

Touring groups presented many other types of entertainment and as the need for productions that appealed to ladies and the family grew, variety shows and vaudeville began to replace minstrelsy. Vaudeville began as small businessmen from circuses and sideshows tinkered with their product to see what would draw the best audience. Attempting to include something for everyone, these shows consisted of an incredible variety of unrelated acts: singers, dancers, magicians, comedians, knife throwers, jugglers, and acrobats. Many acts included wordplay, malapropisms, ethnic humor, and satire, which provided many opportunities for jokes. Some acts in vaudeville were identified by the ethnic type: Irish, Hebrew, colored, blackface or German and were identifiable by the character’s dress, accent, or dialect, and type of act or jokes. With vaudeville’s growing popularity came a developing network of touring companies and booking agencies to bring shows by rail to much of the country. Variety shows with a somewhat more unified plot became revues, follies, or extravaganzas.22

The traveling Wild West show brought stories of the vanishing frontier to many Eastern areas of the country. “Buffalo” Bill Cody’s was the best known, but there were others. These shows used displaced animals, Native American Indians, and whites to recreate action from frontier life for people who had only read about it. P. T. Barnum,
who helped to create many facets of 19th century popular culture, also organized
touring circus companies. He is remembered for his popular museums in New York, his
contractual sponsorship of Swedish singer Jenny Lind in 1850 and 1851, and his
circuses. Between 1851 and 1855 he also produced *Barnum’s Great Asiatic Caravan,
Museum and Menagerie* with captured elephants from Ceylon, Tom Thumb, and a
variety of acts which toured the country. (It was this group which Miesse must have met
in Darke Country, see chapter 2). 23

When a touring company arrived in a small town, its actors often found
themselves performing at the local opera house. Opera Houses were known as centers
of local culture and used for a wide variety of events: theatrical, religious, educational,
musical, or community-related and thrived during the period of about 1880-1920.
Events at the opera house were held to the high moral standards of the community, and
even the name “opera house” was used to imply a higher culture and morality than a
mere “theatre.” The buildings were large structures, located in a prominent place in
town. Typically three stories, the ground floor usually consisted of retail shops; the
opera house was on the second floor; and the third floor held lodge meeting rooms or
offices. The second floor space may have had removable seating so that activities such
as basketball or roller skating could also be accommodated. Seating capacity could
range from 11 percent to 33 percent of the town’s population, and attendance was
looked upon as a matter of civic pride and responsibility. 24

Turner Societies were social/physical groups patronized by many German-
Americans. The Turner concept included physical and mental training, and was
developed in Germany in 1811 by Friedrich Jahn to promote national identity and culture
at a time when his country was experiencing political turmoil. The transplanted American Turner groups were generally against slavery, opposed temperance laws, and emphasized the physical training aspect that gave the movement its name – *turnen* in German can be loosely translated as gymnastics – under the motto of “building a sound mind in a sound body.” Some groups also sponsored rifle shooting contests (*Schuetzenfest*), political activities, and other social gatherings. (The Turner Society as a social concept is used by Miesse in *Schermania*).25

**Musical Theatre**

Another type of production widely attended falls under the broad term of musical theatre. In attempting to classify any work such as *Schermania* relative to the volume of operas, musicals, comedies, and other theatrical works of the late 19th century, one immediately finds disagreements among critics and theatre historians about exact definitions; how these definitions were applied to different works; and how particular works are classified. One author has identified at least 28, (and includes hers as the 29th), differing lineages or partial derivations of the evolution of the musical theatre form proposed by writers concerned with musical theatre in America. The only consensus to be derived from all of these theories is that the precise beginnings and influences of American musical theatre are difficult to identify. As to which early works may have influenced later works, “A creative person is influenced by his or her predecessors, potentially by everything he or she has ever experienced.” 26

What is clear in all of these different opinions and analyses is that there is wide variety in the record of musical theatre. It is not the intention of this study to create a complete or exhaustive catalogue of American musical theatre history or of related
forms of European opera (see Bordman or Grout 27), but to provide enough background to place Schermania within the context of American musical theatre. It is also important to understand which types of these productions Miesse might have known of or could have attended and which may have influenced his creation of Schermania.

While the American colonies were still tied to Britain, most productions were direct imports and English ballad opera was a popular form. The ballad opera was a play for which a substantial number of lyrics were written, often to popular tunes. By the early decades of the 19th century, the “burlesque” became popular, and at that time, the term burlesque meant a parody of a well-known play or performer done in song, dance or dialogue. Most were of European origin, as in fact most other musical theatre productions were at the time. Although some American works were being written, they had yet to gain a following or a well-defined identity.28

Even while all of these other forms were growing and evolving, musical theatre in various forms was part of the scene, and it is from musical theatre that Schermania has its origins. Again, many terms have been used, often interchangeably: musical comedy, operetta, opera bouffé, comic opera, musical romance, and light opera. All of these terms describe a play where music plays an integral part. Musical comedy can be distinguished from these as typically including a fair amount of spoken dialogue, and having plots about ordinary, common people, with occasional cynicism and unpleasant characters. Opera bouffé was typically French in origin, and sometimes included risqué dialogue with double entendre. Comic opera can be defined as light opera with comedy as the principal element. Compared to comic opera, operetta is light, primarily to
entertain, and can be joyously amusing or romantic with tangential comedy. Often librettos were of poor quality, leading to sometimes dreadful humor. Plots are often trivial or inconsequential, and this is not necessarily a negative quality. Many early popular English comic operas had consistent tone, easy melodies and floridly romantic plots. “Complications galore were interwoven into stories built largely on stock motifs and propelled by vigorous, unsubtle action.” 29 The stock motifs included lovers of unequal social rank, mistaken identity and disguises, and elaborate plots that would be impossible to relate in a sentence or two. 30

One American production which stands out, although a frank imitation of European models, was The Black Crook, presented in New York in 1866. The work itself was a combination of two shows, a French ballet and a melodrama, and combined old and new style in a lavish production. It used standard tunes and new music, and had a fairly coherent plot based on the stock story of an unfortunate who risks his soul in a deal with the devil. What made The Black Crook unique at the time, and sent producers on a quest for more, was its huge financial success. 31

Another American product, successful for its long-running family of modifications and sequels, was Fritz, Our Cousin German written by Charles Gayler in 1870. The character Fritz was created by and as a showcase for J. K. Emmet, and first appeared in Cincinnati in 1865. Emmet played a German immigrant character speaking in German dialect, in wooden shoes and green trousers. Typical plots involved Fritz searching for a lost sister, and singing a song recognized from their childhood. Emmet was a very popular performer, and slightly modified his presentation in new shows as Carl, the Fiddler in 1871, Max, the Merry Swiss Boy in 1873, and Fritz in Ireland, 1879.
One thing that most commentators agree on, which can be verified by theatre chronologies, is that most musical theatre productions of this era were not created by Americans. In fact, “After the middle 1860s, and for the rest of that century, the American stage was literally flooded with foreign operettas: the opera-bouffés of Offenbach and LeCocq among others; the operettas of [Von] Suppé and Johan Strauss II; the comic operas of Gilbert and Sullivan. American composers and librettists were, for a long time, driven by the success of these productions to the practice of unashamed imitation.”

After opera bouffé fell somewhat out of favor because of its risqué subject matter, “These two traditions – English comic opera and Viennese operetta – would rule America’s musical theatre for the rest of the century, and American imitations would permit native artists to take their first, tentative steps along beaten paths.” So, American composers and writers of operetta or comic opera in the late 19th century would almost be expected to use ideas from successful foreign imports to create their own success.

In a groundbreaking way, the most successful of those foreign imports was *HMS Pinafore*, with book (libretto) and music by the creative team of Englishmen William Gilbert and Arthur Sullivan. Although *Pinafore* was not their first collaboration, it was the one that really set the stage for much of their future success. Gilbert’s ambition since his early works had been to reform the tone of musical plays because he felt the audiences were ready for more than the frivolousness they had been used to. In *HMS Pinafore*, “American theatergoers were exposed to a rare, but not new, kind of musical theatre in which book, lyrics, and music combined to form an integral whole. What made the show
distinctive was the literacy and wit of its lyrics, and the artistry and almost unprecedented melodic invention of its music.”

The plot of *HMS Pinafore* is filled with unusual situations and unlikely coincidences. The Pinafore Captain’s daughter, Josephine, is sought in marriage by a high ranking, though self-made Admiral of the Navy, Sir Porter. She, however, is loyal in her affections to a common sailor, Ralph Rackstraw. In an unlikely plot twist, it turns out that her common sailor and her father had been switched at birth by a nurse-maid named Buttercup, who just happens to be on the ship. When the mistake is discovered, Ralph is named Captain and Josephine’s father is demoted to common sailor. He marries Buttercup, Ralph marries Josephine, and Sir Porter marries another available lady.

*Pinafore* premiered in London in May 1878, and a short six months later had its first U. S. performance in Boston. Six months after that, performances exploded all over the country, partly due to lack of international copyright protection, and started one of the first modern-era social crazes, complete with countless local productions, satirical take-offs, and *Pinafore* souvenir products. Not all productions were true to Gilbert and Sullivan’s original work, and many followed the common practice of the day of adding extra songs to highlight local performers or jokes with local significance. Since Sullivan retained control of his original score, many performances were given with inferior orchestrations based on the readily available piano score.

Even with all of these variations, *Pinafore* was successful in America because of its new approach of integrating plot, action and music, its all-around entertainment value, and the interpretation by Americans of its endorsement of the values of a classless democratic society. It was exactly what people wanted at the time. Not only
did American imitators capitalize on its success, but Gilbert and Sullivan would use the *Pinafore* style to create several other highly successful works. These successes included *Pirates of Penzance* in 1880 and *Mikado* in 1885. *Mikado* capitalized on the era’s fascination with Japan and Japanese culture, setting its story in the court of a Japanese ruler. The Mikado’s son Nanki-Poo, hiding from a marriage his father is arranging for him, agrees to be beheaded if he can spend one month married to the woman he loves, Yum-Yum. The plot is a variation of their basic plot and includes a many-faced official, Poo-Bah, and various misadventures before a happy ending, plus typical Gilbert and Sullivan patter-songs, and silly character names.39

**HMS Pinafore** set a standard for American imitators, but it took some time before anyone was able to capitalize on this new style. The first successful American imitation in the Gilbert and Sullivan style was less an imitation than some believe. Willard Spenser had completed and copyrighted *The Little Tycoon* in 1882, three years before the *Mikado*, although it wasn’t produced in his native Philadelphia until March, 1886, a year after *Mikado* premiered. Because of the production delay, at the time many thought Spenser had borrowed the Japanese plot elements directly. The *Tycoon* plot actually borrows more from **HMS Pinafore**. In the first act, on a ship returning from Europe, a General has selected a husband for his daughter instead of the man she loves. Upon arriving back home, he is enticed by the current social craze over foreign royalty to promise his daughter instead to the visiting Tycoon of Japan, who happens to be her choice in disguise. Spenser’s story is suffused with pun-based humor, a fair share of clever character names, and includes a character whose only words through the whole play are “Oh! Ah!”. The Tycoon character also speaks in a strange combination of
English words and nonsense syllables meant to represent the Japanese language. *The Little Tycoon* premiered in Philadelphia, and it initiated what became known as “the Philadelphia School” of American Musical Theatre. The work had 3000 performances on tour by December 1891, and one song which outlived the operetta: *Love Comes Like a Summer Sigh*. 40

The perceived success of a theatrical work was often based on its reception by refined critics and experienced audiences in New York City’s many theatres. Boston theatre was also a proving ground, and Boston and New York were often rivals in their tastes and criticisms of plays, authors, and composers. Other large cities had active theatre scenes, including Philadelphia, Chicago, New Orleans, and San Francisco. Another measure of success was the reaction of everyday people in towns across the country, as touring companies brought productions out to them by rail. Often the judgment of big-city and frontier audiences didn’t match up, and for a play to achieve true success, it had to win in both.

Another measure of success for any Victorian theatrical production was how quickly it spawned a burlesque version: a form of imitation which makes fun of any number of features of the original. Author Richard W. Schoch presents scripts for five such satires of successful London productions in his 2003 *Victorian Theatrical Burlesques*. He defines typical characteristics of burlesques of English plays:

“rhymed couplets in a parody of the original text; the transposition of characters from ‘high’ to ‘low’; the contemporization of past events; the ludicrous reenactment of classic scenes; a pronounced theatrical bias with an emphasis on stage business, sight gags, and special effects; relentless puns; and soliloquies and set pieces rewritten as lyrics to contemporary songs.” 41
Burlesques were quickly created, and often had a short lifespan, being interesting only as long as their novelty remained. In order to retain the novelty, "Apart from newly written jokes, a burlesque production could be refreshed by inserting the latest popular song, imitating the idiosyncrasies of an eminent actor... or introducing the newest dance craze at the end of a deeply tragic scene." 42 Some dialogue may not have been written out, but was created and developed by the actors. Each performance would be slightly different from the last, in an effort to keep the interest of audiences. Burlesques were full of topical allusions and local references which often make them inaccessible to later audiences. Series of puns, increasing in intensity and obscurity, were often delivered so fast that audiences didn’t always get them. Schoch believes burlesque audiences had to be more knowledgeable about the original and contemporary material to understand the play than is usually given credit for "popular culture" entertainments. Burlesques were not attempts to edify the masses, rather they were more inclined to ridicule middle class values. By the mid 1880’s, many burlesques were transforming into more musical theatre productions, often merely acknowledging a source text but not engaging in direct parody. They were lengthened from one act to three, with songs and lyrics composed especially for the production, and included more elaborate scenery, dances, and costumes.43

Given this brief recounting of the state of musical theatre during the time that Miesse’s work was being conceived and written, how is the “rediscovery” and study of Schermania relevant? First, it is unique as a part of local and personal history. Gabriel Miesse, Jr. was a multi-talented citizen and participant in his community. Study of the context of Schermania can uncover how aspects of American culture of the time were
manifested in one particular town, allowing a close-up view of the often large-scale historical record. It is unknown, although doubtful, if this work was ever presented publicly. Was it a victim of the industry’s prejudice against unknown creators? If given the chance, how would it have been received by the public? This may be a partial answer, from Bordman’s *American Operetta*.

"In an age when only twenty or thirty musicals were presented on Broadway each year, when some of these were either musical comedies or revues, and when most comic operas were written by either celebrated foreigners or the American giants of the day, room for competitors was scarce. And clearly these competitors never threatened to become rivals. A few, notably Willard Spenser, thrived away from New York; a few others, men such as Thomas P. Thorne or Henry Waller, were heard once or twice and then vanished. The world of comic opera composers was small and tightly knit, and one can only surmise and hope that no genius was denied his place in the spotlight (dissertation author’s emphasis). In any case, no great new figure appeared for a number of years. Perhaps partly because of this, operetta fell into relative disfavor, while new forms enjoyed their moments of triumph.‖ 44
CHAPTER 2 – LANCASTER HISTORICAL CONTEXT

Beginnings and Improvements

In the 19th century, Lancaster, Ohio, was one of many towns established in the new “west” as the country expanded into the Northwest Territories. The town owed its existence and early importance to its location at the intersection of the Hocking River and the first road through Ohio territory, Zane’s Trace (1797). The importance of this road was described by local historian Edward Ebbert: “Zane’s Trace was, indeed, a thoroughfare, and all the roads, trails, and paths through the forest led like the ancient highways, ‘to Rome,’ and most naturally did the stockades and settlements along this primitive boulevard increase in size and importance.” From its eastern beginning at Wheeling, Virginia, (now West Virginia) and southern terminus across the Ohio River from Maysville, Kentucky, the Trace brought to Lancaster ethnic, German-speaking populations from Pennsylvania in the east, and others from Kentucky and Virginia in the south.

From its founding in 1800, Lancaster attracted settlers who understood the potential benefits of opening new territory. The surrounding country soon proved to be rich farmland, and much of the southeastern part of the state was known to contain natural resources such as timber, salt springs, coal, iron ore, and clay deposits for brick. Transportation was needed to exploit these resources, and when the state’s canal commissioners chose the route of the Ohio Canal to bypass the city by ten miles, Lancaster’s merchants became the driving force behind the creation and financing of the Lancaster Lateral Canal, a short connector between the city and the Ohio Canal. When the Lateral opened in 1834, it increased communication with the outside world and
vastly improved two-way commerce: “on its eastern bank, as it passes along the 
western edge of Lancaster [were] some nine or ten warehouses, thronged with goods 
and produce the year round. Through them passed the entire surplus wheat crop of the 
county, as well as the merchandise for all of the stores of Lancaster and the villages of 
the county.” 46 Contemporary historian Hervey Scott thus describes the canal commerce 
in his comprehensive 1877 history of Fairfield County, which includes several illustrations 
by Gabriel Miesse, Jr.

At about the same time the canal began operation, the National Road was 
completed through Ohio, but at a distance of 16 miles from Lancaster had negligible 
effect on its development. Rail lines were established to Cincinnati in 1854, Columbus in 
1869 and Athens and coal fields to the south in 1870. The rail connections to Columbus 
put New York City a day and a half away, and Chicago one day away, giving citizens 
more convenient access to all that these cities had to offer. The railroad also improved 
access to a source of coal from south-eastern Ohio and brought new manufacturing and 
a surge in population growth to Lancaster in the decades following the Civil War, with a 
well-ordered expansion of city streets and annexation of land.47

The continued push for improvements in transportation and other infrastructures 
was a characteristic of the Victorian age, and contributed to Lancaster’s reputation as a 
growing and important center of trade, commerce and culture. Much of the driving force 
and financial support behind these improvements came directly from leading 
businessmen, as Ebbert enthusiastically wrote in 1901.

“... her well-organized city government includes a Board of Trade that actually 
considers itself responsible for the city’s welfare, and, individually and as a body, 
works for its upbuilding. The present Board, for instance, composed of well-
known business men, has, through its influence, induced to locate in Lancaster many enterprising, money-earning, money-spending customers.”

The Lancaster Board of Trade included men such as Thomas Ewing, a lawyer, businessman, and statesman who eventually became a U.S. Senator. A true Ohio pioneer, earning tuition during college breaks at salt works on the Kanawha River, he received the first B.A. degree granted by Ohio University in 1815. He diligently studied law in Lancaster with the Hon. Philemon Beecher, and was admitted to the bar in 1816. Ewing’s energies later extended outside of his legal practice to salt and coal mining and the welfare of the state and city. During his service in the United States Senate, Ewing was considered by many to be on a level with Daniel Webster and Henry Clay. He also had business dealings and was related by marriage to Congressman and Presidential candidate J. G. Blaine.

Ewing was the principal speaker when the state launched its canal-building efforts on July 4, 1825, with a ground-breaking on the Licking Summit near the city of Newark. His grand vision for the canal system was of a country unified by trade, interests, and communications. When the state’s chosen route for the canal bypassed Lancaster by ten miles, Ewing was among the citizens who petitioned the state for the charter of a private company to construct the Lancaster Lateral connection to the Ohio canal at Carroll. They did not want to see business lost to nearby rival Newark, which was on the Canal route. The unique group of Lancastrians who succeeded in establishing the Lateral fought a typically Victorian battle for the growth and future of the city, described in a modern analysis by David Mould.

“The fears and insecurities of Lancaster’s business community were characteristic of a period when politics was shaped by intense urban and sectional rivalries. Regions and communities were engaged in a desperate fight
for development, and the battles were fought as often in the legislature as in the marketplace.” 51

The Lancaster Lateral Canal Company initially sold stock to nearly 200 (in a city with a population well under 2000) local merchants, bankers, and farmers to finance the project. Ewing served as one of the company’s directors, as did leading merchants such as Samuel MacCracken. MacCracken began his career as a tanner and soon moved up to selling dry goods. Eventually he established the Lancaster Bank, and with his other financial interests played a major role in financing for the Ohio Canal. 52 He served as one of three on the state board of canal funds and was involved in buying and selling of bonds between Ohio, New York, and London to raise capital and pay interest and canal contractors. 53

Thomas Ewing was not Philemon Beecher’s only student, and the two of them were just a small part of a flourishing group of lawyers that called Lancaster home. During the first half of the 19th century, Lancaster’s central location in the southern part of the state and on Zane’s Trace made it an ideal base for travel on the judicial circuit. Many of the members of this bar were elected or appointed to state and national government positions. Ewing’s friend Charles Sherman (father of Civil War General William T. and John, author of the Sherman Anti-Trust Act) practiced in Lancaster before serving on the Ohio Supreme Court. Ewing served in cabinet positions for several presidents. Beecher’s son-in-law Henry Stanbery (also related to Ewing by marriage), Ohio and United States Attorney General, defended Andrew Johnson during his impeachment trial. A full list of this group would include numerous Ohio Governors, United States cabinet members, court justices, state and national representatives, and senators. 54
Lancaster’s merchants and politicians wanted to keep the city growing and were able to combine their efforts during the canal and rail era. As these men traveled in Columbus, Washington, and other eastern cities, they brought ideas for cultural and civic improvements back to the frontier town, and also placed its name and reputation in a more prominent place than might be expected. Throughout the second half of the century, the *New York Times* contained a scattering of Lancaster wedding and society notices, news of house explosions and political sabotage, and a “gossipy letter from Lancaster, Ohio,” entitled *Prominent Residents of Lancaster, Ohio.*

It is because of these men and their ideas and leadership that Lancaster was a special community in the 19th century. Many of them were self-made generalists, involved in their own businesses, community improvement, and politics at many levels. They believed that they had the ability and responsibility to manage the community through local autonomy, but they were also well-traveled, with a national perspective. From the town’s founding through the canal and rail era, Lancaster was far from an isolated, island community.

**Victorian Lancaster**

In the small populations of early “log cabin days” (1800-1830 for Lancaster) “people had time to talk to each other; time to help each other; time to visit and nurse the sick, and bury the dead...” and “mutual dependencies and mutual aid became the web and woof of the new settlements.” The town did not escape the social changes occurring during the Victorian era in America. Through the second half of the 19th century, Lancaster’s population grew: in the decade of 1870, it increased by 44 percent. Church sponsored groups and organized government took on many of the social aid
responsibilities that were formerly assumed by individuals. Goods shipped in on the canal and later by rail from other areas of the country or those made by local, large manufacturing companies took the place of the goods created by multi-talented craftsmen. Early Lancaster had been home to some of “the most skilled artisans west of the Alleghenies,” such as cabinet maker Jesse Woltz and clock maker Timothy Sturgeon, who chose the frontier town to ply their trades.

Between the end of the Civil War and the end of the century, evidence of Victorian life in Lancaster was everywhere: religious revivals, many church sponsored activities, a temperance crusade, an expanding downtown shopping area, many lodges and fraternal organizations, new schools, a thriving performing arts calendar, an opera house, a new county court house, a public free library, public water and gas works, new industrialization, and significant population increase.

The new homes that filled the new streets were often financed by building and loan financial institutions, a concept that originated in Germany, and well-known to the town’s large German population. Local sources of natural gas were discovered in the 1880’s, leading to offers of free gas to new manufacturing endeavors, gas-lit streets and the world’s first night horse race by gas light. A municipal waterworks established in 1877 first used canal water, and after construction of a standpipe in 1879, began drilling wells in 1881 with added filtration. This system proved a great value in fire protection, and the city’s first professional fire department was founded in 1893.

Civic improvements also kept pace with a new city hall with a public auditorium in 1859, public free library in 1878, opera house in 1883, and a street rail system in 1889 which united the downtown shopping district with new outlying residential areas.
Public school buildings kept up with the growing population, and there was an orphan’s home, a county poorhouse, and the State Farm School for delinquent boys. Spiritual life was well looked after by many traditional denominations, some with German roots, and by evangelical revivals and camp meetings typical of the era.⁶⁰

Some elements of society in the 19th century were created by ethnic or immigrant groups. Lancaster’s ethnicity was varied, but contained a large proportion of German-born nationals and German-Americans. Men’s singing societies, or Mænnerchor, were popular in many towns with even small ethnic German populations. These groups maintained a cultural heritage connection for their members through singing and other social activities. The active members, who were chosen by audition and sang regularly, were joined by passive members who enjoyed the many social activities and provided financial and audience support for the singers. Another social institution which thrived in many German-American communities was the lager beer garden, which provided a place to cement community ties in an informal social setting. The beer garden was a quiet, family oriented place, with beer, food, and music, where loitering was encouraged.⁶¹

Post-Civil War Lancaster experienced every part of Victorian culture in ways appropriate to its size. In a four month span beginning in March, 1879, the following items were reported in the local newspaper: Tuthill’s bookstore was selling literary magazines by issue and by subscription, and in 1876 noted that Appleton’s Journal, a “high-toned and popular literary weekly has been changed to a monthly, and has taken the most attractive magazine form, comparing favorably with Harper’s, Scribner’s, The Galaxy, or any of the best monthlies.”⁶² The Tivoli Beer Garden provided Thursday night band concerts, complete with “a profusion of appropriate pictures ... graceful
attendants ... and a more delightful place to go for your beer would be hard to find.”

63 Public rail excursions were taken to nearby cities such as Columbus, Zanesville, and Chillicothe to attend special performances.

The Lancaster Mænnerchor, composed of all of the leading male singers of the town, was organized in 1876. In fewer than three years, this group was able to present its own version of Gilbert and Sullivan’s *HMS Pinafore* on April 13, 1879, a short five months after its United States premiere in San Francisco. The Mænnerchor repeated their *Pinafore* performances, apparently by demand, six weeks later. They seem to have followed the common practice of interpolation of local, topical, or well-known works into scripted plays, as reported by the *Lancaster Gazette*: “prospects are that the audience will see more beauties in this unique and very peculiar little opera than they have ever before witnessed. Many new features will be added, such as songs, dances, &c, &c, that are very pleasing, and that will more fairly show the artistic attainments of our home talent.” 64

An interesting comparison between grand opera of elite culture and this operetta of popular culture can be found in the *Lancaster Gazette* review of April 17, 1879:

“H M S Pinafore is a phenomenally popular musical extravaganza, one continuous ripple of the brightest, airiest, most sparkling, pleasant and humorous melody that can be conceived, probably the most adroit and delicate travesty upon the conventional Italian opera ever produced, and in this phase of its character it shows quite as much wit and drollery in the musician as in the poet. Broad burlesques of operatic forms are common enough, and so easy to make, that they are extremely amusing. And yet it is almost entirely free from exaggeration, and a duplicate of every ridiculous situation, every absurd line, every incongruous, laughter-moving musical phrase can be found in the highest of standard opera. The ludicrous aspects are brought out by the usual process of enlarging and distorting some of its worst features, but by a deft arrangement – so artful as to almost defy analysis – which shows in one view the whole plan of the standard Italian opera, and at the same time sets in clear light and effective contrasts its salient absurdities.” 65
Before Lancaster’s Opera House was completed in 1883, the first City Hall, (1859) included a public space which seems to have been in almost constant use in the 1870’s, hosting an incredible variety of events and performances: *Uncle Tom’s Cabin, Mother Goose*, (including new calcium lighting operated by Phil. Sager of Columbus), the John McCullough troupe with music furnished by the local Schneider-Goetz orchestra. The recently formed Free Library sponsored a children’s production of *Cinderella*, and its Dramatic Club presented a farce called *The Wrong Man* followed the next day by *The Lady of Lyons*. City Hall presentations also included religious lectures, such as one by the local Rev. A. W. Hale.66

As Lancaster’s first gas well was drilled deeper and deeper in late 1886 and early 1887, the fortunes of the Chestnut Street Opera House rose higher and higher with the anticipated prosperity and economic growth that a local gas supply would bring. The Fall and Winter performance season was filled with a wide variety of touring companies and shows: minstrel troupes, comedies, Blind Tom the pianist, a German dialect comedian, versions of *The Count of Monte Cristo, The Mikado, Pirates of Penzance, The White Slave, Si Perkens, The Black Crook, and Forgiven*. A benefit performance given at the opera house on July 12th, 1887 may have been an influential event in the creation of *Schermania* (see chapter 3).67

Acceptance of the Victorian growth and civic improvements was often mixed: Self-reliance and independence had been necessary to form the city, but these characteristics also contributed to a reluctance to accept change. Some parts of the population were driving the changes for economic reasons while other parts preferred to keep things as they were. In May of 1879, when the State Legislature was considering
abandoning the canal system, county citizens organized a petition “praying against the abandonment” 68 Hervey Scott’s *A Complete History of Fairfield County* solicited recollections from older citizens (*Gazette* ad 1876). Many who recounted the days of house raisings, log rollings, and quiltings also lamented those days that were never to be seen again, as frontier life was gone forever. The death of a 98 year-old woman in 1879 produced an obituary describing her life-span as covering an entire century of improvements. The railroad, telegraph, telephone and phonograph would all have been seen as magic at the beginning of her life, but carried the country out of those earlier “somber, beclouded days.” 69

Lancaster was aware of the way life was changing, but also sentimental about its past. The very progress that was essential to its survival was changing the character of the community and its people. Individuals took steps to create the canal and to initiate other advancements. Gradually improvements of the Victorian Era came to the city as they moved relentlessly across the country. Cities and society became homogeneous with these changes, local autonomy was being superseded, and generalists were gradually replaced by specialists. By 1870, the change was well underway, but strengths of the past continued to contribute to the character of the city for some time.

A typical example of the spirit of local autonomy in getting the job done, and the pre-Victorian prevalence of non-specialists, is the design and construction of the second county courthouse in 1872 by Henry Orman, a cabinetmaker and builder with no formal training in architecture. Still in use today, it is an impressive three-story Italian palazzo style building constructed of local sandstone. This courthouse, located at the top of the Main Street hill, would have been visible from “East Lancaster,” a newly developing
territory outside of the original two mile square of land granted to Ebenezer Zane, which was also the home of Schermania’s composer.

**Biography of a Composer**

Gabriel Miesse, Jr. (1838-1911) was a fourth-generation descendant of one of the thousands of German Palatines immigrating to the United States in the mid-18th century, settling in and around Berks County, Pennsylvania. The land for these settlers was purchased from William Penn by a group of ten Frankfurt businessmen in 1684 (One of the characters in Schermania was given the same name as one of these ten men). Daniel Miesse was born in Elsoff, Wittgenstein, Germany and settled in Pennsylvania before the Revolutionary War. Daniel is remembered as one of the soldiers who kept campfires burning on the banks of the Delaware River to give the impression that the army was still encamped, while Washington took his army across the river and seized Trenton.

Grandfather Jacob, son of Daniel, became a farmer and wealthy landowner and raised a large family in Reading, Berks County, Pennsylvania. Jacob and his son Joseph had purchased about 400 acres in Greenfield Township, Fairfield County, Ohio, between 1805 and 1816 about six miles north of Lancaster, near what became known as Dumontsville. Six of Jacob’s children eventually moved to Fairfield County. Jacob’s brother Joseph also relocated here, and while Jacob visited Joseph in 1807, the two are said to have worked to clear the forest on the land where Lancaster’s first courthouse was built. Jacob’s son Gabriel LaFayette Miesse was a physician, but was also known as an inventor, engraver and musician. Charles Miesse, the author of Schermania’s libretto, was a descendent of Jacob from the branch of the family that remained in Berks County.
Gabriel Sr. moved to Dumontsville and started medical practice there in 1831. He married a local woman, Mary Weist, in 1832. Son Gabriel Jr., Schermania's composer, was born near Dumontsville on January 5, 1838. After a short stay in Columbus, the family moved on to Greenville, Darke County, Ohio in 1848, where Gabriel Sr. practiced medicine, raised his family, and lived until his death in 1885. Both he and his wife Catherine were very musical: The family had a band and even offered productions to Greenville audiences.71

His father’s many talents seem to have been continued in son Gabriel Jr. A contemporary biographical sketch by A. A. Graham describes his many abilities: Encouraged by a musically talented physician father, Miesse became an excellent pianist and music teacher; by the age of 12 he was apparently organizing classes in Greenville, Ohio. At this time, he also had a large collection and museum of native birds and animals, to which he charged admission of ten cents. This museum even received a visit from P. T. Barnum and company who were in the Cincinnati area on one of their many tours. By 16, he was giving well attended musical entertainments during long winter evenings, giving lectures on anatomy to his friends, and performing surgery under the supervision of his father. He studied medicine with his father, and also received a diploma from the Eclectic Medical Institute of Cincinnati in 1856.72

Miesse could have experienced opera or symphonic music in Cincinnati during the time he was studying there. In the summer months from 1846 through 1858, a touring troupe associated with the Havana Teatro Imperial presented works by Bellini, Donizetti, Rossini, and Cincinnati’s premiere of Mozart’s Don Giovanni. Other troupes that appeared in the city at this time were the English Pyne and Harrison Opera
companies. What was later to be known as the Cincinnati Symphony had not yet been organized, and several fledgling predecessors did not appear to be active during 1854-1856.  

By late 1865, he had married Caroline Kemmerer of Fairfield County and with their only son had moved to Lancaster, where he designed and built his own home on East Main Street. He was elected to City Council in 1872, and later served on several committees involved in platting new city streets and alleys. Graham also reported that “From 1875 to 1877 he delivered a series of lectures upon ‘Anatomy, Physiology and Hygiene;’ ‘The Plow, Its Uses and Improvements from Early Date to the Present Time;’ ‘Fashions and Customs of a Hundred Years Ago;’ ‘Astronomy;’ ‘The Solar System;’ ‘The Farmers' Grange;’ ‘The Sun's Heat;’ ‘Light and Heat;’ ‘Is the Physical Organization of the Sun a Mass of Fire?’” The trend toward specialization had certainly not yet caught up with Miesse, a man who seems to have been interested in and involved in almost everything.  

Newspaper entries indicate that by 1879, he was no longer a member of city council (losing a bid for re-election in April by a vote of 119 to 72) but was permitted to speak before council in June regarding the establishment of the grade on the newly expanded and improved East Main Street. He had concerns about the unsanitary nature of culverts under the street, and the option of a one summit grade he spoke in favor of was defeated the following week and the road given a three summit grade. His house and property were directly affected by this change. The next week’s edition mentions his improvement of the residential property by the addition of a “stylish iron fence in front of his residence, which, together with the evergreen fences on either side, gives the
place a beautiful appearance.” The following year, “the City Council appointed him Chairman of a Platting Commission to plat the city into streets and alleys within the corporate limits” of East Lancaster.

Miesse owned a fairly large piece of land across East Main Street from his home which was the site of several Evangelical revival meetings during 1879. The revivals were associated with the recently organized Trinity Evangelical Church, with a new church building less than one half block from his home, and had a great effect on him. A huge canvas tent was erected, and all “lovers of Jesus” were invited to camp on the site and attend the meetings (admission 10 cents). Local clergy were involved, but the main attraction at these meetings was the well known evangelists Nathan and Esther Frame. Miesse had met them at an earlier revival in nearby Carroll, Ohio, and had been deeply affected, but unconverted. He invited them to stay at his home when they came to Lancaster. The meetings were held over the weekend on May 30, and Miesse, complaining of feeling ill with rheumatism, tried to excuse himself from attending. The Frames pressed him to go, and he seems to have had some sort of spiritual experience along with a cure of his illness. At the time of his conversion during the meeting, Miesse requested that Esther sing one of the hymns that he had composed and dedicated to her. The Frames’ complete account of this experience is included in appendix B. Family accounts have survived about the visit of the Frames, and the doctor’s “miracle cure.”

In 1888, he was admitted to the First Methodist Episcopal congregation (later First United Methodist) in Lancaster, along with his wife, son, and daughter-in-law. Several of his hymns were published and his family seems to have been active in church affairs. It was at this time he began composing the music for Schermania. His only son
Leon Edgar, or “Ed”, had attended the Cincinnati College of Music, was organist for this church and the leader of the Lancaster Mechanics Band until his untimely death in 1894. Ed’s death was sudden, and may have resulted from a burst appendix. It is said that Miesse took this death hard, and afterwards gave up much of his medical practice to devote more time to art and music. Miesse had been writing and publishing music most of his adult life. While in Lancaster, he published mostly piano marches and waltzes, dedicating many to friends and relatives (see appendix A). He painted in both water color and oils, and many of his paintings are still cherished by Lancaster residents and family members. He was also sculpting and casting in plaster: in November, 1881, he had a clay bust of President Garfield on display at Tuthill’s bookstore; in August, 1882, five paintings at C. F. Kirn’s Boot and Shoe store; and in April, 1909, a clay bust of President Lincoln sculpted to commemorate the 100th anniversary of Lincoln’s birth was displayed at the newspaper office. Miesse was also well-known as a teacher of art and music, and among his students was Richard Outcault, creator of the “Yellow Kid” and “Buster Brown” cartoons.79

Even near the end of his life, he was taking on sculpting students, and had developed some interesting new ideas, which were recorded in the diary of one of those students, Faye Stevenson:

“Nov 15 [1909]. Took another modeling lesson today with a lecture thrown in. The interesting old Dr. claims that Adam was not the first man but the king of a tribe, that the Garden of Eden is at the north pole and that United States was populated by Chinese several thousand years ago. But the poor old fellow calls the Old Testament a novelette.” 80

Faye was a young woman of about 20 at the time, and had studied art at Otterbein College and Ohio University. She was also a violinist, often playing in public for
church meetings and with friends. On one occasion she took friends to visit the Doctor, and he played piano for them and later gave them small watercolors as gifts. Faye mentions lessons in the diary for just over a year, and adds a short note in September, 1911 about his death.

“June 6, 1910: I took Ben-Eva and Lovey out to Dr. Miesse’s this afternoon. They seemed to enjoy the interesting old man and his many paintings and modelings. I had not before heard him play in his own home and he looked like a picture out of the Etude. As he sat silhouetted against the twilight his long hair adding to the effect, surrounded by the work of his fingers he drew forth from the keys the fancies of his brain.

June 9 [excerpt] Dr and Mrs Miesse spent the evening with us. He presented Ben-Eva and myself with small water colors.

Sept 11 [1911] My old clay modeling professor, Dr. Gabriel Miesse, wandered away to Columbus and was found dead in bed someplace there. He was such an interesting man.”

In failing health, Miesse did indeed wander away from his home and apparently rode the interurban train to Columbus. He escaped the supervision of a physician friend from Lancaster who recognized him on the street, and the next day made his way to the home of another old friend. There he enjoyed a happy social evening of dinner and piano playing while his family was notified of his whereabouts. He did not awaken the next morning. He left behind a legacy of paintings, sculpture, music, and Schermania.

Miesse’s work Schermania was intended to be a product of and for popular culture. The lightness of the plot and music illustrate this. Family stories that have survived through the years confirm this. Gabriel and his cousin Charles, Schermania's librettist, were interested in producing both a well-written, serious musical work and a work of wide popular appeal, which they could sell to established producers for a profit. They chose the German dialect, perhaps to appeal to the large German population of
New York City. However, they were not successful in having the work produced, as recounted by Gabriel’s great-great grandson:

“When they took this to the New York opera houses and the producers of the time - this all of everything, master of neither - was the very thing that killed it. They were told that musically and thematically it was a very fine piece...BUT, because it was neither a totally serious piece (the upper class) nor a totally entertaining piece (the commoners) it would not be a financial success. In other words, they were told that although it was a very well done piece, their opera was neither here nor there thematically and therefore they [producers] would not risk financing it.” 83

Miesse lived in a time before radio, movies, and television, in a culture where live entertainment of all kinds was the norm. He lived in a town which held a prominent place in a developing country, with an active performance schedule filled by both professional touring groups and local productions. The picture of Miesse that emerges is that of a man trained in medicine as a profession, very well read, who participated in local government, and who also had a spiritual side. He was a typical multi-talented pre-Victorian generalist: a physician, surgeon, painter, sculptor, architect, musician, teacher, and composer.
Figure 2: Dr. Gabriel Miesse, 5 Years Before He Composed *Schermania*
CHAPTER 3 – SCHERMANIA IN AMERICA

An understanding of Miesse’s work *Schermania in America* should begin with an examination of the surviving documents to determine its scope and chronology of creation. This understanding will be further developed with an analysis of both its original material and its content as a burlesque of a similar, popular, period work.

*Schermania* is a musical/theatrical work, scored for full orchestra, with a complete libretto and a continuous plot. Set in Tacoma, Washington, and the surrounding Puget Sound area, *Schermania*’s basic plot is a well-known and common story of a daughter whose father demands that she marry someone of his choice, not hers, and the misadventures experienced before all ends well. Composer Gabriel Miesse describes it as “An Original American Comic and Burlesque Dialect Opera” on the title page of the score for Act I. Created by Americans with an American setting, it is clearly intended to be humorous, making frequent use of puns and satire. The term burlesque is used to mean a parody of a well-known play or performer done in song, dance, or dialogue. In some respects, inclusion of burlesque elements opposes the concept of originality; this will be examined further later in this chapter. The dialogue includes both vocal lyrics and spoken parts. Although lyrics predominate, both are written in a fractured German/American English dialect.

The Opera Documents

The original documents which constitute this work were passed down through generations of the descendants of Dr. Gabriel Miesse, Jr. They were brought to public attention in 2006 during a search for the local music heritage of Lancaster, Ohio, conducted jointly by The Lancaster Festival and by the Fairfield Heritage Association.
The document set consists of a number of hand-written and hand-scored "books," either bound with brass fasteners or hand-sewn. None of the material has been commercially printed. The music scores are in virtually unused condition, the libretti and especially the plot synopsis have some minor damage from age, use, or storage. During the research for this study, the author created high resolution digital scans of these documents and the originals were returned to the Miesse family descendants.87

Table 1 provides a list of the surviving documents in chronological order, with a summary of content and physical characteristics. The dates span a period of five years and indicate that several revisions took place. Most individual pieces are dated, and those that are not can be assigned a place in the chronology by careful examination of content and comparison to dated pieces. It is unknown if other versions or copies originally existed, but given the length of time that has passed and the fact that collaboration involving exchange of documents occurred, it is possible that some of the original documents have been lost. The last three items listed are assumed to be final versions of the opera: Although the music is hand-written, these score books are sewn with covers and each has a stamped title and copyright claim with the latest date of 1892. This date matches that of the U.S. Copyright Office claim letter for Schermania filed by Gabriel Miesse.88 The piano/vocal score, orchestra score, and instrument parts are complete, and could be used for any attempt at a production. The second surviving libretto (Pottsville), bound in a single book, is also assumed to be final.
Table 1: *Schermania in America* Surviving Documents

<table>
<thead>
<tr>
<th>Date</th>
<th>Document</th>
<th>Size</th>
<th>Content</th>
</tr>
</thead>
</table>
| 1887       | **Single Page** found in family album. Heading "Selection from my opera" / piano | 8" by 8"   | Act I, No. 4  
-Happy Peoples I Do Say"  
Not in final version                                                  |
| 1887       | **Overture** / piano      | 9" by 12"  | 7 pages                                                                                                                                  |
| 1887       | **Act II** / Piano-Vocal  | 9" by 12"  | pages 119-166. Contains some songs later omitted.                                                                                       |
| 1887       | **Act III Overture** / Piano | 10" by 14" | pages 167-175                                                                                                                            |
| Feb 1889   | **Overture** / Orchestra  | 10" by 14" | same composition as 1887 piano Overture (not act III Ovrt)                                                                            |
| Feb 1889   | **Overture** / Parts      | 10" by 14" | (oboe, bassoon parts missing)                                                                                                           |
| 1888-1889  | **Early Libretto**        | 8" by 17"  | 113 pages in 4 books (not by Act)                                                                                                        |
| Jan 1890   | **Plot Synopsis**         | 8" by 12"  | 29 pages                                                                                                                                |
|            | Handwritten and signed at the end "Written at Hamburg, Pa. Charles Miesse, Librettist" |           | page 27 and 28 are missing                                                                                                              |
| N/D        | **Libretto** *            | 8" by 17"  | 125 pages                                                                                                                                 |
|            | Handwritten and signed at the end "Librettist Charles Miesse, Pottsville, Pa" |           |                                                                                                                                 |
| N/D        | **Piano / Vocal Score**   | 10" by 14" | 1 volume containing all 4 Acts same composition as final versions                                                                      |
| N/D        | **Act II, III / Orchestra** | 10" by 14" | same composition as final versions                                                                                                         |
| 1892       | **Orchestral Score** *    | 10" by 14" | 4 volumes - 1 per act                                                                                                                    |
|            | Scored in the hand of Dr. Gabriel Miesse, Jr. |           | Act I - 30 pg Ovrt, 74 pages  
Act II - 73 pages  
Act III - 70 pages  
Act IV - 65 pages                                                  |
| 1892       | **Piano / Vocal Score** * | 10" by 14" | 4 volumes - 1 per act                                                                                                                    |
|            | Scored in the hand of Dr. Gabriel Miesse, Jr. |           | Act I - 39 pages  
Act II - 34 pages  
Act III - 57 pages  
Act IV - 38 pages                                                  |
| 1892       | **Parts** *               | 10" by 14" | Piccolo(D Maj), Flute                                                                                                                    |
|            | Spelling given here is as printed on each part. Scored in the hand of Dr. Gabriel Miesse, Jr. |           | Clarinet 1st, Clarinet 2nd  
Oboe, Bassoon  
Cornet 1st (Bb), Cornet 2nd (Bb)  
French Horn 1st, French Horn 2nd  
Trombone  
Drums (includes Timpany)  
Violin 1st, Violin 2nd  
Viola, Violoncelo, Basso  
Piano |
**Manuscript Samples**

Figure 3 shows a sample of the writing style and format of the libretto. Figure 4 is a sample of the plot synopsis. Interestingly, the title character’s name is misspelled in the plot synopsis heading, although occurrences in the text are spelled correctly.

![Figure 3: Writing Sample of the Final Libretto](image)

![Figure 4: Sample of the Plot Synopsis](image)
Figure 5 is an example of a score cover: The writing is a combination of stamped, for the act number and name of the booklet, and hand drawn description and claim of authorship and copyright.
The instrumentation in the orchestra score is laid out in traditional order: beginning at the top of each page - woodwinds, brass, percussion, strings, and piano (not present for all songs). When present, vocal lines are added between the percussion and strings, although lyrics are not included. On some pages, the ink of the noteheads has adhered to the facing page and care must be taken to interpret intended pitch. Figure 6 is an example of a few measures from the string section. Miesse uses an interesting form of the C clef for the viola staff, where the central crossed lines indicate the C pitch. This same clef is also used for the tenor vocal staff (see Figure 7 below), where the notes clearly correspond to the traditional written tenor clef, indicating an octave lower than the G clef pitch when sung.

![Sample Music Notation Style](image)

*Figure 6: Sample Music Notation Style*  

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The vocal score includes a piano part which is a reduction of the full orchestration. Lines for the four-part chorus are sometimes written out individually, and sometimes combined with soprano/alto on one staff and tenor/bass on another. Soloist lines are almost always written out on an individual staff. Minor stage directions are noted, although dialogue indicated in the libretto is not written in. Figure 7 is an example of a few bars of the SATB chorus.

Figure 7: Sample Vocal Notation Style 93
Chronology and Collaboration

Examination of these documents, particularly the details and notes in the earlier libretto (1888-1889), can reveal much about the collaboration between the two cousins and leads to the following scenario for the evolution of the work. Sometime prior to 1887, the cousins began their collaboration. All of the music that remains from this early period is for piano or voice only. Gabriel Miesse had written and published many piano and choral pieces prior to this time, and was well-known as a pianist and composer. Although no other orchestra works created by him are known, he later scored at least one of his marches for brass band, and these parts have survived. A single manuscript page preserved apart from the other Schermania music in a family album gives an indication that he had been composing for Schermania in 1887. The page is titled “Selections from My Opera” and is a version of an Act I song that was later dropped. The lyrics are not written in the German dialect of the later vocal score: perhaps this was composed before the first libretto had been written.

In other 1887 music, Miesse wrote two overtures, one intended for the beginning of the production, and one titled Act III Overture presumably intended to be played after an intermission between Acts II and III. The page numbers of the early Act II score (paged 119-166) seem to show that he wrote a complete piano/vocal score at this time, although only the 1887 Act II book survives. A hand-written note on the last page of this book leads us to believe that Gabriel visited Charles, taking at least some of the music with him: “Left at home the overture, pg 167-175.” This refers to the Act III overture, paged as stated above, and also dated 1887. Lyrics are included in this Act II
piano score, although no version of the libretto (which would have included lyrics), clearly dated 1887, survives.

There are two complete libretti, the “first”, so named because many items in it are crossed out and do not appear in the final version, has a copyright claim of 1889. There are four separately bound sections, and a note written after a section of Act IV is dated January 24/88. The libretto cover page for the first section containing this date is of a slightly different, cleaner, paper stock imprinted “J. B. Lippencott Company, Booksellers and Stationers, Philadelphia, Pa.”, indicating that the cover may have been added after it was completed. The libretto may be further dated by reference to an Ohio Eagle newspaper article of January 5, 1888, which discusses the creation of the “new and novel opera” and its “nearly complete” libretto. Under his signature at the end of the fourth book, Charles writes his location as Pottsville, Pennsylvania. It seems probable that there was an earlier libretto draft, which Gabriel would likely have used to create the first set of piano music and lyrics: A note penciled in next to the Act III opening song (this song is crossed out) reads “see old book for waltz”. A note on the opposite margin reads “This waltz should be with nice effect, something charming arranged in the four parts Soprano Tenors, Basses. C. M.” It seems as if Charles wanted to change the Act III opening song back to an earlier waltz.

This 1889 libretto seems to have been used as a collaborative tool, where songs were cut and changes made. Both men were contributing ideas for the plot, songs, and lyrics. Quite a few songs are crossed out and notes are penciled in throughout this early libretto. Comments and messages from Charles to Gabriel appear at several places in the text. From these comments it can be deduced that Charles wrote the libretto in
installments, and sent it on to Gabriel with advice about matching his music to it:

“Gabe: Arrange above for respective parts” “supply new song, better adaptation” in Act II “This was corrected in your music book when here” or, the extended note at the end of Act II:

“Gabriel: Be careful to avoid unison unless it is so specified or your judgement (sic) dictates it. You can lengthen by repetition wherever it would be effective to suit your fancy, or compositions. I have tried to suggest long holds by long parallel (sic) lines or shorter. This must be for you to determine. The word crag I spelt with two g’s by mistake please correct in every case. I have determined to change the Title to simply “Schermania.” It was well suggested to me to avoid semblance (sic) to The Little Tycoon; and this simple name is far more refined and catching: Besides fresher and novel: For instance, Schermania in America. Prelude to Emmett’s Fritz in Germany” (signed) Chas Meisse” 97

The original title of this libretto was written as The Little Teuton and was crossed out and replaced by Schermania added underneath. Charles’ reference to The Little Tycoon and how it relates to Schermania in America, will be discussed in more detail later. Charles also seems to have had some thoughts about having this libretto published: Next to the second song in Act III he added “Note: ‘Cot’ means Katarina and should be abbreviated as ‘Kat’ Printer correct same”.

Another change made in this version was the reduction of the role of a character named Budwise. He was originally given several songs, which were reassigned to other characters. He is listed in the final libretto, but only has a minor part. It may be that Charles had concerns, or may have been advised not to use the beer brand name for the same reason that he decided to avoid close resemblance to The Little Tycoon title. Although the original United States copyright statute was written in 1790, there had been 12 additional copyright acts through 1870, and amendments concerning international copyright in 1891.98
Comments continue in the last two acts: Next to an Act III song: “Jowest’ enterence (sic) was marked in your music book, this song having been changed to solo and duo C. M.” At the end of Act III: “Gabriel, By this time you will have become familiar with all the characters and their parts, and, will at once concieve (sic) that the voices should be put to their respective parts whenever it is not so indicated, I must of course depend on you for this as you will understand it all no doubt. C. M.” Early in Act IV: “Short musical interlude catching up the following music to Johannas Garden song which should be sweet and beautiful, something that will make a lasting impression, cease when Johannas enters and walks across the stage to front, softly diminishing to fine!” Continuing in Act IV: “Charlie, for this duo change words to “Oh my Jowest” or adapt its words as it suits the occasion admirably and theme song close G. M.” After guests arrive in Act IV for the grand reception: “Gabriel, here will follow chorus I am writing as directed in your last letter of 10 verses. More Anon! Faithfully, Charles Miesse, Librettist January 24/88” and on those following pages: “Dear cousin: having sent you the closing songs to same last time I now send you the libretto complete: conclusion of 4th Act.” And at the end of Act IV: “N. B. Careful note must be taken of all the speaking and acting parts, both in music and out of it and proper time allowed for the workers and singers to get in their acting, notice song of “Love in two Roses” 4th act + other parts of singing and acting combined, music must be accordingly! Nothing else will do. C. M.”

The Act IV note dated January 1888 seems to indicate that they worked on this version for at least two years: The title page of this set is dated by the copyright claim of 1889. Also in 1889, the 1887 overture was orchestrated by Gabriel Miesse. However, this was not the overture included in the final 1892 orchestra score. By the following
year, a plot synopsis was complete, signed and dated 1890 by Charles Miesse at Hamburg, Pennsylvania. The synopsis contains some conversations and information not included in the libretto as well as some written out song lyrics.

By 1890 they had a libretto, plot synopsis, probably a full piano/vocal score, and an orchestrated overture. This would have been sufficient to audition the work for potential producers, and stories passed down in the family seem to indicate that they did this. If there was any indication or promise of production, the four Act orchestration would have to be completed. By 1892, Gabriel Miesse had finished two complete sets (four Acts, each act in one book) of scores, one piano/vocal set and one fully orchestrated. The overture included at the beginning of this final version is nearly identical to the 1887 Act III overture, and the first orchestrated overture (1889) does not appear. There is no 1892 Act III overture. A full set of parts was also created, one book for each instrument, and another libretto was completed sometime after 1889 and before 1892. Even this later libretto has a few songs crossed out, which were not orchestrated in the 1892 scores, indicating that they were still fine tuning the book while the music was being composed.

No record has yet been found of any public performances of Schermania in America. Speaking of the nearly complete libretto, the 1888 Ohio Eagle article indicates that “several of the most competent critics... pronounce it a great success.” However, the stories passed down in the family seem to indicate that it was not accepted by any “big city” producers of New York or Philadelphia. The instrument parts show no signs that they were ever used: there are no rehearsal markings that would have been made by the performers.
Content Analysis

A comparison of the content of the later libretto, 1890 plot synopsis, and 1892 scores reveals inconsistencies which indicate that some details were never completely worked through. This may be another indication that no performances took place. It is possible that there are missing notes or other documents; however, this study must proceed using the material that has survived. These inconsistencies and missing details also make it difficult to determine exactly what constitutes the work as intended by its creators, and fall into two basic categories: songs in the libretto which were not set to music in the score; conversations or events, which seem to be important to the plot, which are referred to in the plot synopsis but are not written out in the libretto.

The libretto is quite long, and a four act musical production was unusual in length for this period. Even in the 1889 libretto, Charles seems to have been aware that the book could be too long. He wrote in ink in the margin next to an Act II song “This song may be omitted if pressed for time.” This song was crossed out in pencil and not scored. It is possible that the other songs crossed out of the final libretto resulted from a consultation between the cousins about this length problem after the libretto was completed: The original work was done in ink, while some of the deletions are made in pencil (presumably later). There are occasional penciled comments next to these songs of “abandoned song,” although no reason is ever noted. In some cases, it seems surprising that some songs which contain important plot elements have been removed.

Seventy-three musical selections (including recitatives and songs for solo, duet, ensembles, and chorus) are written in the libretto and twenty-eight were not set to music in the score. Five of these selections are actually crossed out of the libretto itself:
At the end of Act II, one which restates the fact that a fight is to take place, and one which is a repeat of the opening chorus; In Act III, a solo which is part of series of songs and dances celebrating the new park; In Act IV, two which might be considered a little too directly influenced by the successful, contemporary *The Little Tycoon* (See pp 72-90). Of the remainder not scored, four have a fairly strong German feeling, twelve are somewhat diversionary, either comically or repeating plot elements, and seven seem to be somewhat important to the plot development. A summary of the scored and unscored numbers is included in appendix C.

Because of the inconsistencies between the documents, it is difficult to know exactly what constitutes the “real” *Schermania*. A compilation which attempts to maintain the spirit and intent of its creators as closely as possible has been made from a combination of information from the libretto, the music scores and the plot synopsis, using the following guidelines:

1. Selections set to music in the score are retained.
2. Stage directions and speech marked as dialog in the libretto are retained.
3. Selections which are not set to music are not included as songs, although some material judged as important to the plot has been retained as dialogue.
4. Conversations appearing only in the plot synopsis are referred to at appropriate locations, but such conversations are not written out as actual dialogue.

Since all of the scored work is included, an effective way to present such a combined version is to intersperse dialogue and other material with pages of the
piano/vocal score. This type of presentation is similar to other American published comic opera scores of the period (including *Tycoon*). The combined version has been completed as part of this study.

**Plot Features and Influences**

**Dialect**

The plot of *Schermania* was described by its librettist as "a sort of assimilation of Joseph K. Emmett’s *Fritz in Ireland*, and is composed in a similar dialect," in an 1888 (four years before completion) article in the *Ohio Eagle*, reprinted from the Milton, PA., *Argus*. (refer to chapter 1, page 31 for information on *Fritz*). Charles Miesse, *Schermania*'s librettist, had published other serious works, including the book *Points on Coal and the Coal Business* in 1887 and was known for his skill as a writer of phonetic dialect in several languages. All of the lyrics and dialogue of *Schermania* are written in a German dialect, except that of an Irish servant, which is Irish dialect.

The Miesse family retained connection with and pride in their German ancestry. *Schermania*'s creators could also have chosen the fractured German dialect and German plot elements because they felt it was a key to eventual success in attracting backing from producers, especially in New York City, with its large ethnic German population. American sentiment towards German immigrants in the late 19th century was typically positive. Many cities had nearly self-contained German quarters of schools, churches, German-speaking merchants, and saloons. Germans had a reputation for thrift, honesty, and orderly living, and their habit of Sunday beer-drinking and relaxation had began to have its influence on America’s recreational habits. It wasn’t until the early 20th century that the political situation in Europe provoked outward anti-German feelings.
The role that dialect songs played in American folk music and some particulars of the German dialect often used is discussed in a recent essay by University of Wisconsin scholar James Leary:

"In Dutch [for Deutsch, or German] dialect songs, to cite prominent examples of pronunciation only, certain English sounds are invariably rendered in their German equivalent: “w” becomes “v” (e.g. “ve,” “vell,” “vas”), “th” becomes “d” (“dat,” “dose,” “dere”), “s” becomes “sch” (“schtyle,” “schmelt,” “schtick”), and “j” becomes “ch” or “sh” (“chust,” “chumped,” “cholly”). The English of “foreign”-inflected dialect songs is often infused with residual words and phrases from the old country. In Dutch dialect songs, the predominant holdovers from the German language are words that nearly match their English equivalents in meaning, sound, and spelling: “mein” (mine), “bin” (been), “alt” (old), “mit” (with), “du” (you), “und” (and), “bier” (beer), and so on. Such exclamations or intensifiers as “Ach!” and “Ja!” (rendered “Ya!” or “Yah!”) often carry over, as do loan words like “sauerkraut” and “wurst.” …. While the speech in dialect songs often closely resembles the creolized everyday speech of bilingual immigrants, it is nonetheless heightened, theatricalized, exaggerated, put-on. … As such, they are signs of cultural experiences and identity, past and present. Among German Americans, their duration is especially extended in areas where peoples of German descent settled in sufficient numbers to establish and sustain an evolving ethnic American way of life. … As musical performances, many dialect songs rely on the folk tunes and old time instrumentation of the featured cultural group. Perhaps as many, however, rely on the popular music of the day. From their widespread proliferation in nineteenth century America to their lesser but nonetheless steadfast presence in the twenty-first century, dialect songs have embodied the contemporary sounds of succeeding eras.” 104

A comment written in Act I of Schermina’s libretto indicates that there was awareness of and consideration of the ethnicity of the audience. The content of the show might be altered to accommodate a more or less German crowd:

“One of the tenors, or sopranos, may here introduce a solo. ‘Embarrassment’ ‘I feign a winning tale would tell thee, etc’ would be appropriate, which could be changed according to the predominance of German in the audience to German or English. ‘Balthaser deich’ should be substituted.” 105

The first song referred to is Embarrassment, originally written and composed by Prussian-born Franz Abt. A musical theatre conductor and prolific composer of songs in Europe, Abt visited the United States in 1872 as a guest of several singing societies.
Embarrassment was very popular in translation in America at the time Schermania was written. No details are available for the second reference, assumed to be a song title, Balthaser deich. Perhaps they considered using these songs to help the audience connect better with the plot and characters. Seemingly contradictory to this is that although some songs remain in the Schermania score with references to Germany and Teutonic pride, four were not set to music, and the German dialect of the libretto lyrics was also toned down in the vocal score.  

Burlesque

Miesse’s use of the term “burlesque” on the Act I score cover page is the first indication that parts of Schermania are meant to be parodies of a well-known play(s) of the time. Satire, parody, and burlesque are terms that seemed to have been used almost interchangeably in the 19th century. The creation of works based on and making light of well-known pieces was a quite common and accepted practice. This included theatre and poetry, where editor Walter Hamilton compiled six volumes of contemporary parodies based on English and American poetry during the late 1880’s. In introducing one of these volumes, Hamilton quotes Lord Jeffrey’s reflections on the well developed and respected art of imitation and mimicry (Lord Jeffrey was an editor of the Edinburgh Review early in the 19th century):

"There is no talent so universally entertaining as that of mimickry, even when it is confined to the lively imitation of the air, manner, and external deportment of ordinary individuals ... It is another matter, however, to be able to borrow the diction and manner of a celebrated writer to express sentiments like his own - to write as he would have written ... To do this in all the perfection of which it is capable, requires talents, perhaps, not inferior to those of the original on whom they are employed - together with a faculty of observation, and a dexterity of application, which that original might not always possess".
The successful musical theatre of the decade prior to *Schermania* was typically English comic opera and Viennese operetta, and the style of *Schermania* can be seen to have much in common with Gilbert and Sullivan’s early works *HMS Pinafore* and *Mikado*. In fact, *Schermania*’s plot shares many elements with Spenser’s *The Little Tycoon*, and this is intentional and clearly indicated: The original title in the early libretto was *The Little Teuton* and was changed upon advice to avoid semblance to Tycoon. In the *Schermania* libretto, a description of a heel and toe dance step is written as “behind all in close order like Dolphin and Teddy in Tycoon” and “Both dancing imitation of Lord Dolphin and Teddy like.” Charles Miesse’s home in Pottsville was near Philadelphia, where *Tycoon* premiered, and he certainly must have seen it to make this reference. Figure 8 is from a set of promotional photo cards for The Little Tycoon showing the Lord Dolphin and Teddy characters in this dance posture.

![Figure 8: Lord Dolphin and Teddy, “Heel and Toe”](image)
In fact, the original production of *The Little Tycoon* has another interesting connection to Gabriel Miesse’s Lancaster: The second male lead, a character named Alvin Barry, was played by a Lancaster native, Will S. Rising.

Rising was a tenor who had studied law, but soon left it for vocal training in New York and Italy and a career in both grand and comic opera, in the United States and Europe. He toured with the *Tycoon* company for a short time, then briefly formed his own opera company before returning to his *Tycoon* role in Philadelphia. His family was well known in Lancaster: His father, Phillip Rising, was a wealthy banker, railroad promoter, and businessman, best remembered for his purchase and donation to the city of the glacial sandstone Mt. Pleasant and the surrounding land, today known as Rising Park. It is very likely that Gabriel Miesse knew or knew of Will Rising: Rising was nephew to Miesse’s one-time student Richard Outcault, who was also working in Cincinnati at the same time as Miesse’s son Ed was attending the Cincinnati School of Music. Will Rising returned to Lancaster during the summer of 1887, as the “local boy made good,” a noted guest at dinners and parties. He also organized and participated in a concert held to benefit the local library on July 12th. This concert was held at Lancaster’s Chestnut Street Opera House, and included at least two songs from *The Little Tycoon*. It is possible that Gabriel Miesse attended this concert, and the timing makes it concurrent with the earliest known work either Gabriel or Charles Miesse created for *Schermania*. 111

So, at the time they began creating *Schermania*, both Charles and Gabriel had opportunities to see and hear *The Little Tycoon*. It is also possible that Gabriel Miesse could have obtained a copy of the widely published piano/vocal score. 112 A close
examination of the two works will show that they created a unique piece which burlesqued many Tycoon elements, but contained a fair amount of new and original material as well.

_Schermania in America_’s basic plot is the story of General Scheutzenfest and his daughter, Schermania. The General has chosen a young man for her husband, but she loves another. After two contests between the rivals meant to settle the matter both end inconclusively, Schermania elopes with her choice, a young beer-fortune heir, Jowest. In order to mend feelings with her father, the pair return disguised as Japanese royalty and convince/command him that they belong together.

Because _Schermania_ is an unknown and unpublished work, and in order to describe relationships with _The Little Tycoon_, a detailed summary of the plot of _Schermania in America_, created by the author, is now presented:

**Introduction:**

_General Scheutzenfest, a widower, and his daughter Schermania have emigrated from Berlin, Germany and settled in Tacoma Washington. With them are Katarina Limburger and her son Johannas (about the same age as Schermania). Katarina has served as Schermania’s governess for many years. The General is well thought of by all of his friends and business associates, having maintained the philosophy of ‘the ancient order of the Knights Hospitalers’, from which his family descended. Schermania shares those qualities, and is known among her many friends for her kindness and patience. A young woman from Germany, Delightful Sauerkraut, has recently arrived and become a friend and companion for Schermania. These five live at the General’s villa along with valet Budwise, special servant Irishman Halahan, and are often visited by the General’s good friend and private physician, Doctor Federgoose. Also often visiting the villa is young Balthaser Jowest, who inherited the family brewery and great fortune upon the death of his father._

_Jowest is using his wealth to create a new park across Puget Sound from Seattle, and over the course of time has developed a great affection for Schermania, which she reciprocates. His feelings for Schermania are discovered and not welcomed by the General, and Jowest is no longer welcome at the villa. The General’s affectionate feelings for his daughter’s governess have prompted_
him to consider marriage, and in order to keep the family together, he feels that her son Johannas is a better match for Schermania. Despite efforts of Jowest and Schermania to persuade him to change his mind, he does not. Shortly before the park’s completion and dedication, Jowest has enlisted the help of his friend Hans Wylic, to devise and execute a scheme to allow Jowest and Schermania to be together. Wylic has bought the cooperation of Delightful and the servants of the villa, who are to appear to agree with the General, but will really support Jowest’s plans. Hans also has cooperation from Three Leading Brewers of the city, and Louisa, queen of the Turner Maidens. The General is oblivious to the scheme, and believes he is surrounded by people who agree with him that Johanna’s, and not Jowest, is the right man for his daughter.

Part of the scheme involves enlisting the cooperation of a reliable Indian from the nearby reservation named Gobbledem. The chief was to place his hut and nearby cliff at the ready and disposal of Wylic as a hiding place for Schermania, and to constantly be ready for a signal to execute this plan at any moment. If Gobbledem would execute all of his part without uttering anything but the syllable “Me”, he would be paid an additional bonus.

The Operetta Begins:

The dedication of the park was to take place in a two day celebration, the first a public celebration, which all attended. The operetta begins with the private ceremonies of the second day, which include hunting, sports, frolic in the park, and an evening ‘grandly illuminated’ ball, beginning in the morning with singing and an exhibition by the Turner maidens. That second morning, the General and his daughter have not returned, and Hans fears that his scheme is doomed. The conspirators confer, and decide to send Delightful to pacify the General so that he would return. As she is about to leave, Delightful meets Schermania, who has ‘escaped’ from the villa because she knows the scheme to unite her with Jowest cannot work if she is not present at the celebration. The group knows they will have to alter their plans slightly, and anticipate the General’s imminent arrival in search of his daughter. They also know that the General’s superstitious habit of announcing his arrival with a shrill whistle will give them the opportunity to celebrate until the last minute, when they will begin the first step in the plan. This is a call to chief Gobbledem, who is hiding nearby and will come to escort Schermania and hide her safely away at his hut.

The General arrives in a rage, but after arguments with those present, is finally apparently convinced that the group knows nothing of her whereabouts. He retains his private suspicions and resolves to look for himself during the day’s outdoor activities. It is discovered that the General had plans for a private search and has also brought materials to bargain with Indians. Warning is sent to Gobbledem to be prepared for meeting the General, to attempt to scare him off, and to be sure and conceal Schermania. The General goes off with two of the party, who are actually conspirators of Wylic’s. Jowest and Wylic alter the plan so
that they will find the General at Gobbledem’s hut, reveal Schermania to him, and convince him to allow the winner of a boxing match between Jowest and Johannas to take her hand.

The second Act opens at Gobbledem’s hut, where Schermania is sleeping inside when the General’s whistle is heard. The chief helps her to a hiding place on a rocky crag just before the General arrives. The chief frightens the General, who then attempts to win his cooperation with whiskey and gifts. Chief takes him away from the crag, calling other braves to drink the whiskey and promises to help the General find Schermania. Wylic comes and speaks to her in her hiding place, promising to send Jowest. Jowest arrives with the chief, who collapses (drunk) before revealing the exact hiding place. They meet, and Jowest hides with her while the General returns with some friends. Wylics’ conspirators enter, disguised as Indians, and convince the General to agree to the contest for his daughter between Johannas and Jowest. Once he agrees, they all remove their disguises, and join together in song before the battle. Unfortunately, the match ends in a draw and they all return, disappointed, to the park.

Act III begins with the grandly illuminated night at Jowest Park and a round of singing and dancing. Katarina arrives as the group is dancing in celebration. She describes the difficulties she has had getting there in the slippery mud, and presents some songs she has composed for the occasion. While the group moves off, Schermania and Hans review events, resolving to get Katarina and the General together, and to revise the scheme to unite her with Jowest. Hans leaves and Jowest arrives. They embrace and are discovered by the General, the trio each restate their position in song. Katarina and the whole company re-enter and distract the General, allowing Jowest and Schermania to escape his further judgment. All discuss Schermania, the company giving the General a hard time, and the General insisting that he will protect her and choose for her. The Three leading Brewers, whose arrival has been anticipated, are sighted by Gobbledem. They are cooperative with Wylic’s scheme, are powerful and greatly respected figures, and are asked to suggest a solution: they decide that a duel with swords should settle it. After a joking fake sword fight between Gobbledem and Budwise, the true combatants begin, but are stopped by an emotional Schermania, who was not aware of this latest twist of the plot. With plans foiled again, the company prepares to retire. Before they leave, the General invites everyone to his villa for a grand reception, which all, including Jowest, promise to attend. Hans, Jowest, and Schermania agree upon new plans, and discharge Gobbledem from further obligation.

In Act IV, Doctor Federgoose arrives at the General’s villa the day before the grand reception, let in by two maids. He and the General talk, and have a little wine. They are flirting with the maids, and just as they are ready to kiss, Delightful enters, picking up on the activity and taunting the old men, all leave. Johannas enters, reminiscing about his father, and recalls his mother’s garden in song. That night, Jowest and some of his conspirators arrive at the villa secretly,
by yacht. Jowest pays Halahan to keep watch over the following: Jowest walks to Schermania’s window, she climbs down, and they elope, leaving on the yacht. Schermania has left a note for her father, explaining her absence by saying that she has gone out early to the costumers, and other errands, and could not possibly be back until the reception. He believes it.

The morning of the reception, the servant Halahan has his solo song where he describes his duties. This includes his observations of the elopement, and his decision to keep the secret, in part because he’s been paid by Jowest. He also recounts these events, somehow shifting the action from people to cats, perhaps as a way for him to discuss things with the General without giving away the secret. He and the General talk about the activities of the night before, Halahan attributing it all to the cats, not wanting to reveal the elopement, but also not wanting to lie to the General and lose his job. The General does not like cats, and they talk about having a cat war to keep them off of the grounds. As they leave, Johannas and Delightful enter. She wants to capture his heart, and they talk about tomatoes and turnips, with some wordplay about love, smashing a tomato and what will turn-up with a tail. It is clear that they have won each other’s hearts.

As the General prepares for the reception, he tries to think of a way to explain Schermania’s absence (thinking she has gone to the ‘customs house’, not the costumers). During the beginnings of the reception, the Turner maidens’ dance, Budwise is a little drunk, and the guests send a tray full of visiting cards up to the General. Budwise and Halahan are sent out to scare off the cats, a shot is heard creating excitement and confusion, and one of the guests gives away the elopement, causing the General to faint. He revives, more shots are heard outside, when Jowest and Schermania, unconscious and in costume of Japanese are brought in. Halahan explains that they were mistaken for cats because of their hair queues, and were frightened by the shots. The company exclaims about the strangeness of these two, a document is brought out introducing them as the Mogal and Mogalla, rulers of Japan. Realizing that the two had apparently been frightened in the yard by gun shots and fainted, the company realizes they must apologize to avoid a diplomatic crisis. Halahan acts as interpreter, using gibberish talk to explain to the revived couple. Just as the couple is paying tribute to the ‘famous’ General and commanding the General to marry Katarina, they reveal their identity, and also ask to be allowed to marry. The General finally consents, once Johannas and Delightful say they also want to marry. So, all three couples will marry, and the entire company is very happy.

The following plot summary of The Little Tycoon from Bordman’s Chronicle of American Theatre will be helpful in understanding its connections to Schermania.
Bordman also points out that Spenser's plot for *Tycoon* resembled that of an earlier work, *The Bourgeois Gentleman*.

“General Knickerbocker and his daughter, Violet, are returning from Europe accompanied by the famous nobleman whom Knickerbocker has selected to be his daughter's husband, Lord Dolphin. But Violet's heart is given to Alvin. By no coincidence Alvin is on the same crossing. Lest Alvin and Violet meet, the General has his daughter locked in her cabin. Violet's lady friends obtain a passkey to free her. Furious, the General announces his daughter will wed the lord immediately upon their return to Newport. However, once home, the General receives a letter from "His Royal Highness Sham, The Great Tycoon of Japan," announcing his imminent appearance at the Knickerbocker mansion. Overwhelmed by the potentate and the "craze for everything that's Japanese" (it was, after all, the year of The *Mikado*), the General forgoes his English favorite and presents his daughter to the monarch. Of course, the Tycoon is merely Alvin in disguise. Lord Dolphin's domineering mama, the Marchioness of Pullhimback, angrily hurries off with her milquetoast son. The music, lyrics, and dialogue were simple, almost to the point of being puerile. Much of the humor came from outrageous puns. The General entertains the Tycoon by singing "The Cats On Our Back Fence":

Oh! the cats on our back fence! / Politicians they of sense.  
Win they with cooperation, / With con-catty, ratty-oscination.

The Tycoon requests the General sing some more. Flattered, the General is soon at the monarch's beck and call:

GEN. KNICKERBOCKER: Any other request the Great Tycoon can make I pledge myself to grant.  
LORD DOLPHIN: Oh, ah!  
ALVIN: Show-im-up, tight squeak.  ki-yi; Choke-imoph Tycoon yah-yah, ki-yi! Chum-yah, boojumsnark hop-scotch Tycoonee,-yum yum.  
GEN. KNICKERBOCKER: Yes, I understand. You have my unqualified consent, your majesty. *(To Rufus)* But what does he say?  
RUFUS: Great Tycoon ask for hand of General Knickerbocker's beautiful daughter.  
LORD DOLPHIN: *(In consternation)* Oh, ah!  
GEN. KNICKERBOCKER: I swoon! How very unfortunate! My daughter's hand is promised to Lord Dolphin.  
LORD DOLPHIN: *(Despairingly)* Oh, ah!  
GEN. KNICKERBOCKER: But hold. Never was there such a craze for everything that's Japanese. She's yours.  
LORD DOLPHIN: *(Despairingly)* Oh. ah!

Dolphin's two monosyllables were his only sounds throughout the work. With Alvin and Violet hand in hand the company reprised the little waltz that was the most popular melody in the show, 'Love Comes Like A Summer Sigh.' “113
For the burlesque to be successful, *Schermania* had to use enough *Tycoon* material to be recognizable to the audience and apply exaggeration and imitation to incorporate it in an entertaining way. The plot elements which *Schermania* shares with *The Little Tycoon* (although many are also typical of the period), are as follows:

- The basic plot of the parent who chooses a spouse for his child when the child loves another.
- Unusual character names: Delightful Sauerkraut, Dr. Federgoose, the servant Budwise. This practice was fairly typical of musical theatre of the period, including works by Gilbert and Sullivan.
- A character who says only one phrase throughout: Chief Gobbledem (“Me”) like *Tycoon’s* Lord Dolphin (“Oh, Ah”).
- The heel and toe dancing of the General and Chief Gobbledem is taken directly from *Tycoon*, although in *Tycoon* it is used throughout as a signature for Lord Dolphin. The libretto description of dancing to accompany Act II, number 1B *Out in the Back Yard* is: “Both dancing imitation of Lord Dolphin and Teddy like”; and later for number 4 *The Deuscher Militaire*: “behind all in close order like Dolphin and Teddy in Tycoon.”
- Hiding Schermania from her father in the crag compares with Violet hiding in Miss Hurricane’s room onboard the ship.
- Schermania uses the terms “Vesuvius” and “Diplomacy” almost as two opposing ideas in the 4th act, which may come from *Tycoon’s* Vesuvius song (Act I, number 3); one of the dancing maidens, Dolly, had fallen into Vesuvius while walking on the brink of the crater, and *Checkmated We*
(number 5, Act II); where diplomacy must be used to convince Knickerbocker to consent to the marriage of Alvin and Violet, and repeats that word “diplomacy” numerous times.

- The General comments on his daughter’s absence, presumably arranging for her costume, with “Never was there such a craze for customs dressing nowadays” which compares to the *Tycoon* phrase of “never was there such a craze for everything that’s Japanese,” used when General Knickerbocker relents and gives his daughter’s hand to the Alvin-in-disguise Great Tycoon.

- When General Scheuztenfest laments his daughter’s headstrong behavior, he uses the phrase “not like in Germany,” which compares closely to General Knickbocker’s use of the phrase of “when I was a boy” when his daughter Violet behaves in a like manner.

- There is a minor running pun/element in *Schermania* using “fly” which compares to running pun/element in *Tycoon* of sighting a “whale.”

- Sneezing in *Tycoon* vs coughing in *Schermania* to cover the meeting of the respective young couples. In *Schermania*, this leads to the song *You vas Consumptive*. In *Tycoon*, there is a dialogue song which the General begins with “Gentlemen you have bad colds I find.”

- To intimidate the General into accepting the outcome of the boxing match, the *Schermania* company enter disguised as Indians. In *Tycoon*, the “college tourists” on the ship enter as crazed hobgoblins from the hold to separate Violet and Alvin from General Knickerbocker.
- "Schermania’s Act IV and Tycoon’s Act I setting at the “General’s elegant villa.”
- During the Grand Reception, Scheutzenfest is bombarded with a hat full of visitation cards, which compares to the duplicate visitation cards introducing two Lord Dolphins at Knickbocker’s villa.
- Jowest and Schermania disguise themselves as Japanese royalty, so Scheutzenfest would feel obliged to consent to their request to marry, complete with official documents and interpretation of a “Japanese” nonsense language. This mirrors very closely the concluding scene from *Tycoon* and the entrance of Alvin disguised as “Sham, the great Tycoon of Japan.”

It is easy to speculate, but difficult to be sure, just how much material Schermania’s librettist meant to use or to mimic from *The Little Tycoon*. Some of the items described above could be intentional or coincidence. For example, the basic plot is so often used, including in *HMS Pinafore*, even from the time of Shakespeare, that it can’t be considered as an element unique to *Tycoon*. Since the Miesse cousins wanted to produce a financially successful work, it seems reasonable for them to start with a proven formula and adapt it to their own story ideas. The original title and references to the heel and toe dance are clear connections. *The Little Tycoon* had more performances than almost any musical theatre piece of its time, and was popular enough to have inspired several burlesques, including *The Little Fly Coon* in 1887. So Schermania was not unique in its mimicry of *Tycoon*. 
An examination of newspaper articles from some of the cities where *The Little Tycoon* touring company appeared, illustrates that many of the performances followed a typical practice of including topical songs and local material that were not part of the published score. The performances changed slightly over time and place. It is not possible to know exactly what material was added since written records were not generally made. In the early years at least, the tour was under the control of composer and librettist Willard Spenser, who also conducted the music. He must have permitted such minor additions of material. In one instance, when Spenser briefly left the tour, the actors reportedly gave a version that was completely “off-book” in an effort to freshen up the play, but quickly reverted to the original when he returned. 115

When *Tycoon* first played in New York, and moved from the Standard Theatre to the Fifth Avenue Theatre, it went complete with “new tunes in the libretto [which] please the public. Mr. Graham’s topical song is growing so fast that it will soon be big enough to walk.” 116 R. E. Graham was the original General Knickerbocker, wrote the song *Cawn’t do it Ye Know* and sang it as that character a year prior to the first performance of *Tycoon*. It was apparently used in many of the performances although it is not in Spenser’s published score. Will Rising sang another topical song, *Yammo*, for which he became very well-known and seems to have sung almost everywhere he went after *Tycoon*, until at least 1901. In 1888, two years after its premiere, “new songs have been introduced, much to the credit of the composer.” 117

The inclusion of topical material in some performances makes it difficult to know exactly what version of *The Little Tycoon* the Miesse cousins may have seen. A careful comparison of the songs in *The Little Tycoon* and *Schermania in America* (including
those not scored) shows that they probably were familiar with Graham’s topical song.

This examination also reveals the extent of the burlesque: A close correspondence can
be seen, on a song by song basis, of the plot development function of many tunes
through the first act and continuing less closely through the middle of the Second Act of
Schermania. After that point, the plots diverge, and only minor or coincidental matches
occur until the conclusion. Table 2 shows a comparison of the songs in these two operas
and how they can be connected. All of the songs written in Schermania’s libretto are
included in this comparison, even those not scored. Perhaps some of these were
dropped because they were too closely linked to well-known songs from Tycoon. If the
similar songs are compared as to musical form and structure, there are very few
similarities: The musical nature of Schermania’s songs appears to be original.
<table>
<thead>
<tr>
<th>Song Summary</th>
<th>Schermania Songs</th>
<th>Plot Development</th>
<th>Tycoon Songs</th>
<th>Song Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>whole company in a jolly mood, express general happiness at being in the park, enjoying the nearby sea and ships, good German fellowship.</td>
<td><strong>Overture</strong></td>
<td></td>
<td><strong>Overture</strong></td>
<td>company is happy to be at sea singing and dancing. steam power is better than sails</td>
</tr>
<tr>
<td>introduces the fly gag</td>
<td><strong>In The Park - Opening Chorus</strong></td>
<td>put beer on / put salt on it's tail</td>
<td>1. <strong>On the Sea - Opening Chorus</strong> dialogue</td>
<td>introduces the whale gag</td>
</tr>
<tr>
<td>Happy Germans Dancing</td>
<td><strong>You Will See What You Shall See</strong> happy dancing</td>
<td>2. <strong>We'll watch for the Whale</strong> watch for the whale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schermania asks Gods to consult her heart and let her marry Jowest</td>
<td><strong>O Ye Gods</strong> female enters, sings her unhappiness</td>
<td>4. <strong>Doomed am I to Marry a Lord</strong> Violet is at first resigned to marry Lord Dolphin, but then decides she cannot</td>
<td></td>
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<tr>
<td>They must convince the General</td>
<td><strong>Marked Recitative: Mine Gracious Here is a Perplexity</strong> group knows this should not be</td>
<td><strong>Marked Recitative: 5. Oh it is such an unheard of ...</strong> They should be able to convince the General that Alvin should marry Violet</td>
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<tr>
<td>Germans bragging, Kalamazoo, yodeling (in place of the repeated &quot;zoo zoo&quot;)</td>
<td><strong>For we Are Inherent Teutons</strong> Their 'man' should be good enough for her</td>
<td><strong>5a. For we're immensely High-toned</strong> frat boys, kalamazoo zoo zoo (this syllable repeated many times)</td>
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<tr>
<td>Schermania will hide on the reservation. Gobbledem arrives to escort her.</td>
<td><strong>Now to the Reservation</strong> the female will hide from her father</td>
<td><strong>6. We've A Scheme</strong> Violet sings then hides in Miss Hurricanes stateroom, and she will not marry Dolphin</td>
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<tr>
<td>Libretto lyrics refer to the summer sigh. Schermania will enjoy the solitude while hiding</td>
<td><strong>I'll Trust my Fate to Him</strong> Female solo about her love</td>
<td><strong>6a. Love Comes like a Summer Sigh</strong> This song was popular and had a life outside of the play.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2 Continued

<table>
<thead>
<tr>
<th>Schermania seems to have some doubt about Jowest's feelings</th>
<th>In my Heart</th>
<th>Generals enter, group coughs/sneezes to cover the exit of Schermania/Louisa</th>
<th>They're 'up to snuff' and sneeze as he enters</th>
</tr>
</thead>
<tbody>
<tr>
<td>all cough</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>They argue with, then calm the General with beer</td>
<td>You are Consumptive</td>
<td>Looking for Daughter</td>
<td>Dialogue Song</td>
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<tr>
<td></td>
<td>Said Heel</td>
<td></td>
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<tr>
<td>General will dance for now, but when he finds her, he will send her home</td>
<td>I am Here and She is There</td>
<td>He can't find her, so they dance</td>
<td>7. To Song and Dance</td>
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<td></td>
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<tr>
<td>in Germany, children obey (or are quieter about disobeying)</td>
<td>Not Like in Germany</td>
<td>Daughter would never have acted this way</td>
<td>7a. Now when I was a Boy</td>
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<td></td>
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<tr>
<td>Dance</td>
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<tr>
<td>Act 2 Begins</td>
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<td></td>
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<tr>
<td>Schermania hiding in chiefs hut hears her father approaching and chief hides her on the crag</td>
<td>O What is That I Hear</td>
<td>An Indian Hut</td>
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<td>very short, introduces next</td>
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<td></td>
<td></td>
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<tr>
<td>General offers chief trinkets</td>
<td>Here's Pipe and Here's Tobacco</td>
<td>General and Chief, Dolphin and Teddy Dance</td>
<td>7a. Heel and Toe We Always Go</td>
</tr>
<tr>
<td>Heel and Toe imitation of Dolphin and Teddy</td>
<td>Out in the Backyard</td>
<td>General and Chief, Dolphin and Teddy Dance</td>
<td>7a. Heel and Toe We Always Go</td>
</tr>
<tr>
<td>Gen'l and chief dance well</td>
<td>Both Done it Well</td>
<td>General and Chief, Dolphin and Teddy Dance</td>
<td>7a. Heel and Toe We Always Go</td>
</tr>
<tr>
<td>Marry your choice, even though Father objects</td>
<td>Don't Make a Mistake</td>
<td>General and Chief, Dolphin and Teddy Dance</td>
<td>7a. Heel and Toe We Always Go</td>
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<td>8. The Fatal Step</td>
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<tr>
<td>Schermania solo</td>
<td>O the Anxious Moments Suffered</td>
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<tr>
<td>Jowest solo</td>
<td>Tell Me oh ye Forests Stately</td>
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<tr>
<td>Duet</td>
<td>Love Like Thine and Mine</td>
<td>The couple sings solo, solo and duet</td>
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<td></td>
<td>The Deuscher Militaire</td>
<td>heel and toe dancing, entrance of company</td>
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<td>9. Dark Though My fate may be</td>
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<td></td>
<td></td>
<td>Violet and Alvin sing solo / duet</td>
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<td>dialogues Gen discovers Violet and Alvin</td>
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<td></td>
<td>instead of conquering the</td>
<td>General will search for Schermania</td>
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<tr>
<td></td>
<td>world, General will search for</td>
<td>I Conquered It</td>
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<td></td>
<td>Schermania</td>
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<td></td>
<td>Disguised company control the General</td>
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<td>10. Hobgoblin Dance and Chorus</td>
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<td></td>
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<td>College tourists disguised as hobgoblins from the hold</td>
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<td>11. Love Reigns</td>
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<td></td>
<td>Violet and Alvin duet</td>
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<td>13. Oh don’t you see how</td>
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<td></td>
<td>2 songs about problems with the customs officers</td>
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<td></td>
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<td>14. A lament</td>
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<td></td>
<td></td>
<td>lament about customs officials taking their possessions</td>
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<td></td>
<td></td>
<td>dialogue: General discovers Jowest and Schermania on the crag</td>
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<td></td>
<td></td>
<td>Schermania shouldn’t give herself away</td>
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<td></td>
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<td>The observation / A Teuton’s Daughter</td>
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<td></td>
<td></td>
<td>That was a Foolish Fly</td>
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<td>Don’t You Know Me</td>
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<td></td>
<td></td>
<td>Prizefight ends in draw</td>
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<td></td>
<td></td>
<td>Closing Chorus</td>
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<td></td>
<td>16. Closing Chorus</td>
<td></td>
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<tr>
<td>Combatants must fight</td>
<td>You vas do id you know</td>
<td>Graham’s topical song “Cawnt do it Ye Know” here?</td>
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<tr>
<td>repeat of opening chorus</td>
<td>Now to Park</td>
<td></td>
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<tr>
<td>Act 3 Begins</td>
<td>Act 2 Begins</td>
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<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
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<tr>
<td>opening waltz</td>
<td>Whirlpool</td>
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<tr>
<td>cheese and beer</td>
<td>O say!</td>
<td></td>
<td></td>
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<tr>
<td>Katarina Arrives</td>
<td>I was Glad To Come</td>
<td></td>
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<tr>
<td>Stones have ears puns with ‘stone’</td>
<td>I Never Saw a Stone Rejoice</td>
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<tr>
<td>cheese and beer</td>
<td>No 7a Speak Low, Walls have Ears</td>
<td></td>
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<tr>
<td>a fly on someone’s nose</td>
<td>Trip Tral</td>
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<tr>
<td>the contest failed</td>
<td>Our Plans are all Defeated Now</td>
<td></td>
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<tr>
<td>Schermania is sad, but Jowest enters and they realize there is still a cance for them</td>
<td>Why Should I Pine</td>
<td></td>
<td></td>
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<tr>
<td>female sings of sadness,</td>
<td>No 1. Sad Heart of Mine</td>
<td></td>
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<tr>
<td>Schermania happier</td>
<td>dialogue: Alvin disguised as Lord Dolphin, and Lord Dolphin appear</td>
<td></td>
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<tr>
<td>Will Violet ever get to marry Alvin?</td>
<td>Another duet of the couple, very much in character and phrasing like “Love like Thine”</td>
<td></td>
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</tr>
<tr>
<td>Neither the General or Jowest will give up</td>
<td>No. 2. To See Thee</td>
<td></td>
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<tr>
<td>Smelly shoes and news</td>
<td>General confronts the couple - Trio</td>
<td></td>
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<tr>
<td>Brewers boast about beer</td>
<td>No. 3 Oh! Destiny</td>
<td></td>
<td></td>
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<tr>
<td>company wants to tell brewers</td>
<td>Trio - Neither General or Alvin give in</td>
<td></td>
<td></td>
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<tr>
<td>they tell brewers the story</td>
<td>A Beatuous Maiden Fair and Free</td>
<td></td>
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<tr>
<td>Brewers decide what to do</td>
<td>Here is a Mess</td>
<td></td>
<td></td>
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<tr>
<td>Brewers decide what to do</td>
<td>Hello</td>
<td></td>
<td></td>
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<tr>
<td>Smelly shoes and news</td>
<td>Catch On</td>
<td></td>
<td></td>
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<tr>
<td>the contest failed</td>
<td>The Brewers Song</td>
<td></td>
<td></td>
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<tr>
<td>Brewers boast about beer</td>
<td>The Brewers Song</td>
<td></td>
<td></td>
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<tr>
<td>company wants to tell brewers</td>
<td>Such a Sophistication</td>
<td></td>
<td></td>
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<tr>
<td>they tell brewers the story</td>
<td>A Beatuous Maiden Fair and Free</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brewers decide what to do</td>
<td>Here is a Mess</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General and Schermania argue, she gives in</td>
<td><strong>I Have Control of thee Now</strong></td>
<td><strong>No. 4. Oh You Incense, You Madden Me!</strong></td>
<td>General not happy with Violet.</td>
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<tr>
<td><strong>No. 5. Checkmated We</strong></td>
<td></td>
<td></td>
<td>The plan fails, now they must invoke Diplomacy - this word repeated many times</td>
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<tr>
<td><strong>No. 6. Tell Me Daisy</strong></td>
<td></td>
<td></td>
<td>she asks the daisy petals if she will gain her love</td>
</tr>
<tr>
<td>Budwise and Gobbledem swordplay</td>
<td><strong>Schpare Ribs</strong></td>
<td></td>
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<tr>
<td>Budwise suggests that the combatants fake the duel</td>
<td><strong>So It Was</strong></td>
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<tr>
<td>company gives up the duel</td>
<td><strong>Let Peace Reign</strong></td>
<td></td>
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<tr>
<td><strong>Act 4 Begins</strong></td>
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<tr>
<td>Doc introduces himself</td>
<td><strong>I'm Doctor Federgoose</strong></td>
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<tr>
<td>song of fun flirting with maids</td>
<td><strong>Hoopla</strong></td>
<td></td>
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<tr>
<td>introduces Delightful</td>
<td><strong>Dialogue Song</strong></td>
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<tr>
<td>Delightful sings about herself</td>
<td><strong>Ha, Ha, Delightful</strong></td>
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<tr>
<td>Johann solo about the sweet garden</td>
<td><strong>In My Mothers Garden</strong></td>
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<tr>
<td>Lowest and friends sing of dreams</td>
<td><strong>The Serenade</strong></td>
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<tr>
<td>duet under the balcony</td>
<td><strong>The Elopement</strong></td>
<td></td>
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<tr>
<td>Halahan sings of his role in the scheme</td>
<td><strong>Halahans March and Song</strong></td>
<td><strong>Irish valet sings of himself</strong></td>
<td><strong>12.(Act 1) Valet's Song and Dance</strong></td>
</tr>
<tr>
<td>General urges Bud and Hal to get rid of the cats</td>
<td><strong>War on the Cats</strong></td>
<td><strong>cats!</strong></td>
<td><strong>No. 10. The Cats on Our Back Fence</strong></td>
</tr>
<tr>
<td>Gottlieb is worried to keep the secret</td>
<td><strong>What an Explosion It would Make</strong></td>
<td></td>
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<tr>
<td>Event Description</td>
<td>Song/Performance</td>
<td></td>
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<td>-----------------------------------------------------------------------------------</td>
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<td></td>
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<tr>
<td>Johann and Delightful realize they are in love</td>
<td>Love in Two Roses</td>
<td></td>
<td></td>
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<tr>
<td>The Turner maidens dance</td>
<td>Turner Waltz and Song</td>
<td></td>
<td></td>
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<tr>
<td>Anticipating the reception</td>
<td>The Reception</td>
<td></td>
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<tr>
<td>Budwise explains his drinking</td>
<td>His Toilet</td>
<td></td>
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<tr>
<td>General explains Schermania’s absence</td>
<td>But Let Her Alone</td>
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<tr>
<td>Guests reminisce about Germany then speak fake Japanese about what is to come</td>
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<tr>
<td>Shots are heard in the yard</td>
<td>The Fright</td>
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<tr>
<td>Gottlieb reveals the elopement</td>
<td>The Revalation</td>
<td></td>
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<tr>
<td>Titled like Tycoon hit song</td>
<td>Love Comes Like an Autumn Blast</td>
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<tr>
<td>We all love Schermania</td>
<td>Finale</td>
<td></td>
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<tr>
<td></td>
<td>Happy Ending</td>
<td></td>
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<tr>
<td>No. 7 Yes, we've all seen Sham.</td>
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<tr>
<td>chorus of Japanese maidens</td>
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<tr>
<td>No. 8 Tycoon March</td>
<td>Grand Entrance</td>
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<tr>
<td>No. 9 Sham the Great Tycoon</td>
<td></td>
<td></td>
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<tr>
<td>full of nonsense Japanese talk</td>
<td></td>
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<tr>
<td>No. 11 An American Always Pans Out</td>
<td></td>
<td></td>
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<tr>
<td>Our scheme with Alvin will work because of diplomacy</td>
<td></td>
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<tr>
<td>No. 12. Yes I’ll be the Little Tycoon</td>
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<tr>
<td>Violet will Marry Alvin</td>
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*Not Scored*
Schermania’s Original Material

Even though the influence of *Tycoon* and other contemporary works can be seen in its style and plot, *Schermania in America* includes enough new material to create a work which would stand on its own strengths. Table 2 shows the songs which might be considered “original” as having no corresponding entry in the tycoon song column. There are also references to current (late 19th century) events, and some slang or idiomatic usages which might be unclear to 21st century audiences.

The setting is the Puget Sound area, including the towns of Tacoma and Seattle and Bainbridge Island. Like many pioneer towns of the Northwest, Seattle was carved out of the forest. Early settlers cut trees for pilings and lumber shipped to San Francisco during the 1850’s. Indian attacks in the mid-50’s limited growth for some time. By the 1880’s, rail lines were being built through the territory and the city prospered, although it was not without rough frontier characteristics, including daylight robberies at gunpoint and a public lynching in 1882. This is the area’s early history leading up to the period of time of *Schermania*.

In August, 1883, General William Tecumseh Sherman passed through Seattle, giving a speech about its future as a great city to rival San Francisco. Lancastrian Sherman’s visit could have been publicized back home and influenced the choice of locale. In the summer of 1883, financial genius Henry Villard made a third grand tour through the area with several foreign dignitaries. His landing at Seattle included a ‘grandly illuminated’ night reception (Similar to that described in Act III at Jowest’s Park) and speech-making. By 1884, four breweries were in operation (*Schermania*’s Three Leading Brewers, perhaps from Seattle, play an advisory role in the scheme).
Miesse family had a connection to the area as well: some of the Pennsylvania Miesses had moved there, although their exact relationship to Charles and Gabriel is unclear.\textsuperscript{118}

Tacoma, the location of General Scheutzenfest’s villa of Act IV was a rough frontier town during the 1880’s and like Seattle, was founded on the lumber and fishing industries. Shipbuilding was important to early settlers, many of whom were of Scandinavian and Slavic descent. The site for Tacoma was selected by speculators who believed that it was the logical choice for the terminus of the Northern Pacific Railroad, which was in fact located just two miles south in 1875.\textsuperscript{119} A map of the Puget Sound area is shown in Figure 9.

\textbf{Figure 9: Map of Puget Sound}

Showing relative locations on Puget Sound of the site of Jowest’s Park (Bainbridge Island), present day Indian Reservation (Suquamish), Seattle, and the site of General Scheutzenfest’s villa in Tacoma “on the shores of Commencement Bay”. Map not to scale.
Jowest’s Park, the setting for Acts I, II and III, seems to be by its libretto description “opposite the city of Seattle on Puget Sound”, Bainbridge Island, which is seven miles west of Seattle. It was the home of Chief Seattle and the Suquimash tribe and was also originally settled by whites and exploited as a source for lumber. In an 1855 treaty, the Indians ceded the island, with 1250 acres at the head of Port Madison as a reserve. The Suquimash Indian Reservation is now located across the Agate Pass in and around the small town of Suquamish. The site of Jowest’s Park exists, and there is still a nearby Indian Reservation, which was designated as the home of Chief Gobbledem.

As the Act I curtain opens, the chorus is to appear humming, then singing the “National Song” called out in the libretto as the “New National Hymn.” This could be a reference to “God of Our Fathers,” with words written by Rev. Daniel C. Roberts for America’s centennial celebration in 1876. Originally sung to the melody of the Russian national anthem, new music was commissioned of George William Warren to commemorate the centennial of the adoption of the United States Constitution and published with Roberts’ lyrics in 1894.

Near the beginning of Act III, there is a short spoken dialogue referring to Gladstone, Ireland, and evictions:

Der contest undecided wich vay! Dey schoot der vale – und dook do cotching flies.
To be continued in our next: For der benefid of Dolphin!
Ensemble – Oh – Ah !
Kat – Oh!
In an effort to alleviate uprisings by Irish tenant farmers, English Prime Minister William Gladstone persuaded Parliament to pass the Irish Land Act of 1870, which was intended to guarantee tenant rights to compensation and reduce evictions.122

At the end of Act III, after the sword fight is abruptly called off, the chorus sings that peace should reign, young ladies should marry their choice, and "If Cleveland und Folsom vas married mit fame, Or Jowest und Schermania unite mit less name." This reference is to President Grover Cleveland, who early in his first term in June, 1886, in the only wedding to take place in the White House, married Frances Folsom, the daughter of his former law partner. He had served as guardian to the young Folsom, and it was generally agreed that the marriage softened his image and was both expected and accepted.123

Vesuvius was active in the late 19th century, with major eruptions in 1872 and 1886. The latter event was part of a cluster of planet-wide seismic events in September which included an earthquake that nearly destroyed Charleston, South Carolina, and was felt in Lancaster, Ohio, where chimneys tumbled to the ground, and people streamed into Main Street, unsure of what was happening. So, not only was the Vesuvius reference part of the *Tycoon* burlesque, but a topical connection to recent events.124

Although the Indian Chief Gobbledem is a key player in the execution of the scheme to win General Scheuztenfest’s approval of Jowest as Schermania’s choice for husband, the chief is portrayed as a stereotypical whiskey-loving Indian. The chief’s
dialogue is restricted to the single word “Me”, but this is more a component of the burlesque of The Tycoon character Lord Dolphin than a comment on a limited English vocabulary. It is possible that the Chief’s whiskey consumption could be portrayed as subterfuge on his part, to hide his true role in the scheme.

The following dialogue from Schermamia’s Act II is an interesting example of some word-play and visual humor: The General uses his friends to look through a telescope at the hidden Schermania:

Act II (dialogue)
“Gen – [Discovers his daughter on the crag with Jowest and cries] Fall in!
Ensemble – What, in love?
Gen – [Excitedly and strutting up and down waiving them off] No! No! Fall oud!
Ensemble – Schdars above!
Gen – [Looks up! Draws a telescope, straddles out his legs takes a quick look at the crag and rolls over on his back exclaiming] Eardh peneadh!
Ensemble – [Picking him up] vat a sighd!
Gen – [coolly] Fall Down!
Hans – [To General] Beholt your – Schermania!
Gen – I vill arrange dot for opschervasion [Sets his telescope carefully on end, places Gobbledem in front standing erect, Johannis next, stooping;
Gottlieb behind him stooping lower. Budwise following; a little lower. Gen on his knees behind, first inspecting the rear ground, lays the long telescopes on their sloping shoulders, looks through it, and sings][ No 5: The Observation]’

This chapter has considered the subject matter, plot, and the burlesque aspects of Schermannia. This operetta can be seen to be a unique product of its time, although one that was unknown to the public. The next chapter will consider the musical details of Schermannia.
CHAPTER 4 – THE MUSIC OF SCHERMANIA

Dr. Gabriel Miesse, Jr., man of many talents, did most of his composing for piano and voice. His arrangement for brass band of one of his marches is his only other orchestrated work which survives. It is unknown if he composed any works for full orchestra other than *Schermania in America*. His family background was filled with music, and he could have been exposed to professional presentation of orchestral music and opera while attending college in Cincinnati. With *Schermania*, he was writing a work to be accepted into the popular culture of the day. The music had to be accessible to the intended audience, with melodies that could be sung by the performers.

There are 44 titled songs in the score, which is a higher number compared to contemporary works (32 in *The Little Tycoon* and 26 in *HMS Pinafore*). There are dances, arias, duets, trios, and ensemble voices with and without chorus. Some of *Schermania’s* songs are short, and in several instances two or three songs in a row are performed by the same character or group. If each song and its subject are examined, certain groupings by scene seem reasonable, and these are included with the song list in appendix C.

**Structure, Form and Harmonies**

Miesse’s composition style can be illustrated by examining two songs from the second act. They are part of a scene in Act II consisting of three numbered songs, numbers 2, 3 and 4. Number 2 is an aria sung by Schermania – *O the Anxious Moments Suffered*, number 3 is an aria sung by Jowest – *Tell Me O You Forests Stately*, and number 4 is a duet for both – *Love Like Thine and Mine*. For purposes of simplification, the piano/vocal score is used in the examples that follow.
Number 2 is in the key of G-major, with a modulation to the relative minor, and movement back to the original key. It begins with an 8 measure introduction built of two 4 measure phrases. The phrase cadences are [(I-V) (V7-I)], half and perfect authentic. The song consists of two 8 measure periods of two 4 measure phrases each. The first period’s cadences are the same as the introduction: [(I-V)(V7-I)]. The second period begins with the vi chord in G-major, but because of the harmonies in the remainder of the phrase, might be better analyzed as i/vi, or the tonic in e minor (see Figure 10). The e-minor phrase continues with V-V7-V-i. The chord which serves as the modulation back to G-major is the ii\(_6\), or the secondary dominant in G, V\(_6\)/V, and is followed by V and V7 in G. This progression makes a strong statement of the return to G. The final phrase of this song ends with an authentic cadence: I\(_4\)-V-I.

Figure 10: Modulation to Relative Minor and Return
The melody of number 2 is built from repetition and variation of a two measure motive with two parts: The first part consists of a dotted quarter note followed by five eighth notes. The rhythm of this part does not change, but it undergoes pitch variation with each repetition. The second part varies slightly to match lyrics: either a half note or a dotted quarter tied to an eighth note, followed by a quarter note. Each occurrence of this motive is followed by a rest. The only time the melody departs from this motive occurs at the end of the modulation to e minor and the pivot back to G-major (refer to Figure 10). In this way, Miesse varies both the rhythm and the key briefly, before returning to the home key at the end of this short song.

Number 3 is entirely in the key of G-major and is written in two-part form with an ABA repeating structure, with the second A part written out independently, not as a da capo. The song begins with an 8 measure introduction of two 4 measure phrases, with perfect authentic and half cadences. Each of the A and B parts is similarly built from two 8 measure periods and each period consists of two 4 measure phrases. The length of B is increased by one extra measure in its last phrase. The cadences for part A are [(IV-I)(ii-V)] and [(I-IV)(V7-I) or (ii-I)]. This last V7-I cadence is actually $V_7^{6-5}-V^{6}_5-I$. Miesse’s use of the ii chord in both phrases can be analyzed as the secondary dominant, $V^{6}_4/V$, which reinforces the strength of the dominant chord of the cadence and the G-major key of the song. $^{126}$ Cadences for part B are [(V-I)(I-V)] and [(I-V)(ii7-V)]. Considering the ii7 as V7/V, the only chords sounding in the second phrase are V7/V and V or V7 of the tonic key, while the accompaniment contains an ascending-descending-ascending scale passage of chord and non-chord tones. This ends part B on a very
strong statement of the dominant of G-major. Figure 11 shows this phrase and associated harmonic analysis.

![Figure 11: Act II, number 3: Part B Ending](image)

V7/V       V        V7/V        V             V7

Figure 11: Act II, number 3: Part B Ending

Miesse’s use of the supertonic chord in these songs to function as a secondary dominant V/V or V7/V is fairly common in *Schermania*. A further example of this from Act IV, number 3, *In My Mother’s Garden*, will be discussed below.

The melody of the entire song number 3, consists of various combinations of two basic rhythmic motives: half note followed by quarter note, and three quarter notes. There are slight variations in some instances, where the lyric syllables require replacing a note with a rest. Each phrase ends with a half note followed by a rest. One might at first think that a construction based on multiple combinations of only two simple motives would lead to a monotonous feeling. However, Miesse uses a variety of pitch variations and an occasional rest to create an interesting melodic line. A visualization of these
rhythmic and pitch choices is shown for song number 3 in Table 3. This table shows general pitch assignments as simply steady, increasing, or decreasing during the phrase.

Table 3: Rhythmic and Pitch Motive Variations for Act II, number 3

Number 4 is a duet between Jowest and Schermania which consists of several parts alternating between each soloist. It concludes with a duet of exchanged phrases and simultaneous lyrics. Schermania begins the song in G-major and switches to e-minor at the end of her phrase. Jowest picks up the new key, but only briefly, before returning to G-major. Schermania’s next phrase stays in G-major, with some chromatic tones and an increase in the harmonic rhythm at the end. The song changes to C-major by key signature with Jowest’s next phrase, with an increased harmonic rhythm. There is a key change to A-major for Schermania’s next phrase, which returns to the slow harmonic
rhythm that started the song. The two voices sing together in A-major for 76 measures, with a harmonic structure of mostly tonic and dominant chords.

In this three song scene, Schermania’s melodies seem a bit unsettled with several brief modulations to the relative minor. Jowest’s melodies in major keys give a feeling of stability, and during the duet, she seems to absorb that stability. The song ends for both characters with a relatively stable and simple harmonic structure.

The songs of *Schermania* vary widely in character. Melodic rhythms vary from those based on half note/quarter note to those based on 16th notes. Harmonies range from tonic-dominant only to songs with chords built on every scale degree and harmonic rhythms of one change per beat, to steady harmonies of 4 measures or longer. Some songs follow a strict formal structure very closely while others do not. There are serious ballads such as those described above, humorous tunes in which the soloist describes himself or a situation, and dialogue songs such as Act I, number 5, *You are Consumptive*. The General enters to find the ensemble coughing to cover the departure of Schermania, which he questions as perhaps a sign that they are ill. The group denies it to say that they are merely eating and drinking, and offer him beer. For the first half, dialogue passages in F-major consist of 4 measure call-and-response sections between the General and members of the ensemble, where the call is usually a variable, simple melody over changing harmony (I-IV or I-V) and the response descending scalar over static tonic harmony (I). A 6 measure modulation/transition to D-major sets up the second half, where the call is now given over static harmony, and the response is over changing I-V7 chords. The effect of these changes, and the variety of the melodies is a lively, active tune.
A very stately tune *Let Peace Reign* for full chorus (SATTBB) concludes Act III. This song consists of four repetitions of an 8 measure period which has a harmonic progression of I-V7-vi-III---IV-I$^6$-V7-I in c-minor, $\frac{3}{4}$ time. The harmonic rhythm is consistent at one change per measure on the first beat. The melody is simply three repeated notes, descending by step for each of six measures, before ascending by leap of a third, and then returns by step to the tonic pitch on the last note. For the first 16 measures, the accompaniment follows this pace, and then becomes a transition of ascending/descending triplets to the last 16 measures, where every other measure includes an eighth note scalar section. In the orchestration for *Let Peace Reign* all instruments and every section play this accompaniment. The effect of this song, occurring just after the agitated, conflicted *I Have Control of Thee Now*, is one of calmness and stability.

These examples demonstrate that Miesse’s music is tonal, generally following rules of the common practice period (1650-1900):$^{128}$ His music is homophonic, with triadic harmonies, and their structure and use follows the principles of major-minor functional tonality, with occasional chromatic embellishments. He seems to use minor harmony in a traditional sense of conveying darkness or uncertainty. His implementation of this traditional system in the score for the full orchestra will now be examined.

**Orchestration**

Miesse’s orchestra score is written with the following instrumentation (refer to Table 1, on page 58) Piccolo (D)/Flute, Oboe, 2 Clarinets (A, Bb, C), Bassoon, 2 Horns (D, F), 2 Cornets (A, Bb), Trombone, Percussion (Bass Drum, Cymbal, Small Drum, Timpani), First Violin, Second Violin, Viola, Cello, Bass, Piano (overture only). Miesse
wrote for the instruments in common use in the late 19th century. Compared to an orchestra of the early 21st century, the piccolo would be in C, and the clarinet in C and horn in D are obsolete. The cornet parts would likely be written for trumpets in Bb while the clarinet part would possibly be written for a Bb and/or an A instrument.

Generally speaking, a composer’s choice of instrument key could be made for a number of reasons: to minimize the number of accidentals in the key signature for easier playing; to extend the range of the instrument; to limit the changes in register; or for some desirable change in tone quality. In Schermania, it is the clarinet part that is most often changed between keys. The changes usually occur between songs, but in several instances within a song, written notes to the players in rest measures indicate the change. The composer must know or make assumptions about what instruments players may have. Parts written for instruments which are not available must be transposed for more common instruments if a performance is to take place.

Musical instrument design has evolved over many years. Modern instruments are designed so that each of the same type uses the same fingering pattern, giving a different sounding pitch for the same fingering configuration. As this fingering system was developed, parts were written which transposed notes by the appropriate interval so that each instrument sounded the desired pitch. These transposing parts have a different key signature than the sounding key (concert pitch) of the music. Depending on the instrument and the key, the transposed key signature could have a large number of sharps or flats, making it more difficult to play. Concert pitch keys with flats are easier for instruments pitched in a flat key since the player’s music has fewer flats, and concert pitch keys with sharps would be assigned to an instrument pitched in a natural
key. Parts could also be written enharmonically to create an easier key for a particular instrument. This general rule would be expected to lead to choosing the same instrument whenever the same key signature was used.

Miesse’s use of instruments pitched in different keys is therefore not unusual, but his choice of when to use each one seems to be inconsistent. Table 4 is a summary of key signatures and instrument transpositions used in the music of *Schermania in America*. This table shows that, for key signatures with flats, Miesse always chooses the instrument which gives the least number of flats in the transposed key signature. However, when he uses a key signature with sharps, he sometimes specifies the Bb or C instrument when an A instrument would result in fewer sharps in the transposed key signatures. The inconsistency most often observed is the choice of Bb cornet instead of A.
Table 4: Key Signatures and Instrument Keys

<table>
<thead>
<tr>
<th>KEY SIGNATURE</th>
<th>CLARINET</th>
<th>CORNETS</th>
<th>TRANS.P.CHOICES</th>
<th>HORNS</th>
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<td>C</td>
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<td>Bb - 3#</td>
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</table>

(Yellow highlight shows Miesse’s choice resulting in greater number of accidentals, green highlight shows choice which would result in lowest number of accidentals.)
One possible explanation for this could be a perception of the time that the cornet key should be chosen to allow the instrument the most natural notes (those played without use of its valves, occurring as part of the instrument’s harmonic series) for better tone quality. Contemporary composer Hector Berlioz wrote about this and other concepts to be discussed in chapter 5 in his *Treatise on Instrumentation and Orchestration* (1882)\textsuperscript{130} This late 19\textsuperscript{th} century perception that the natural notes of a cornet “sound better” than valved notes, and any differences in tone between an A and Bb instrument, will be examined acoustically in chapters 5 and 6. However, contemporary authorities generally differ in the claim that there is perceptible difference in tone between the A and Bb instruments (clarinet or cornet). Many agree that the Bb clarinet has a richer and mellower tone than the A and note that players often, and in opposition to the composer’s specification, use the Bb clarinet exclusively, transposing parts written for the A “on the fly.”\textsuperscript{131}

*General Observations About Miesse’s Orchestra Score:*

Miesse follows common practices for theatre music: at the beginning of each song, he writes the names and keys of instruments, with clefs and appropriate key signatures. He brackets woodwinds, brass, first and second violins and also cello and bass together, and on every page, repeats these brackets. Tempo markings are sometimes written in at the top of the page and the top of the strings, sometimes also at the top of brass section. He almost never copies clefs at the beginning of each staff on a new page. When there is a key or tempo change in the middle of a song, he typically only writes in the new key and time signature without repeating the clefs. Dynamic marks are used throughout the score.
In many instances in the score and in various parts, he writes in the name of a different instrument above slightly smaller notes. These notes are typically of a different rhythmic pattern than the instrument has been playing. An example is shown in Figure 12 of the string section staves. This could be done to indicate a cue for that instrument, but it seems more likely he was anticipating not having a full orchestra available: If the intended instrument is not available, its notes can be covered (or played) by another instrument that is available. In two occurrences of this technique in the brass section, he wrote out “if no oboe, play small notes” for the cornet, or on the trombone staff “play uppermost notes if no cello plays”. Although used mostly in the strings, these alternate notes and instrument names are written in almost every line at some point in the score. Because of the locations and the alternative instrument indicated, it seems as though he wanted to cover any possibility of missing instruments for certain critical notes.
Miesse’s style of orchestration retains a certain amount of the nature of the piano part of the vocal score. Many instruments are given only notes which duplicate the rhythmic character of the left hand accompaniment, instead of a more continuous melodic line. In every song, the vocal melody is almost always doubled by the first violin part. He may have done this because he was unsure of the experience level of singers. Other instruments share this vocal doubling: For Schermania’s songs, the flute is often also used, for the General and other male voices, often the cello or clarinet. Chorus lines are sometimes doubled by the string section. Doubling may occur throughout a song, mostly in the first violin, or be shared at various places in a phrase by other instruments. This practice is taken to the extreme in Act I, number 3, where Gottlieb’s melody is doubled by the first violin and bassoon for three measures, the flute for six measures, the brass for two measures, and the flute again for three measures. The chorus part in this song is doubled in the clarinets, bassoon and first and second violins. Frequently, components of the orchestration (melody, on-beat rhythm, off-beat rhythm) are assigned to instruments in different sections – shared by instruments of different colors – rather than block scored by section.

In assigning chord tones to instruments throughout each section and the orchestra as a whole, certain ideas are normally considered. Composers may choose to model spacing on the harmonic series with wide spacing on the low end, and tighter spacing on the high end. Over the tonal range available, a choice of open or close spacing is possible, although close spacing is sometimes considered more effective in an orchestra. If the balance of each section (winds, brass, strings) is treated separately so that the section alone would sound good, the combination of sections is likely to also be
effective. If the chord is a primary triad (I IV or V) in first inversion or any 7th chord, the bass should not be doubled in upper parts, although it may be doubled an octave lower.  

To illustrate Miesse’s technique of spacing and doubling, examples of scoring for chords from several measures of the Act III number 9 song *Let Peace Reign* (discussed above) are shown in Figure 13. This song is written for full chorus, but is not highly melodic, and is orchestrated for all instruments. Assuming these three measures are typical, some characteristics can be observed. The flute and first violin are in unison, an octave higher than the next highest instrument or voice. There is an octave doubling of the bass note by one or more instruments. The choral voices are doubled as follows: Soprano: oboe, Alto: clarinet 1, Tenor 1 and 2: usually by cornet and/or horn, or by clarinet 2, Low Bass: bassoon, trombone, cello, Upper Bass: second violin (one of the double stop tones). Spacing within sections may be open or close. Considering the orchestra as a whole, Miesse uses a “safe” orchestration technique of close spacing, with octave doubling of the outer parts.

Figure 13: Spacing and Doubling of Chords, Act III number 9
The melody for Act II number 2 is fully orchestrated in the 8 measure introduction, which makes it a good example of Miesse’s techniques for orchestration. Figure 14 shows two pages of the vocal score, and Figure 15 includes the first 16 measures of the orchestra score. The melody is given to the oboe and cornets, and doubled an octave higher by the flute and first violin. The arpeggiation of the left hand piano part is given only to the cello, strong beat notes to bassoon and bass, weak beat to horns, second violin and viola, and the clarinets and trombone have a sustained bass accompaniment.
Figure 15: Act II, number 2: Orchestration
**Characteristics of the String Section:**

The section plays almost non-stop throughout the entire score. Miesse specifies "pizz" (pizzicato) in only a few places, usually for the low strings, and does not always use "arco" afterward. There is only one instance where he divides the first violins by "divisi". The first violin part almost always doubles a vocal line, for either male or female voice, occasionally the cello also doubles the same vocal line. While the first violins are playing the vocal line, the seconds and violas are usually playing a rhythm accompaniment with two simultaneous notes for the great majority of their parts. The intervals vary from normally a third to a sixth, to a few places of greater than an octave. These two-note passages could either indicate double stop notes or divisi parts, although he never writes "divisi". Tremolos are occasionally used, on one or two strings, for the seconds and violas and on rare instances for the firsts and celli.

**Characteristics of the Woodwinds:**

The top staff is shared by flute and piccolo. Although the part book for piccolo indicates a D major instrument, any time the instrument is called for in the orchestra score, it is written in the same non-transposing key as the flute (assumed to be played an octave higher than written). The piccolo is specified for only one song in each act, and about halfway through the overture. It is unclear if Miesse meant for the flute to be played afterward in the overture or not, as “flute” is not written in again until the staff name in the first song of Act I. In general, the winds often have long periods of rests. In some songs they play only a few notes to punctuate the end of a phrase. The flute plays most often, sometimes doubling vocal lines. The clarinet part is sometimes written for first clarinet, sometimes with two lines for “a 2” “a deux” or “both clar.” There are two places for the clarinet marked “cadenza” where notes are written in as passages of
ascending-descending scales. At one point, the cadenza starts with the flute and descends through the clarinet. The oboe and bassoon play least frequently, often as a rhythm accompaniment instead of melody. All of the woodwind instruments are usually written comfortably within their ranges with notes within the staff. Only the flute usually has notes of 3 ledger lines or more above the staff. The piccolo has only one 8va marking. Some bassoon passages, with rhythmic effect, have notes nearing the high end of the instrument’s range, up to G above middle C. Flute and clarinet have several notes marked “tr.” For the oboe, clarinet and bassoon in some instances where conflict is occurring in the action, repeated short notes (16th) of the same pitch are indicated by the tremolo mark, while other instruments are playing 16th note passages of changing pitch. (For instance in Act I where Schermania is hiding from her father, and at the end of Act II during the boxing match). Note values range from whole notes down to 16ths, and all four instruments are occasionally given arpeggios in 16th notes.

**Characteristics of the Brass:**

Miesse follows a custom of the time in writing the horn part with no key signature, using accidentals as appropriate. 136 This custom began in an era when horns had no valves, and notes were limited to those of the natural harmonic series (open sounds) and those modified by using the player’s hand in the bell (closed sounds). The harmonic series fundamental, and the key of the instrument, were changed by adding various short lengths of tubing (crooks) which changed the length of the instrument. By Miesse’s time, valves had been added to horns which allowed all chromatic notes to be formed as open sounds by changing the length of the horn tube. Miesse uses horns in F, except in the finale (horn in D), and even without key signature, the part in F is still
written a perfect fifth higher than it sounds. There are no written instructions in the score to specify any closed notes.

There are several instances of tremolo notes for each of the brass instruments. Each instrument, and sometimes the entire section are given long periods of rest. Several songs have no cornet part at all. In certain passages of solo singing, and light scoring, the brass instruments are given softer dynamic markings than the rest of the orchestra. The variation can be as much as $f$ for the strings with $pp$ for the brass. In one case in Act IV, the trombone is marked $pppp$ when it doubles a vocal line with the first violins. Several short passages are also marked “solo” for a particular brass instrument. It seems that Miesse’s choice of using the A or Bb cornet does not depend on whether the cornet is playing solo or not: In Act I, number 4, a Bb cornet line is marked solo, and in Act IV, number 10, an A cornet is marked solo.

**Characteristics of Percussion:**

In writing for timpani, Miesse was using drums of his time, which did not have the pedal for pitch adjustment of modern drums. He followed the custom of using two drums, specifying their pitches at the beginning of each piece, and writing only notes of the tonic and dominant of the key. Because of the limited octave range of these drums, sometimes their tuning is in fourths, sometimes in fifths, and the dominant tone is sometimes written below and sometimes above the tonic. \(^{137}\) Use of the timpani is limited to song introductions and endings, and rhythmic punctuation at the ends of phrases, with only a few longer passages in march songs.

Other percussion instruments used are bass drum, “small” (possibly snare) drum and cymbals. In songs where timpani are not used, mostly marches and dances, the
percussion staff is labeled for bass and small drum, with two lines written in. There is only one instance where special instructions "on the skin" are used. Cymbals are used only briefly in the overture. There are several songs with no percussion part.

**Vocal Parts: Ranges and Characteristics**

*Schermania in America* includes singing parts for 14 soloists and chorus. Among the solo characters, the General and Schermania have by far the largest number of songs (solo, duet or with ensemble). The General has parts in 16 songs, eight of which are solos and Schermania has parts in 11 songs with six solos. The remaining cast assignments (solo or ensemble combined) are Hans – [7], Jowest and Halahan – [5 each], Federgoose and Delightful – [4 each], Louisa, Johanas, Gottlieb and the Brewers – [3 each], Katherine – [2]. The chorus takes part in 25 songs.

A review of the score indicates the ranges for each of the solo voices as shown in Figure 16 and for the chorus in Figure 17.

![Figure 16: Vocal Ranges - Soloists](image-url)
The solo voice ranges (S, MS, T, BAR) abbreviated after each name in Figure 16 were not specified by Miesse, but suggested by the author based on generally accepted practical ranges. Technically, all of the female solo voices could be classified as mezzo-soprano within possible range limits. The five male voices listed as tenors fall within the possible range for the classification, and are usually notated with a treble clef, assumed to represent a tenor clef (sounding an octave lower than treble clef). The lowest two male voices have been classified as baritone, although the low end of the range for Hans could put that character within a bass or bass-baritone range; his highest notes probably make that impractical.138

The chorus voice ranges are fairly typical of the possible range limits on the low side, as opposed to practical ranges, perhaps indicating an assumption by Miesse of the availability of well-trained voices. The low end of the soprano voice is a whole tone lower than might be expected. The three entries for tenor voice are shown because Miesse used three different clefs for chorus tenor throughout the score. The last clef, although unusual in appearance, can be clearly seen to perform as a vocal tenor clef by analyzing key signature and harmony where it is used: Notes occupy the same staff positions as on the treble clef, but sound an octave lower.
Vocal lines for soloists often proceed by leap of a fifth or more, up to an octave. Typical chorus voice distribution has the alto and tenor lines taking chord roots and/or proceeding by step, with the soprano and bass voices having more active lines and leaps. An example which illustrates Miesse’s four-part writing style for chorus is from Act IV, number 3, *In My Mother’s Garden*. This song is a multiple verse solo for tenor, with chorus refrain. The sixteen measure verse has two 8 measure periods of very similar construction, with cadences of [(IV₆-I)(II7-V)] and [(IV-I)(II₆-V7-I)]. The supertonic chord, again functioning as secondary dominant, is altered throughout this song to a major triad by raising the third a half tone to C#. Thus all of the chords in this song are major triads or major-minor seventh chords. The choral refrain is written *a capella*, and uses the same basic harmonies as the verse except that some occurrences of the IV or I chords are in different inversions. The first phrase of the refrain is shown in Figure 18.

Figure 18: Act IV, number 3: Chorus Refrain – Voice Leading
The voice leading for the SATB chorus used by Miesse in these four measures, illustrated by the slanting arrows, follows standard practice: Progressing from one chord to the next, the bass takes the chord root, common tones are repeated in the same voice, and the upper voices take the nearest chord tone of the new chord.

**Song Evolution and Syllable Placement:**

*Schermania* was created by two people collaborating over a distance by mail and infrequent visits. Charles Miesse wrote lyrics which his cousin Gabriel would then have to set to a rhythm and melody of his composition. In order to create the seemingly natural syllable placement seen in most of *Schermania’s* songs, Gabriel had to occasionally make adjustments to the lyrics. An example of this can be seen in the Act 1, number 6 song, *I Am Here and She Is There*. In the early libretto, the lyrics for this song are marked in the original ink with small numbers which seem to indicate the beats in each line of text. In the verse, this original notation shows four beats on the first and second lines, and six beats on the third and fourth line. Figure 19 shows this page from the libretto. Examination of this figure shows that changes have been made to these lyrics, first in pencil and then in ink of a slightly different shade written over the pencil. The changes to the lyrics consist of several additions of words and syllables to change the basic meter to four beats in each line. It appears that some additions were written down and then crossed out as different combinations were tried. It is possible that as Gabriel was writing the music, he had to alter the lyrics to fit the meter of the music. For this song, he chose a \( \frac{2}{4} \) time signature instead of the \( \frac{6}{8} \) pencil note in the margin. Each four beat lyric is converted to a 2 measure musical phrase, giving the syllable placement a more natural feel and the song a more unified phrasing than the original two lines of
four beats each followed by two lines of six beats. Figure 20 is the page of this song from the vocal score showing this structure and the beat/syllable assignment.

![Figure 19: Act I, number 6: Early Libretto, Beat-Marked Lyrics](image)

Figure 19: Act I, number 6: Early Libretto, Beat-Marked Lyrics
Figure 20: Act I, number 6: Solo Verse 141
The music composed for *Schermania in America* demonstrates tonal harmonies and forms typical of the common practice period. Miesse’s orchestration style generally follows safe practices, but his work also includes creative and imaginative elements over and above basic techniques. He was not an experienced orchestral composer, but created a work which would have likely compared favorably with other musical theatre works of his time. His somewhat inconsistent choices of keyed instruments for passages written in particular music keys will form the basis for exploration of the acoustic properties of period instruments in the next two chapters.
CHAPTER 5 – CORNET ACOUSTICS

The remaining two chapters of this dissertation will focus in detail on a minor element of Miesse’s orchestration choices from a point of view that he could only have had a qualitative understanding of: the acoustic characteristics of the cornets he selected for the high brass instruments in his full orchestral score. In this chapter, the theory of acoustics as it applies to the cornet is discussed. Characteristics of valves, music scales and natural harmonics all contribute to an understanding of how the tuning of notes can be evaluated.

A 19th Century Perspective

Miesse was certainly familiar with the brass bands of his time and their instruments, particularly the Lancaster Mechanics Band that his son directed and for which he composed. As discussed in chapter 4, he made some unconventional, although not unacceptable, choices when selecting the instrument key for the cornets in various songs in Schermania in America (See Table 4, pg 105). His key choices may have been deliberate, or may have been based on reasons that will never be known. It is possible that he was influenced by conventional thought of his day. He was talented, well-read and self-educated in a number of areas, including music. One resource he may have had access to is a standard orchestration book of the 19th century, A Treatise upon Modern Instrumentation and Orchestration by French composer Hector Berlioz. The second edition was translated into English and published in 1858.142 By this time, valves had become fairly commonplace on horns, trumpets and cornets, although not completely accepted because of intonation and tuning problems.
Berlioz makes several statements throughout the *Treatise* regarding a preference for using the “open notes” of a number of different instruments. Although most do not apply to the cornet, the variety can help illustrate the prevalence of this way of thinking:

The Violin: “Paganini, in order to give more brilliancy to the instrument, occasionally raised all the strings half a tone, and consequently transposing his part, he played in D, while the orchestra was in Eb, and in A, while the orchestra was in Bb, &c, thus keeping the majority of his strings open – the sonorousness being greater when open than when pressed by the finger – in keys where, with the ordinary method of tuning, that would have been impossible.” p 4

“Violins are more brilliant, and play more easily in keys which leave them the use of the open strings. The key of C, alone, appears to be an exception to this rule, as regards its sonorousness, which is evidently less than that of the keys of A and E, although it keeps four open strings, while A keeps but three, and E two only. The timbre of the various keys for the violin may be thus characterized;” p 24

The Cello: “They are also excellent for airs of a religious character; and the composer ought, in such a case, to select the strings upon which the phrase should be executed. The two lower strings, C and G, especially in keys which permit the use of them as open strings, are of a smooth and deep sonorousness, perfectly appropriate;” p 37

The Horn: “They have two kinds of sounds, very different in character; open sounds, almost all of which are the natural resonances of the harmonic divisions of the instrument’s tube, and come out without other assistance than that of the lips and breath of the player; and closed sounds, which are obtained by closing more or less the bell (the lower orifice of the horn) with the hand. ….. There is therefore an important distinction to be made among the closed sounds …. To those which are the best notes and for which the bell must be only half closed. The closed sounds present, not only as compared with the open sounds, but even with themselves, marked differences of tone and sonorousness. These differences arise from the greater or smaller opening left in the bell by the hand of the performer. …. The old masters limited themselves, in general, to the use of open sounds; which they wrote – it must be owned – very clumsily. Beethoven himself is exceedingly reserved in his use of the closed sounds, when he does not use the horns in solo.” pp 129 – 131

The Cornet: “Although the cornet possesses all the degrees of the chromatic scale, the choice of key in changing is not immaterial. It is always better to take that which offers the means of employing the most natural notes, - it is scarcely necessary here to repeat that the natural notes are those which come without
the aid of pistons, by the sole effect of the resonance of the tube of the instrument ..... and which bears few or no sharps or flats in the key signature. .... The habit which exists now-a-days of hearing in ball orchestras melodies devoid of all originality and distinction executed on this instrument, together with the character of its quality of tone, which has neither the nobleness of the horn nor the loftiness of the trumpet, renders the introduction of the cornet à pistons into the high melodial style a matter of great difficulty.” pp 149-151

Other period writers seemed to share the idea that open notes sounded better, given the evolution of instruments at that time.

“By the invention of valves or pistons a so-called complete scale was obtained on all brass instruments, together with great facility of execution, and the old slide trumpet has been in consequence to a great extent superseded by trumpets and cornets with three valves: a fact which is, I believe, generally regretted by those who have given attention to the subject, as these instruments, besides being decidedly inferior in quality of tone, are most faulty in intonation.” 143

“The idea on which the modern valve system is based has more analogy to the trombone principle than to any other. The depression of a valve or valves opens air-ways into additional tubing, which virtually lengthens the instrument, so that the effect is similar to that produced by the extension of the trombone slide. The early attempts were faulty in many details. Where the tube passed through the valve its normal caliber was much constricted, and other mechanical defects greatly impaired tone-quality.” 144

“The horn-tone, when the “natural” or “Waldhorn” is used, is of exquisite beauty, but its available notes are limited to the harmonic series, and every enlargement of its scope, whether by the use of crooks for the various keys, or by other means, brings about a certain deterioration of its individuality. The trumpet, in like manner, loses a good deal of its beauty when keys are applied to it, and it finally degenerates into the cornet-à-pistons which can perform anything, but which is satisfactory in nothing.” 145

Philip Bate, *The Trumpet and Trombone*, 1966:
“In brass instruments the only quite unavoidable sudden changes in the cross-section of a bore are found at either end of a trombone slide, or in valve tubes when drawn out for tuning purposes. Both of these can of course be made very small, no greater indeed than a difference in diameter of twice the thickness of
the tube wall. Nevertheless, minor deviations such as these can introduce quite marked reflections, etc., which may show themselves as altered peaks in the resonance curve of an instrument, and here we find our practical, though at the period unexplained, justification for players’ prejudice against some of the first valves to be produced.”

These passages help to illustrate a general notion of the middle 19th century that instruments with valves, and valved notes, were decidedly inferior in tone quality. Valves were first applied to the post horn in the 1820’s, and cornet designs underwent evolutionary development during much of the 19th century. Both rotary and piston valve designs were used. By Miesse’s time, in the United States, three Périnet-style piston valves were almost universally encountered, and it is assumed that this is the style of cornet he was writing for in Schermania. Even after improvements were worked out by instrument makers, the open note perception may have remained for many years. For the cornets which Miesse knew of, it is entirely possible that open notes did sound better than valved notes: Choices among song or instrument keys could have been justified based on desired tone quality or sonorousness.

A thorough understanding of the techniques and measurements used in this study to investigate tone quality should begin with a review of acoustic theory of brass instruments.

**Acoustic Principles**

Western music consists of a sequence of notes of definite pitch (frequency), and families of musical instruments that can produce these notes in a controllable and repeatable manner. Pitch is represented by a number, or frequency, with low pitch sounds having low values and high pitch sounds, high values. Some intervals between pitches share simple mathematical relationships, such as the octave, which is an interval
between two notes whose frequencies are related by a 2:1 ratio. A special series of notes will be created when each succeeding note pitch is obtained by multiplying the same base note by 2, 3, 4, 5, and so on. This is called a harmonic series, and forms a basis for the creation of certain musical scales. An example harmonic series based on the note C (C2) two octaves below middle C (C4) is shown on a standard musical staff in Figure 21. The frequency interval between each note is the same, but the note spacing on the staff becomes progressively smaller. Some notes generated in this mathematical series do not match the scale pitch very well, as indicated. This will be discussed further later in this chapter.

![Harmonic Series Example](image)

**Figure 21: A Harmonic Series Example**

In any of the families of musical instruments, notes are produced by the transfer of energy from the player to the instrument. That energy creates vibrations in a part of the instrument, such as strings, air columns, membranes, or wooden or metal objects. These vibrations are transmitted to the air by the instrument and then to the listener’s
ear by pressure variations in the air. Musical vibrations generally consist of combinations of a number of different frequencies of varying strengths (harmonics, or overtones), which combine to give the sound its characteristic tonal quality, or timbre. It is mainly the timbre of a sound which allows a listener to differentiate between sounds produced by different instruments. A composer’s ability to use timbre is one feature which may distinguish his work from that of other composers. The component frequencies and their strengths can be represented graphically in a diagram called a spectrum. Often, an instrument spectrum will bear some relation to a harmonic series. The spectra of some common instruments are reproduced in a simplified form from *Music, Physics, and Engineering* by Harry F. Olson, in Figure 22. ¹⁴⁸ For each diagram, frequency is represented on the horizontal axis, and amplitude on the vertical axis. Each vertical line of the spectra represents one frequency component of the composite sound.

![Figure 22: Some Typical Instrument Spectra](image)

Many factors can influence the sound produced by a group of musicians who are attempting to reproduce a composer’s work represented as written notes on paper: the composer’s abilities, experience, and intentions; the abilities, experience and instruments of the musicians; musical common-practice changes over time; the characteristics of the instruments in use may have evolved. If Miesse was composing in
the 21st century, he likely would have written for trumpets instead of cornets: Trumpets are almost universally used as the high brass instrument in the modern orchestra.

The cornet is a member of the brass family of instruments. It is constructed of metal tubing which is approximately 4 feet in length, cylindrical over about 1/3 of its length, and slightly conical over the remaining 2/3. A conical tube will support a different set of harmonics than a cylindrical tube given the same end conditions. The combination of the two shapes in one instrument produces a characteristic spectrum. Proportions of cylindrical to conical tubing are reversed in trumpets, and this is one factor which contributes to the tonal difference between these two instruments.

Acoustic energy is provided by the player’s “buzzing” lips applied to the cup-shape mouthpiece at one end of the instrument. This buzzing is converted to musically useful pitches by interaction with the physical geometry of the tube: some pitches are reinforced over the tube length, and some are scattered. The player can change pitch by adjusting the tension in his lips. Different pitches can also be made to sound by changing the tube’s length through the use of valves which, when depressed, add length and lower the pitch. The sound produced by the instrument is radiated into the room through the bell end.

In brass instruments such as the cornet, the vibrations of the air column inside the instrument create a characteristic tone with harmonic components. These vibrations can be visualized by first considering the lips of the player producing one short puff of air at the mouthpiece end. This pulse travels along the tube until reaching the open end where there is a large change in cross sectional area from the tube diameter to the
expanding bell, and then to the room. The pressure at the open end of the bell must also equal that of the room. These two factors create an acoustical boundary which acts to reflect the pulse back towards the mouthpiece end. The returning pressure pulse will bounce off the player's buzzing lips and repeat the journey. Pulses which occur at a rate where a new puff can be admitted when the original pulse begins its first repeat journey will be reinforced. A graphical depiction can show that two such pulses traveling in opposite directions are superimposed to form what is called a standing wave in the tube.¹⁴⁹ Such a wave creates a stable oscillation of a particular frequency. And, because the lips comprise a non-linear flow control device, (flow through them is not directly proportional to pressure), higher frequency oscillations and standing waves are generated by the non-linearity, which correspond to the higher harmonic frequencies of the tone.¹⁵⁰

Measurement of the pressure variations in the mouthpiece when a set of standing waves is generated will show a number of peaks occurring at each frequency where oscillations are best supported, similar to Figure 22. These internally generated pressure peaks act in cooperation with the buzzing lips to support sustained, stable oscillations. When considered in conjunction with the flow of air entering the instrument, a parameter called input impedance can be defined which represents the internally generated spectrum of an instrument. Expressed as a basic principle governing oscillation in wind or brass instruments, “Oscillation is favored at a frequency for which the air column input impedance is large, and oscillation is also favored if the impedance is large at some or all of the harmonics of this frequency.”¹⁵¹ Input impedance can be
measured and used to evaluate the acoustic performance of an instrument, but should be differentiated from the sound produced externally, that which is heard by a listener.  

**Equation 1: Input Impedance Defined**

\[ INPUT = IMPEDANCE = \frac{PRESSURE}{VOLUME/FLOW} \]

The characteristics of tone quality that this study is concerned with are largely determined by the tuning accuracies (intonation) and the strengths of the various harmonics of open and valved notes for cornets. Sounds generated externally could be used in an evaluation of tone quality. However, there are many subjective factors which would have to be considered: the player’s level of skill - advanced players can overcome instrument deficiencies and use lip tension to produce tuned notes by immediate and minute pitch adjustments; the dynamic playing level (loudness) has an effect on the number of harmonics which are produced;\(^{152}\) The measurement of input impedance removes this subjectivity, and as discussed below, can give a good picture of how the external sound will be harmonically constructed.

The basis for comparison of impedance measurements of real instruments with theoretical tuning values begins with consideration of the set of standing waves in a simple, cylindrical tube. In brass instruments such as the cornet, the mouthpiece end is considered as a closed end. Table 5 shows how the harmonic series is naturally generated in a tube closed at one end and how it is related to tube length. At the closed end, pressure can reach a maximum, but remains at zero at the open end. The fundamental has a wavelength that is \(\frac{1}{4}\) of the tube length, and the harmonics are odd
multiples of the fundamental frequency. Given a cornet-like tube length of 48 inches, these frequencies can be calculated, and are shown in Table 6.

Expansion of the harmonic series for a closed tube would result in a series of frequencies, odd multiples of the fundamental. These could be used to generate a musical scale which would be naturally playable on this tube. The first 10 tones of this series for the 48” tube length are shown in Table 6 and compared to notes of the equal tempered scale.
Table 5: Standing Waves in a Closed Tube

<table>
<thead>
<tr>
<th>CLOSED TUBE / PRESSURE WAVE OUTLINES</th>
<th>FREQUENCY</th>
<th>SERIES NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>( N=5 \text{ Wavelength = } 4L/5 )</td>
<td>( \frac{1}{4} \cdot \frac{c}{L} )</td>
<td>( \text{FUNDAMENTAL} )</td>
</tr>
<tr>
<td>( N=3 \text{ Wavelength = } 4L/3 )</td>
<td>( \frac{3}{4} \cdot \frac{c}{L} )</td>
<td>( \text{FIRST OVERTONE} )</td>
</tr>
<tr>
<td>( N=1 \text{ Wavelength = } 4L )</td>
<td>( \frac{5}{4} \cdot \frac{c}{L} )</td>
<td>( \text{SECOND OVERTONE} )</td>
</tr>
</tbody>
</table>

Pressure wave outlines for the standing wave harmonic series in a tube closed at one end. Upper frequencies are odd multiples of the fundamental. The resultant wave is the summation of the fundamental and all of the overtones.

\[
\text{Frequency} = \frac{N \cdot c}{4L}
\]

Table 6: Natural Frequencies of a 48" Tube Closed at One End

<table>
<thead>
<tr>
<th>Wave Number</th>
<th>Frequency ( \text{N}^*C/4L )</th>
<th>Nearest EQT Note Frequency</th>
<th>Equal Tempered Note Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>69.4</td>
<td>69.3</td>
<td>C#2</td>
</tr>
<tr>
<td>3</td>
<td>208.1</td>
<td>207.6</td>
<td>G#3</td>
</tr>
<tr>
<td>5</td>
<td>346.9</td>
<td>349.2</td>
<td>F4</td>
</tr>
<tr>
<td>7</td>
<td>485.6</td>
<td>493.9</td>
<td>B4</td>
</tr>
<tr>
<td>9</td>
<td>624.4</td>
<td>622.3</td>
<td>D#5</td>
</tr>
<tr>
<td>11</td>
<td>763.1</td>
<td>784.0</td>
<td>G5</td>
</tr>
<tr>
<td>13</td>
<td>901.9</td>
<td>880.0</td>
<td>A5</td>
</tr>
<tr>
<td>15</td>
<td>1040.6</td>
<td>1046.5</td>
<td>C6</td>
</tr>
<tr>
<td>17</td>
<td>1179.4</td>
<td>1174.7</td>
<td>D6</td>
</tr>
<tr>
<td>19</td>
<td>1318.1</td>
<td>1318.5</td>
<td>E6</td>
</tr>
</tbody>
</table>
In the western music that the cornet is designed to play, the scale used is called the equal tempered scale: Within an octave, 12 note pitches are assigned, separated by equal intervals defined by a mathematical relationship of $12\sqrt{2}$. The equal tempered pitches are adjusted from mathematical interval relationships that can be naturally generated, such as in a closed or open tube, in order to compensate for tuning errors. These errors occur when different key notes for an octave are used and increase over a number of octaves. In instruments with fixed tuning, such as the piano, the errors could be eliminated by creating a very large number of notes matching the required frequencies for different keys, but this solution is considered impractical.

Not only are a number of the obtainable frequencies of a closed tube not close to the equal tempered notes (note names shown as shaded in Table 6), but those that are available do not form a harmonic series, and many series notes are missing. Where note spacing is closer together, at the high frequency end, there are more tube notes nearer to scale notes. However, notes higher than the E6 are not often musically useful, and would likely be difficult to play well. This tube would not make a very good instrument.

A scale developed based on the closed tube frequencies would be poorly tuned and missing notes. For a tube open at both ends, both even and odd frequency multiples of the fundamental are possible. A historically common scale developed from frequencies where intervals between notes are small number ratios of a base, or key, note is called the just intonation scale, although it is uncommon today. There is a close relationship between just intonation and the harmonic series naturally generated in simple open or closed cylindrical tubes. The discrepancy between the pitches of just intonation and the pitches of the equal tempered scale are shown in Figure 23 using the
A-440 note as a base. The tuning differences are given in units of “cents” which are of variable size, and divide the interval between each semi-tone into 100 equal parts.

Figure 23: Equal Temperament Tuning Differences Compared to Just Intonation
Resonant frequencies of simple cylindrical tubes do not closely match frequencies required for the equal tempered scale. Instrument makers have discovered ways to adjust tube geometry in order to better align the resonance peaks to match the tube frequencies with the musical scale.

**Instrument Design**

A major goal in an instrument design is to produce notes of the scale. The fundamental of a tone will be recognized as the pitch, and the higher harmonics contribute to the timbre. In order for the tone to sound ”good”, the intonation of both the fundamental and the harmonics must be accurate. Since a whole number ratio harmonic series is naturally generated, there will be some differences between the ideal harmonic frequencies and those derived from the equal tempered scale notes. Harmonics which are just slightly out of tune can combine to produce beat tones, which are low frequency sounds perceived when two note frequencies almost coincide, or are related by a very nearly whole number ratio.

The addition of the flared bell and the mouthpiece to an instrument based on a cylindrical tube can greatly improve both the harmonic tuning and the stability and support of desired frequency of oscillations. In addition to these major factors, minor characteristics such as necessary bends in the tubing and diameter discontinuities of tuning slides can affect the note and harmonic tunings. It is even possible to adjust an individual harmonic frequency or a standing wave node by minor alterations of the tube at specific locations. An instrument maker must carefully balance and combine the geometries of the tube, mouthpiece volume, backbore, mouthpipe, and bell flare in order to construct an instrument that produces notes corresponding to the equal
tempered scale pitches, with a well-tuned harmonic series for each note. Figure 24 shows a typical 19th century cornet (1885 Conn, Faust Collection) with all of these parts identified.

The addition of a mouthpiece to the tube will make some beneficial changes to the natural frequencies. A brass instrument mouthpiece is a cup shape, with a narrow exit leading to a tapered back bore which expands to fit the lead pipe diameter. The cup volume possesses its own widely peaked natural frequency, which for a cornet is typically centered between 750 and 850 Hz. This cup resonance acts to amplify the tube frequencies occurring close to its resonance relative to those lower or higher. Additionally, the tapered back bore and a slight taper to the lead pipe section into which the mouthpiece fits act to constrict the tube towards the closed end, which reduces spacing between the higher resonant frequencies.154
A flared bell is added to the open end to make additional corrections to the resonant frequency locations. It also has a consequence of improving the radiation of higher frequencies into the room. The appropriate expansion of the bell can be determined mathematically and essentially acts to change the acoustic boundary location depending on the frequency of the standing wave, effectively changing the tube length as a function of frequency. By allowing the highest frequency range of the original standing wave to cross the boundary and radiate into the room, those high frequencies are diminished in the standing wave set. The bell also moves the lower resonant frequencies of the instrument closer together.\textsuperscript{155}

The effect that these two changes (bell and mouthpiece) can have on available notes can be seen in Figure 25, which is reproduced from \textit{The Trumpet and Trombone} by Phillip Bate. In this figure, the note series for a complete trumpet is shown on the right, and closely approximates a harmonic series. The fundamental of this series would occur at the solid black note, but the actual note obtained is significantly lower in pitch. This occurs for all trumpet-like instruments, including the cornet, making the fundamental unplayable. The bell and mouthpiece cannot adjust the fundamental peak sufficiently, therefore, the first peak in the instrument response and the impedance curve does not contribute to support of the desired oscillations. It is present as part of the impedance curve, but is not considered as part of the harmonic series.
It can be seen in Figure 25 that the notes which are produced in a harmonic series of a straight tube are not a complete scale, especially at the low end. Such an instrument would be useful for playing only certain notes. Natural trumpets (without valves) are typically used in the fourth octave of the harmonic series, where note
spacing is closer. However, these closely spaced notes require more skill and control on the part of the player in order to play them accurately and consistently.

Increasing the length of an instrument would linearly decrease the fundamental frequency of the lowest note and allow a different series to sound, which would include some of the missing notes. By incrementally adding tube lengths, a set of series can be produced which completely fill in the gaps in the scale, allowing the entire chromatic range of notes to be produced. This was accomplished historically by giving the player a set of short “crooks” of tubing of varying lengths which could be inserted after the mouthpiece. Sometimes, an entire set of instruments of different overall lengths was made. Often the former solution required quick change of the crooks, and the latter required players to possess several complete instruments. Both solutions were somewhat impractical.

Once valves were added to brass instruments, it was possible to obtain all the chromatic notes in one instrument. In a three-valve instrument, this is accomplished as follows: The valve closest to the player (V1) adds length to lower the base pitch 1 whole tone. The middle valve (V2) adds a shorter length which lowers the base pitch by 1 semi-tone. The last valve (V3) adds the greatest length which lowers the base pitch by 1 and a half tones. As shown in Table 7 these valves are used separately and in multiple combinations to lower the base pitch over a range of between 1 semi-tone and a diminished fifth.\textsuperscript{157}
Table 7: 3-Valve Combinations

<table>
<thead>
<tr>
<th>Combination</th>
<th>Harmonic Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>V0 No valves depressed</td>
<td>Original Harmonic Series</td>
</tr>
<tr>
<td>V2 depressed</td>
<td>Series begins one semi tone lower</td>
</tr>
<tr>
<td>V1 depressed</td>
<td>Series begins one whole tone lower</td>
</tr>
<tr>
<td>V1 and V2 depressed</td>
<td>Series begins one whole tone plus one semi-tone lower (minor third)</td>
</tr>
<tr>
<td>V2 and V3 depressed</td>
<td>Series begins two whole tones lower (major third)</td>
</tr>
<tr>
<td>V1 and V3 depressed</td>
<td>Series begins two whole tones and one semi-tone lower (perfect fourth)</td>
</tr>
<tr>
<td>V1, V2 and V3 depressed</td>
<td>Series begins three whole tones lower (diminished fifth)</td>
</tr>
</tbody>
</table>

There is an inescapable effect of using the valves in combinations, which creates another inherent reason for mistuned notes. The length of tubing added for individual valves is based on the main instrument tubing length, and for the equal tempered scale, V2 adds length of a ratio of \( \sqrt[12]{\frac{1}{2}} \), or 5.95 percent of the main length. In order to lower the base pitch by one whole tone, V1 must add \( \sqrt[12]{\frac{1}{2}} \), or 12.2 percent, of the original tube length. For one and one half tones, V3 adds \( \sqrt[12]{\frac{1}{2}} \), or 18.9 percent. Whenever two or more valves are used together, the percent length required to be added must be determined by using the increased base length of whatever the first valve adds, which will always be longer than the main tube length. Because valve tubing additions are calculated based on the shorter main tube length, extra length added by one or more valves used in combination will always be incorrect, and the note produced will be either sharp or flat depending on the length error.\(^{158}\)

Instrument makers provide a means of making slight adjustments to the tubing lengths added by each valve. At the sharp return bend in each valve tube, a removable slide is added. This tuning slide fits tightly, and can be adjusted in or out as needed. The main instrument tubing also has a tuning slide at its first or second sharp bend, often before any valves. (see Figure 24). These slides can be set to make minute adjustments to the playable notes.
Although the tuning slides cannot eliminate the inherent tuning problem of valves used in combination, they do permit some compromises which can act to distribute the errors to minimize their worst effects. Several different compromises are possible: Each individual valve can be set to produce its fundamental note accurately; V1 and V2 can be set for accuracy, and V3 is adjusted so that the V1+V3 combination produces a tuned note; or, V1 and V2 can be set for accuracy, and V3 is adjusted so that the V2+V3 combination produces a tuned note. For all of the measurements made which are discussed in chapter 6, the second option has been used. The results of the V1+V3 compromise are shown in Table 8.

Table 8: Valve Tuning Compromise with V1, V2 and the V1+V3 Combination

Set Exactly

<table>
<thead>
<tr>
<th>note name</th>
<th>equal tempered ratio</th>
<th>valve combination</th>
<th>V1+V3 set actual valve tuning ratio</th>
<th>tuning error cents</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>2.00000</td>
<td>V0</td>
<td>2.0000</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>1.88775</td>
<td>V2</td>
<td>1.8878</td>
<td>0</td>
</tr>
<tr>
<td>Bb</td>
<td>1.78180</td>
<td>V1</td>
<td>1.7818</td>
<td>0</td>
</tr>
<tr>
<td>A</td>
<td>1.68179</td>
<td>V12</td>
<td>1.6920</td>
<td>11</td>
</tr>
<tr>
<td>Ab</td>
<td>1.58740</td>
<td>V23</td>
<td>1.5726</td>
<td>-16</td>
</tr>
<tr>
<td>G</td>
<td>1.49831</td>
<td>V13 or V0</td>
<td>1.4984</td>
<td>0</td>
</tr>
<tr>
<td>Gb</td>
<td>1.41421</td>
<td>V2</td>
<td>1.4143</td>
<td>0</td>
</tr>
<tr>
<td>F</td>
<td>1.33484</td>
<td>V1</td>
<td>1.3349</td>
<td>0</td>
</tr>
<tr>
<td>E</td>
<td>1.25992</td>
<td>V12</td>
<td>1.2677</td>
<td>11</td>
</tr>
<tr>
<td>Eb</td>
<td>1.18921</td>
<td>V23</td>
<td>1.1782</td>
<td>-16</td>
</tr>
<tr>
<td>D</td>
<td>1.12246</td>
<td>V13</td>
<td>1.1226</td>
<td>0</td>
</tr>
<tr>
<td>Db</td>
<td>1.05946</td>
<td>V123</td>
<td>1.0747</td>
<td>25</td>
</tr>
<tr>
<td>C</td>
<td>1.00000</td>
<td>V0</td>
<td>1.0000</td>
<td>0</td>
</tr>
</tbody>
</table>
When valves were initially added to instruments, there were many contributors to degrade the sound: physical configuration of the tubing; the valve type and action; and shape and direction changes of the tube as it entered and left each valve. Over time, these problems have been largely overcome, and today valve-length induced tuning errors are minimized by an added finger ring to the tuning slide for V1 and/or V3. The player can make adjustments as needed by moving the valve slides as a note is sounded. However, in the mid to late 19th century, the finger slides were rare.

In considering the causes of the perception that open notes sounded better than valved notes, the construction and evolution of the piston valves used in cornets of European and American manufacture should not be ignored. This history has been researched by musicologists, and although some uncertainties remain, major developments are known. Both rotary and piston valves were applied to cornets and trumpets, with the rotary valves being popular in Germany, and piston valves predominantly used in Europe, England and the United States. The first patented piston valve design of 1818 never became widely used.

Although a variety of designs for piston valve were built beginning about 1820, two found widespread acceptance during the 19th century. In the Stöelzel valve, the tubing entered on the side, and exited straight out of the valve bottom. The valve passages through the piston were made straight across and sometimes smaller than the instrument tubing. These factors necessitated sharp corners and some constriction in the windway, which would have led to inefficiencies in its performance. In the Périnet style piston valve, tubing entered and exited on the side, and valve passages were diagonal, sometimes curved, and maintained the same diameter as the tubing. This
allowed for a smaller, faster response and fewer losses. By 1850, the Périnet style valve had began its eventual domination over other designs, and was also being continually improved.\textsuperscript{160}

Poor early valve designs and the inconsistencies of hand-manufacture very likely contributed to poor acoustic performance in valved instruments in the mid-19th century. It is possible that perceptions of unacceptable valved notes continued even as designs and performance improved. These improvements occurred over time and geography, and it is likely that perceptions and acceptance of valved instruments did as well.

Another lesser reason exists for mistuning in valved notes: Tubing added by the valves is cylindrical, partly to accommodate the need for the tuning slides. The cornet is constructed and optimized for a particular combination of cylindrical and conical tubing. As different valve combinations are used the proportions of cylindrical to conical tubing change, and this can cause minor alterations in the harmonic alignments.

The harmonics generated by real instruments are not mathematically pure, nor completely equally tempered. The suitability of the internal impedance spectrum to support external notes of the instrument depends on the skill of the maker. In the 19th century, instruments were hand-crafted by skilled individuals, but with no access to advanced manufacturing technology and processes available today, results were inconsistent. This affected the quality of tone obtainable.

The internal spectrum of an instrument air column, measured or specified by the input impedance, will collaborate with the player’s lips to produce “a steady oscillation containing several harmonically related frequency components.”\textsuperscript{161} This collaboration has been called a \textit{regime of oscillation} to describe the interaction between the air
column and the excitation energy source. It is affected by the peak locations and their width, dynamic level (loudness), the player’s ability, and the geometry of the instrument, among other factors. The regime of oscillation concept was studied extensively by Arthur H Benade and his students at Case Western Reserve University throughout the 1970’s and 1980’s. The concept is often presented graphically by an input impedance curve superimposed with harmonic series frequency components. Such a diagram is reproduced below in Figure 26 illustrating how two notes of a trumpet are supported by the impedance peaks.

Figure 26: Benade’s Illustration of a Regime of Oscillation
At low dynamic levels, the first impedance peak has the greatest effect on the tone, and an output is produced with nearly only this one frequency component. As the dynamic level increases, upper resonances begin to contribute, and the sound becomes richer in harmonic components. It has been shown\textsuperscript{163} that the magnitude of a harmonic component in the external sound will depend on the height of the impedance peak at the given frequency. If a given impedance maximum is not properly placed on the frequency scale, (out-of-tune) the height of the harmonic that would be supported by that peak will be reduced. This is how the tuning of the impedance peaks contributes to the contents of the external harmonic spectrum: Poor intonation of the impedance peaks can adversely affect the harmonic characteristics of the external tone. Some components might be greatly reduced or missing and this would contribute to a perception that the played tone “sounds bad.”

It will be the goal of the final chapter to present measurements of input impedance of a number of 19\textsuperscript{th} century instruments and analyze these measurements to determine if differences in the tuning of the harmonics for valved or open notes can be seen and contribute to the perception that open notes of these instruments sound better.
CHAPTER 6 - MEASUREMENT TECHNIQUE AND RESULTS

The experimental goal is to measure the acoustic response of a number of 19th century cornets to determine quantitatively any observed differences in factors which may affect the tone quality between open and valved notes. This will be achieved through measurement of the input impedance for each valve combination. Previous work of a number of researchers has shown that certain characteristics of the impedance curves are known to affect instrument performance. Current experimental results will be analyzed in a number of ways to evaluate these characteristics.

Input Impedance: Overview of Theory and Measurement

The property of acoustic impedance seems not to have been defined until early in the 20th century. Impedance was first treated analytically in 1929 by Henri Bouasse, who believed that brass instruments would possess natural frequencies closely related to the played note harmonics. He also mathematically described the interaction between the impedance peaks and the non-linear flow of air through the player’s vibrating lips.

Derivations of mathematical representations of input impedance can be found in a number of texts. In Fletcher and Rossing’s The Physics of Musical Instruments (1998), an expression for input impedance in finite cylindrical pipes is developed as follows:

Impedance is defined as pressure divided by volume flow velocity, both of which are functions of position along the tube (x) and time (t). Both pressure and flow are also considered as superpositions of components traveling in opposite directions. Because there can be phase differences between the two components, they are represented as complex functions:
Equation 2: Pressure Function

\[ p(x,t) = [Ae^{-jkt} + Be^{jkt}]e^{jot} \]

Equation 3: Volume Velocity Function

\[ U(x,t) = \left( \frac{S}{cho} \right) [Ae^{-jkt} - Be^{jkt}]e^{jot} \]

In both equations 2 and 3, A and B represent the amplitude coefficients of the left and right traveling waves, respectively. k is the wave number \((\omega/c)\), S is the cross-sectional area of the pipe, \(\rho\) and c are the density of and speed of sound in the medium and j is the usual complex operator. Given known values of impedance at \(x=L\) and \(x=0\) \((Z_L = \text{terminating impedance and } Z_0 = c\rho/S)\), an expression for the ratio B/A can be determined. Then, dividing \(p(x,t)\) by \(U(x,t)\) and simplifying gives an expression for the input impedance (at \(x=0\),

Equation 4: Input Impedance Function

\[
Z_{IN} = Z_0 \left[ \frac{A + B}{A - B} \right] = Z_0 \left[ \frac{Z_L \cos kL + jZ_0 \sin kL}{jZ_L \sin kL + Z_0 \cos kL} \right]
\]

Two simple, ideal cases for known end conditions can be easily extracted from this equation. For a pipe stopped at the far end, \((x=L)\), \(Z_L=\infty\) and \(Z_{IN} = -jZ_0 \cot kL\). For a pipe open at \(x=L\), \(Z_L=0\) and \(Z_{IN} = jZ_0 \tan kL\). For a pipe ideally open at \(x=0\), resonance will occur when \(Z_{IN}=0\). In an ideal pipe stopped at one end and open at the other (such as a brass instrument), the zeroes of \(Z_{IN}\) will occur when \(\cot kL \text{ or } \cot (\omega/c)L=0\) which gives the ideal resonance frequencies \((\omega = 2\pi f)\) as shown earlier in Table 5:
Equation 5: Closed-Open Tube Resonant Frequency

\[ f_n = \frac{(2n-1)c}{4L} \]

The equation for \( Z_{IN} \) can be further developed to account for wall losses by allowing \( k \) to be represented as a complex number, \( k = \omega/v - j\alpha \) where \( v \) and \( \alpha \) are the phase velocity and an attenuation coefficient, respectively. Both values depend on the medium and the physical ratio of the pipe diameter to length. Substitution of this expression for \( k \) into Equation 4 and simplification results in this expression for the input impedance of an ideally open pipe:

Equation 6: Input Impedance with Wall Losses

\[
Z_{IN} = Z_0 \left[ \frac{\tanh \alpha L + j\tan(\omega L/v)}{1 + j \tanh \alpha L \tan(\omega L/v)} \right]
\]

The maxima and minima of \( \tan(\omega L/v) \) occur near the points where the tangent function is undefined \( (x=(2N-1)\pi/4) \). These values for the argument will also be the maxima and minima of the input impedance. The magnitude of these maxima and minima are, respectively, \( Z_{IN,\text{max}} = Z_0 \coth \alpha L \) and \( Z_{IN,\text{min}} = Z_0 \tanh \alpha L \). Since \( \alpha \) is frequency dependent, both maxima and minima will decrease as frequency increases: the series of impedance peaks will converge towards the value \( Z_0 \). For diameter and length dimensions typical of brass instruments, the impedance curve predicted by Equation 6 is reproduced from Fletcher and Rossing, pg 204, as Figure 27.
Further theoretical development can include cases more relevant to musical instrument geometry. Shapes such as conical sections, compound straight pipes and cones, and horn shapes are treated in a similar fashion as above, where the cross sectional area is a function of the $x$ position along the axis of the given shape. Effects can also be included which account for frictional and thermal losses and radiation from the open end for various bell shapes. Computer based numerical methods using finite element modeling can now analyze and predict impedance behavior for extremely complex, but very realistic instrument shapes. Additionally, work has also been accomplished in modeling the behavior of the lips as a non-linear flow control and the interaction of the instrument, lips and mouth and vocal cavities.

It is possible to measure the impedance of simple shapes or real instruments. Systematic measurement of the acoustical properties of musical instruments became possible with the use of oscilloscopes, strip chart recorders, microphones, and other electronic devices beginning in earnest in the second half of the 20th century. For brass and wind instruments, these techniques utilize an energy or audio source coupled to the
mouthpiece end of the instrument, and pressure or audio sensors which record the instrument response. Measurement systems have taken many forms and most include a fairly involved process for calibration which is necessary in order to measure impedance in absolute units.\textsuperscript{170} Researchers have investigated diverse topics such as aural perception, playing techniques, detailed instrument profiles, and acoustic and physical characteristics of the instruments themselves. Many individuals and institutions around the world have been conducting research and improving techniques. In recent years, measurement systems have been developed which make use of the powerful abilities of computer-based hardware and software for recording, analysis, and modeling. One such system now commercially available is BIAS, developed at Institut für Wiener Klangstil in Vienna.\textsuperscript{171}

The acoustic energy input to the instrument under test is often an ideal sine wave whose frequency can be varied over a range of interest. It is also possible to measure properties of the instrument with a short impulse of energy. In much the same way as the standing wave visualization was described in chapter 5, the impulse travels along the length of the instrument from mouthpiece to bell, where it reflects off of the acoustic boundary and returns to be recorded. Additionally, some small part of the signal will reflect off of any section change or irregularity inside the bore of the instrument. With sufficiently sensitive measurement, and some processing of the results, these reflections can be used to reconstruct the internal bore profile. This technique is called pulse reflectometry, and has been developed to a high degree of accuracy.\textsuperscript{172}

The theoretical representation of impedance contains both real and imaginary components, and with many experimental techniques, it is possible to measure both.
The technique to be used in this study is discussed below, and will include measurement of the impedance magnitude only, without consideration of the phase difference between pressure and volume flow. Therefore, it is a measurement of only the real component of impedance. The characteristics of impedance of greatest interest are the frequency and to a lesser extent, magnitude of each peak. Near the impedance maxima, the phase angle is typically near zero, and the near zero imaginary component is assumed to have negligible effect on the frequency and amplitude of impedance at these points. Further, if damping is neglected in a standing wave, oscillations will have the same phase between nodes with the entire phase change occurring across the node (at resonance) and no information is gained by observing or recording the pressure phase.

Under actual playing conditions, the real and imaginary components of the instrument impedance interact with the real and imaginary components of the non-linear lip valve. This interaction will normally result in a slight increase in operating frequencies above the passive resonance frequencies.

For the purposes of this study, analysis and comparison of the 19th century instruments will concentrate on the objective measurement of the internal impedance characteristics only. However, the ideal arrangement and tuning of the impedance peaks is not a question with a single, obvious answer. Given any fundamental note to be played as a part of the equal tempered scale, the naturally generated harmonics are integer multiples of this fundamental. Placement of the natural harmonics may have been altered by the effect of the mouthpiece, bell, tubing curves and cross-sectional discontinuities in the valves and tuning slides. But because of equal tempered tuning,
these natural harmonics are likely to be out of tune with an equal temperament spectrum, depending on their harmonic number (refer to Figure 23 pg 135). The perceived quality of a played note (consonance or dissonance) depends partially on how its harmonics are related to the scale that is being played.176

On one hand, ideal harmonic alignment is beneficial for maintaining a strong regime of oscillation and stable standing wave oscillations. On the other hand, exact harmonic alignment and narrow peaks would make it difficult for a player to lip a note for tuning accuracy or artistic purposes. The player’s lip control (embouchure) would have to be precise for the excited frequency to match the narrowly available supporting regime. Some peaks must sometimes act to support a fundamental and sometimes as a member of the numerically related harmonic series of a different fundamental. In the former case the peak frequency should match equal temperament and in the latter case the peak frequency should match the whole number harmonics. Some impedance peaks support multiple regimes (for instance the even numbered ones) while others support only one. Therefore, the actual intentional placement of each peak would be a compromise between its function as harmonic support of different fundamentals or as a fundamental itself.177

These concepts can be illustrated in Figure 28, which is a typical measured impedance curve obtained for this study. The information presented in Figure 28 includes an impedance curve for valve combination V12 and frequencies of the associated regimes of oscillation. Peak 2 (note G3) is considered the first peak of the regime built on the harmonic series of note G3. The first peak of the curve cannot act as the fundamental of each series: G2 would not be playable on this instrument because of
the poor spacing of the peak relative to the note. Each succeeding peak of the regime is an integral multiple of the fundamental G3, not of equal tempered notes. The set of regimes is generated based on the harmonic series of the missing fundamental G2, as equal tempered notes which closely match pitch with each of the numbered peaks. This same set of notes is that which a player would naturally obtain by increasing lip tension while not changing the valve combination (G2, G3, D4, G4, B4, D5, F5, G6).

Figure 28: Illustration of Impedance Peaks and Regime Support
As an example of a single impedance peak participating in more than one regime, with an associated dual ideal frequency, the function of peak 10 in Figure 28 may be considered. This peak comprises the fifth peak of the first (G3) regime and the second peak of the fourth (B4) regime. As the fifth integral multiple of G3, its ideal frequency would be 980 Hz, while as the second integral multiple of the fundamental B4, its ideal frequency would be 987.8 Hz. Similar corresponding frequency values are given in Table 9.

**Table 9: Numbered Peak Functions in Different Regimes**

<table>
<thead>
<tr>
<th>Peak Name</th>
<th>Name</th>
<th>Regime Function</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEAK 6 599</td>
<td>3G3</td>
<td>3\textsuperscript{rd} harmonic support of EQT G3</td>
<td>588</td>
</tr>
<tr>
<td></td>
<td>D5</td>
<td>2\textsuperscript{nd} harmonic support of EQT D4</td>
<td>587.3</td>
</tr>
<tr>
<td>PEAK 10 992</td>
<td>5G3</td>
<td>5\textsuperscript{th} harmonic support of EQT G3</td>
<td>980</td>
</tr>
<tr>
<td></td>
<td>B5</td>
<td>2\textsuperscript{nd} harmonic support of EQT B4</td>
<td>987.8</td>
</tr>
<tr>
<td>PEAK 12 1198</td>
<td>6G3</td>
<td>6\textsuperscript{th} harmonic support of EQT G3</td>
<td>1176</td>
</tr>
<tr>
<td></td>
<td>D6</td>
<td>4\textsuperscript{th} harmonic support of EQT D4</td>
<td>1174.7</td>
</tr>
<tr>
<td>PEAK 14 1415</td>
<td>7G3</td>
<td>7\textsuperscript{th} harmonic support of EQT G3</td>
<td>1372</td>
</tr>
<tr>
<td></td>
<td>F6</td>
<td>2\textsuperscript{nd} harmonic support of EQT F5</td>
<td>1396.9</td>
</tr>
</tbody>
</table>

The height of the set of impedance peaks will have an effect on an instrument’s playability and tone quality. When a player attempts to switch from one regime to the next by a change in lip tension, a consistency in the response of the instrument will allow a more predictable playing technique. A smooth change in the height of adjacent peaks would support this.\(^{178}\) As an illustration, the peaks heights for the instrument and valve combination shown in Figure 28 are plotted in Figure 29. This example shows very inconsistent peak height characteristic, and will be discussed further in the results section of this chapter.
Changes in dynamic playing level modify the contributions of each peak in a regime. At low levels, the first peak comprises nearly the entire support, which is one reason it is difficult to play some notes softly and in tune. As dynamic level increases, additional peaks add their support to the regime and the richness of the note increases as higher harmonics become significant. The progressively increased weighting of higher peaks at higher dynamic levels has been recently modeled in the BIAS system. Although this study will not consider the instrument response to a change in dynamic level, the height of the impedance peaks should still prove valuable in comparing instrument characteristics.

The width of the resonant response has also been shown to be a factor in evaluation of instrument tuning, but will not be considered in this study.
Proposed Measurement Technique

The concern of this study is primarily that of comparing tone quality of open and valved notes for cornets, primarily those of the late 19th century. Measurement of the intonation of the overtones, and a number of other characteristics of the impedance spectrum of such instruments for various valve configurations will be used for this comparison. Recorded external spectrum of played notes will be briefly discussed.

Measurement of the impedance spectra will demonstrate characteristics of the instrument only. Therefore, this does not give the same information as an analysis of the sound that is actually heard by a listener. It does not take into account the individual skill of a player. An experienced player will listen to the sound that is produced, and make minute and nearly instantaneous adjustments in lip tension or breath to modify the note if needed. Different styles of music also make use of different playing techniques. Skill level of players varies greatly, and it may be difficult to tell whether a player’s abilities or an instrument’s characteristics are responsible for any poorly sounded notes. The internal impedance measurement does not allow for interaction between the player’s vocal tract, lip vibrations and the instrument itself and removes any subjective effects.

The technique used for obtaining measurements in this study is a slight modification of one originally described by Benade and Ibisi (1987), and further discussed by Peter Hoekje in a workshop and subsequent paper from a 2006 colloquium at the Center for Computer Research in Music and Acoustics \(^{181}\). This technique uses a piezo disk as the audio source and a small, inexpensive microphone as the sensor.
Benade’s theoretical analysis of the disk/instrument resonator system concludes that “If the stiffness of the piezo electric disk is sufficiently large relative to the highest possible input impedance of the air column under study, then the acoustical pressure observed at the input end of the air column is an accurate measure of the air column’s own input impedance.” The only caution is that both a magnitude and phase error will be introduced when the system is used close to the resonance frequency of the disk.

The disk is similar to those used to play sounds in toys and greeting cards. Stainless disks manufactured by Murata, 7SB-34R7-3C are used. The diameter is 34.7mm, thickness 0.5mm and resonant frequency is 3.1 KHz. All frequencies of interest for the present study are 2000 Hz or below, so the higher disk resonance will not affect these measurements.

Each cornet mouthpiece is fitted with the piezo disk, attached by blue-stick adhesive putty. The putty is applied to the disk in a thin bead around the edge to minimize extra volume added to the mouthpiece. The “original” instrument mouthpiece may then be used without risk of damage by stronger adhesives. Early development of the technique used a PVC plumbing compression-type fitting with rubber gasket to connect the disk to the mouthpiece (epoxied to the opposite end of the fitting). This added a large volume to the mouthpiece, thus changing its effective peak response frequency with corresponding undesirable shift in the envelope of the impedance peaks of the instrument. The use of epoxy to mount the disk directly on a representative mouthpiece was considered, but judged less than ideal since the mouthpiece matched to each instrument can be a critical element in determining acoustic characteristics. For the
particular size of disks used, the epoxy around the inner edge of the mouthpiece rim also reduced the amount of disk free to vibrate, affecting volume and frequency response.

The small electret microphone is attached on the inside wall of the mouthpiece cup by a small dot of blue-stick, and the microphone wires are routed between the disk and the mouthpiece rim. The microphone is a Jeou Luen JL-4015C, has a diameter of 4.0 mm, frequency response of 50-16000 Hz, and signal to noise ratio of >60 dB.

The wires coming from the disk and the microphone are gathered together for stress relief and each device has its own 1/8” plug for connection to a PC. Both devices are connected through a PC sound card, and audio software is used to play a sine sweep signal and record the instrument’s response. The PC headphone output is amplified through an external, AC powered op-amp circuit before being sent to the disk to provide appropriate signal level. The microphone signal goes directly to the PC microphone input. An instrument, test device, and the PC set up and ready for testing are shown in Figure 30.
At the PC, a freeware program called Audacity\textsuperscript{183} is used to play a sine sweep signal of 20-2000 Hz, with a 6 dB attenuation per decade. This signal was generated by audio software with an 8000 Hz sampling rate. Other investigators have used the sine sweep with acceptable results.\textsuperscript{184} The attenuation compensates for disk motion to approximate constant volume velocity so that the microphone pressure signal is approximately proportional to the input impedance.\textsuperscript{185} Each recording cycle repeats the sine sweep 4 times. The first 3 cycles of the recorded sound are selected by the cursor, and from the “Analyze” window, “Plot Spectrum” is used to obtain a frequency based result. Settings for the FFT spectrum are: Hanning window; the maximum number of points, 16384; a linear frequency scale. The 8000 Hz sine sweep sampling rate gives an FFT up to 4000 Hz with over 8000 data points. Data up to 2000 Hz is used for analysis.
Figure 31 shows the Audacity window for a typical test. Figure 32 shows a typical FFT result.

**Figure 31: Audacity Window: Sine Sweep and Cornet Response**

**Figure 32: Audacity Window: FFT Spectrum**
The FFT spectrum data is exported as a text file to EXCEL, and used in plotting impedance curves. Further analysis and comparison of results is done in EXCEL, and will be described below.

This measurement technique is inexpensive, portable, uncalibrated, and is not as rigorous as those used by other investigators. However, it can be shown to give accurate results for the measurements of interest: the frequency values of the impedance peaks, and to a lesser extent, their levels. As an initial test of the technique, a metal tube, ¾” in diameter and 48” long was tested. The disk was attached to the tube end, with the microphone just inside, attached to the tube wall. The theoretical natural frequencies of this tube can be calculated (see chapter 5). A test as described above for this tube produces the graph shown in Figure 33. The differences between measurement and theory (no losses or end effects) are less than 3 Hz below 766 Hz, with a maximum difference of 10 Hz at 1745 Hz. Below about 200 Hz, some signal noise is evident, and the data at and below 60 Hz is discarded as unusably noisy. The lowest frequencies of interest are those for the maximum valve length added on an A natural instrument: Eb3 at 156 Hz. Some of the lowest frequency measurements could be affected by this noise.

If published impedance curves are compared to Figure 33, differences in peak level at low frequencies are noted. In published curves, the fundamental is typically the highest peak, and levels gradually drop off. The results below show lower peak levels at low frequencies. A number of factors may account for this: The pipe used in this test was larger diameter than typical instrument tubing, giving a larger diameter to length ratio than published results. Although the microphone specifications list a flat response
down to 50 Hz, the disk response at low frequencies is unknown, and a lower level for the sound input would create a lower impedance measurement. The sine sweep rate for the lowest frequencies might not allow sufficient time for the standing waves to develop. However, it will be seen from the actual impedance measurements that the mouthpiece has a marked attenuation on these lower resonances, reducing the effect of this inaccuracy.

Figure 33: Straight Tube Impedance Measurement
Adding a large trombone mouthpiece to the test tube produces the measured impedance curve of Figure 34. This shows the expected effect of boosting the level of peaks near the mouthpiece resonance, while reducing those farther away. The peaks are also drawn closer together along the frequency axis. The noise seen at several regions in the higher frequency range is typical when the blue-stick putty is used with a mouthpiece. Most of this noise occurs at frequencies above the impedance peaks measured for cornets.

![Figure 34: Straight Tube with Mouthpiece](image-url)
A final qualitative test of this measurement technique demonstrates the effect of adding a bell described in chapter 5. In this test, the bell used is approximately 24” long, and a shorter piece of straight tube was used, to give a total length of 48”. In Figure 35, the higher frequency peaks are greatly reduced, or disappear, as expected.

Figure 35: Straight Tube with Bell
Other tests were run on a sample instrument to determine the sensitivity of this technique. Frequency and level differences could be detected in the impedance curves for loose mouthpieces or leaks in the tubing, small objects placed in the instrument tube, and small objects placed in the bell.

For the cornets tested in this study, a standard method of set-up was developed. Before each test series of all valve configurations, the volume levels are set as follows: Output to the disk is set with the V0 valve configuration. A high signal level sent to the disk would produce a distorted sine, which would add undesirable high frequency components. This distortion produces an obvious change in the timbre of the output sound, so the volume is decreased until a pure sine is heard. The sweep is played while simultaneously recording the microphone input, and microphone level is then adjusted to the maximum level possible without clipping of the recorded wave, detected visually in the Audacity audio track. High frequency artifacts in the FFT would result from a clipped recording. Both volume adjustments are made using a combination of the PC volume and the Audacity speaker and microphone adjustments.

Each cornet is tested with available crooks or shanks, in the usual key of Bb, sometimes A, and others as available. An integral part of the testing procedure is setting the tuning slides in a repeatable and systematic manner as follows: First, for V0, a run is made, the Audacity FFT plotted, and the peak frequency of the second harmonic (read in the Audacity FFT maximized window) of the series is compared to a theoretical value. The second peak is used because of the signal noise present at low frequencies. This noise could introduce uncertainty in the first peak results for some valve combinations. The cursor can be placed over the visual peak and moved back and forth, giving a
numerical reading in the FFT window. If that peak frequency is too low, no instrument adjustment can be made. If the peak frequency is too high, the main tuning slide is adjusted outward. Another run is made, and 2\textsuperscript{nd} peak frequency is checked again. This process is repeated until the peak is within approximately 1 HZ of theoretical. The resulting full spectrum FFT is then exported and saved as the V0 spectrum. The same process is repeated for V2 with adjustments made to tuning slide 2, and V1 with adjustments made to tuning slide 1. The full spectra for V12 is then taken and exported. For the third valve setting, the V13 combination is used, again comparing the 2\textsuperscript{nd} harmonic peak to theoretical. The V1 tuning slide is not changed, all adjustments are made to the V3 tuning for V13. This corresponds to the tuning compromise discussed on page 142. Spectra for V13, V23, and V123 combinations are then obtained and exported.

Data analysis begins by collecting all seven of the FFT files in one EXCEL file. The FFT exported files are text files with two columns: one is frequency and one is audio level in dB. Each file is opened and the audio level columns are pasted into one EXCEL spreadsheet. One frequency column is also pasted in to serve as the x-axis data. This raw data is saved and then transferred to a pre-configured worksheet which will produce the valve configuration impedance graphs including the oscillation regime’s harmonic series values. A sample impedance curve has been shown in Figure 28.

Each data column is then manually examined for peak frequencies and dB level values, which are transferred to a preconfigured section of another worksheet containing theoretical tuning values. The output of this preconfigured section is a set of
calculated differences between measurement and theoretical values for each oscillation regime, and several plots of the harmonic tuning for each valve configuration.

**Measurement Analysis**

All of the instruments used are listed in Table 10. The 19th century instruments available for testing are all in good playing condition. They range in age from about 120-90 years old, and their conditions and restoration history are noted in the table.

Most instruments had two straight crooks, the shorter of which was used to set the instrument to Bb3 pitch, while the other was used to set for A3. The 1885 Conn had only one straight crook, and the main tuning slide had more adjustment than typical. During the normal tuning slide set-up procedure, this instrument could be set well to A3, but was flat of Bb3. The 1901 Lyon-Healy had a duplex switching valve with linkages to the valve tuning slides, so they could not be independently set during the tuning process. The 1906 Holton had one straight crook and two lengths of main tuning slide, and using both, it was possible to tune to both A3 and Bb3. The 20th century Meredith cornet was used for comparison to the results of earlier instruments. The Toronto import Aine, likely to be 20th century, had two straight crooks and two longer crooks with 360° loops. There was also slight damage to the bell and some small dents in the instrument tube. Because of the bell damage, it was not possible to fully extend the V3 tuning slide. During the normal tuning set-up and test runs, it was not possible to accurately tune this instrument to standard equal tempered pitches, based on either A-440 or A-435 low pitch. The 1960’s era Getzen cornet was included as an example of a professional model of modern manufacturing and assumed to be of excellent acoustic quality. A modern era
trumpet (Severinsen Akright) was also tested, but because of the higher harmonic timbre of trumpets, it was not directly comparable to the cornets.
Table 10: Instruments Used in this Study

<table>
<thead>
<tr>
<th>Maker</th>
<th>Key</th>
<th>Serial No.</th>
<th>Origin Location</th>
<th>Model</th>
<th>Finish</th>
<th>Date Made</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conn, C.G. 1</td>
<td>Bb</td>
<td>8049</td>
<td>Elkhart</td>
<td>Ultimatum</td>
<td>Silver</td>
<td>1885</td>
<td>Fully Restored*</td>
</tr>
<tr>
<td>Besson, F. 2</td>
<td>Bb or A by crooks</td>
<td>24556</td>
<td>London</td>
<td>Bell Tuner</td>
<td>Silver</td>
<td>1885</td>
<td>Fully Restored*</td>
</tr>
<tr>
<td>Heald, John 3</td>
<td>Bb or A by crooks</td>
<td>2050</td>
<td>Springfield, MA</td>
<td>Shepherds Crook</td>
<td>Raw brass</td>
<td>1895</td>
<td>Fully Restored*</td>
</tr>
<tr>
<td>Lyon &amp; Healy 4</td>
<td>Bb/A switch valve</td>
<td>3275</td>
<td>Chicago</td>
<td>Own Make Duplex</td>
<td>Silver</td>
<td>1901</td>
<td>Fully Restored*</td>
</tr>
<tr>
<td>Holton, Frank 5</td>
<td>Bb, A by sld, crks</td>
<td>2049</td>
<td>Chicago</td>
<td>Short Model</td>
<td>Silver</td>
<td>1906</td>
<td>Mint original condition</td>
</tr>
<tr>
<td>Meredith 6</td>
<td>Bb/A switch valve</td>
<td>192</td>
<td>Marion, OH</td>
<td>Open Tone</td>
<td>Silver</td>
<td>&lt;1920</td>
<td>Very Good</td>
</tr>
<tr>
<td>Aine 7</td>
<td>4 crooks</td>
<td>N/A</td>
<td>Imported by Thomas Claxton, Toronto</td>
<td>Brass</td>
<td>&lt;1923</td>
<td>Slightly damaged</td>
<td></td>
</tr>
<tr>
<td>Getzen 8</td>
<td>Bb</td>
<td>J847</td>
<td>N/A</td>
<td>Eterna 800 Series</td>
<td>Nickel</td>
<td>1960</td>
<td>Very Good</td>
</tr>
<tr>
<td>Severinsen Trumpet 9</td>
<td>Bb</td>
<td>110287</td>
<td>Oakland, CA</td>
<td>Akright Bel Canto</td>
<td>Silver</td>
<td>1987</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

* dent removal, spot plating of sliver finish, chemical cleaning, new corks and felts

1 Loaned from the collection of Bill Faust
2 Loaned by Peter Hoekje. Tested on-site, Baldwin-Wallace Department of Physics
3 Loaned by Martin Kordesch
4 Loaned by the Ohio University School of Music, Rick Seiter. Tested on-site, Ohio University Glidden Hall
5 Loaned by Arnett Howard
The impedance measurement described above is used as a source of data for several different methods of comparing the performance of instruments. The first method will compare the frequency values of the impedance peaks with theoretical values. The theoretical harmonic series is an equal tempered pitch fundamental with numerically related series values. If the instrument response is not well-tuned to the equal tempered scale, this could produce a judgment of a poorly tuned instrument. A second method will examine the instrument response compared to a harmonic series based on another pitch, regardless of the tuning of the fundamental. These two approaches may be considered as accuracy for the former and precision for the latter.

The accuracy approach uses peak data directly from the impedance plot and the numerically related harmonic series built on an equal tempered note. Instead of a simple subtraction of frequency between the impedance peak and the harmonic frequency, the difference is presented in units of cents. When the interval between any two equal tempered notes is divided into 100 equal parts, the differences between one pitch and another can be compared directly, regardless of the actual span of the interval in hertz. 50 cents is a quarter-tone interval whether it occurs at C2 or E6. This approach will be identified as the *Measured Pitch Series* (MPS) tuning.

The approach which examines the precision of the harmonic alignment of the instrument is based on obtaining, for each peak frequency, the value of the hypothetical fundamental of which that frequency is an exact harmonic. Called the *Equivalent Fundamental Pitch* (EFP), it is calculated simply by dividing the measured frequency by the peak number. The set of hypothetical fundamentals is then compared to an arbitrary reference frequency to evaluate the quality of its tuning. If the impedance peaks were aligned as a perfect harmonic series, the equivalent fundamentals would all be equal.
The reference frequency is selected as one of the peaks with the assumption that its tuning is exactly correct. In this study, the reference frequency has been chosen as the second peak of the series (third on the plot), corresponding to the peak which was used as the tuning base for setting valve slide positions. It was not always possible, however, to set the pitch of this peak to the theoretical value by adjusting the tuning slides. The EFP concept has been used by other researchers, and Benade also used a similar concept of “reduced frequency” in evaluating his piezo disk impedance measuring method.

An example of these two approaches of presenting inharmonicity of the instrument is shown in Figure 36. As can be seen in this figure, an obvious difference in the two curves for a given valve combination is a shift along the frequency axis. The choice of EFP reference pitch as the 2nd series peak puts this point on the 0 cents axis, and correspondingly shifts the entire curve. What cannot be shown in this plot is the significance of the error magnitudes, which depends on the height of the impedance peak. As discussed above, both the peak height, width, and its tuning will affect the output spectrum. The width of impedance peaks was not measured, but their height can be represented in the tuning plots by the relative size of each plotted point. This is shown in Figure 37. The general trend in the impedance peak heights is a decrease with frequency. For some instruments with variable heights that do not follow this trend closely, or widely varying tuning errors, this type of graph may be a valuable tool. A similar presentation of inharmonicity which included measurement of the peak mistuning, height and width was used effectively in a recent study of trombone optimization by target impedance characteristics.
Figure 36: Equivalent Fundamental Pitch and Measured Pitch Series

Inharmonicity
Figure 37: EFP Inharmonicity Including Peak Magnitude Representation

The Equivalent Fundamental Pitch results can be used to create a single plot for the behavior of an instrument at all valve combinations with all impedance peaks. An instrument with an ideal harmonic series tuning would have equal EFP for every peak, and the plot of EFP vs. Peak number would be a horizontal line. An example of such a plot is shown in Figure 38, where the EFP results for each valve combination are related...
to the ideal fundamental for the equal tempered (EQT) pitch of that valve combination. If the instrument demonstrated a perfect harmonic series response, each line would be horizontal, and if the instrument was ideally tuned for the equal tempered scale, this line would coincide with the EQT fundamental dashed line. In the example chosen, the instrument demonstrates fairly accurate EFP tuning relative to the EQT scale. Valve combination V23 has the worst overall agreement and some of the low frequency peaks (Nos. 2, 3 and 4) are not well aligned for any valve combination.

Figure 38: Equivalent Fundamental Pitch Set Example
Evaluating the characteristics of every impedance peak gives an overall result. It should be remembered, however, that only certain subsets of peaks act together in supporting the regimes of oscillation as notes are played. The inharmonicity of each regime can easily be obtained from data that generates the EFP sets (such as Figure 38). If the major deviations were all part of a particular regime, that regime would produce relatively poor intonation, and the opposite would also be true. For the instrument data above, the first regime plot is shown in Figure 39.

Figure 39 Equivalent Fundamental Pitch Set for First Regime of Oscillation
Another measure of how an instrument matches ideal harmonic series behavior is the consistency of frequency spacing of the impedance peaks. Peak spacing is integrally related to the plots discussed above, however as a single component of a plot it can also be a valuable tool for analysis. Ideal harmonic spacing based on integer multiples of the fundamental would be equal. For a given valve combination, each peak can serve as the most significant support for the fundamental frequency of an equal tempered note, or as harmonic support for a different fundamental. Intentional placement of the peaks by the instrument maker will normally be a compromise between its function as a fundamental or as a harmonic support. An example of peak spacing for all valve combinations of an instrument is shown in Figure 40.

![Figure 40: Measured Peak Spacing](image)
One last method of comparing instrument performance can be obtained from the impedance data: the height of the impedance peaks. The peak heights will typically decrease as frequency increases, and an instrument will respond in a more consistent manner if this height decrease is monotonic. An example is shown below in Figure 41.

![Conn Bb Peak Heights](image)

**Figure 41: Peak Spacing Example**
Discussion of Results

All of the methods described above of presenting information from the impedance data have been achieved by inserting raw FFT data from Audacity into pre-configured Microsoft Office EXCEL\textsuperscript{190} spreadsheets, and by the manual review and selection of impedance peak/dip values. The peak/dip data is then copied into preconfigured worksheets. The resulting series of graphical depictions have been carefully examined for a number of different characteristics.

When these characteristics are to be used for evaluation of the tone quality of open and valved notes and of instrument quality in general, some factors should be considered. There is no “ideal” set of performance data available to make an absolute judgment. The placement of the impedance peaks on the frequency scale intended by an instrument designer will be a compromise between peak function as fundamentals and as harmonic support in a regime of oscillation. Slight deviations from ideal harmonic spacing may be desirable for flexibility in playing and intonation. The actual peak location obtained depends on accuracy and consistency in manufacturing processes. Smoothness of the descent of the peak height curve, equal peak spacing, and inharmonicity of the modes and regimes of oscillation are more useful as a comparative rating than as an absolute result.

Physical considerations may also affect the results. The history of the older instruments that were tested is not known with certainty although their current condition is good. Restoration efforts may have changed the instrument performance, for better or for worse. The results obtained, particularly the inharmonicity of the peaks for the measured pitch series case, have been observed to be somewhat dependent on
the setting of the instrument main or valve tuning slides. As previously discussed, the measured peak heights at low frequencies (below approximately 300 Hz) may be slightly lower than actual values.

Before discussion of specific points of comparison, some general observations of the results may be made. In almost all of the inharmonicity plots such as Figure 36 or Figure 37, and for all valve combinations, the first peak of the set (peak 2 of the impedance curve) has a notably lower frequency (very flat) compared to the remaining peaks. This difference can range from 10-20 cents to over 100 cents (a semi-tone), is more extreme in the older instruments, and is less notable for the V0 position. Often the V0 first peak is sharp, especially in the newer instruments, but the first peak of all other combinations for the same instruments is found to be flat. Similar results were found in the Braden, Newton and Campbell (2008) study of trombone bore optimization based on impedance targets. In that study, the flatness of the first peak frequency was linked to a preference for bass trombone over tenor trombone for low pitch music. This was observed in all of the cornets tested and was more severe in the older cornets; it may be more likely that this effect is associated with an incomplete realignment of the first peak by the bell/mouthpiece influence. It is possible that designers’ ability to place the peaks was improved over time, with better understanding of the acoustics involved and modern manufacturing control.

Observation of the peak spacing graphs for all instruments reveals a common deviation from the “ideal” equal harmonic spacing. In Figure 42, a curve showing the equal tempered peak spacing has been added, shifted upward for clarity. The departure from ideal horizontal for the EQT curve can be understood by comparison to Figure 21:
A Harmonic Series Example: notes of an equal tempered series deviate, either sharp or flat, from the ideal numerical harmonic series. It is interesting to note that some of the deviations from ideal in the measured peaks occur at the same peak number as deviations in the EQT curve.

![Figure 42: Measured Peak Spacing with Equal Tempered Peak Spacing](image)

In order to compare the quality of sound between valved notes and open notes, the inharmonicity can be examined in both the EFP pitch sets (such as Figure 38) and the MPS plots, both for all of the peaks, and for each regime of oscillation. A typical inharmonicity plot for the first regime of oscillation, measured pitch series, is shown below in Figure 43. In this example, the expected inherent mistuning due to the valve length problem previously described is shown for the three valve combinations that
cannot be tuned exactly. Curves for all of the valve combinations in this example seem to be shifted approximately 20 cents sharp, with the V0 curve generally in the center. It can also be seen that if this shift is ignored, the mistunings of V23, V12, and V123 mirror the inherent mistuning in approximate spacing and magnitude. If peak two is ignored due to its known flatness, and the sharpness shift is neglected, then the V0 open note tunings appear to be centered between all of the valved note combinations. If the V0 tuning was grouped around 0 cents, this would imply that V0 open notes and harmonics in the first regime were more in-tune than the sharp or flat valve combination regimes. The resulting open note external tone supported by the V0 first regime would be more likely to have better aligned harmonics than the first regime valved notes. If this response is typical of multiple regimes and instruments, then one factor supporting the theory that open notes sound better can be demonstrated.
Notes on detailed observations of the graphical results are included as appendix D and the complete set of measured pitch series first regime curves are included as appendix E.

In general, a number of differences exist between instruments in all of the data presentation methods. As expected, the 20th century instruments display more accurate tuning and more consistent response. For example, Figure 44 shows that the peak height decrease for the Getzen Bb (1960) is much smoother than for the Besson Bb
(1885). Not all of the older cornets had as much variation in peak heights as did the Besson Bb, but none approached the smoothness of the Getzen Bb response. The equivalent fundamental pitch sets for these same two instruments are shown in Figure 45. This type of curve-set shows consistency in the harmonic fundamental alignment of the peaks for each valve combination and in the degree of agreement with the equal tempered scale. Except for the V123 combination, the Getzen Bb equivalent fundamentals are more consistent (straighter line) and closer to equal tempered pitch notes.

Figure 46 shows the equivalent fundamental pitch tuning errors for both the A and Bb keys of the Besson. Even though the Besson demonstrated the most variation in peak heights, it did not necessarily also have poorer peak tuning. The Besson A had more peak height variation than the Bb, but had less variation in the peak tuning errors.
Figure 44: Comparison of Peak Height Data for Two Instruments
Figure 45: Equivalent Fundamental Pitch Sets for Two Instruments
Figure 46: Equivalent Fundamental Pitch Tuning Errors for Two Keys of One Instrument
Among the three instruments that existed during the time Miesse was composing, (1885 Conn, 1885 Besson and 1895 Heald) observations of the measured pitch series inharmonicity curves demonstrate some support for the idea that open notes would have more accurate and more consistent harmonic tunings than the valved notes (See appendix E). These three instruments also had harmonic peak heights that varied from a preferred monotonically decreasing behavior. The results for these three instruments set for the key of A3 also were somewhat better than when set for Bb3.

Although the goals of this study did not include detailed analysis of the externally produced tone of the test instruments, recordings were made of 5 of the cornets. A sequence of notes, consisting of the equal tempered series over two octaves, was played at each valve combination, at medium playing level. For example, on a Bb instrument, at V0, these notes are Bb3, F4, Bb4, D5, F5, G#5, Bb5. The same microphone was used to record these notes as that used in the impedance measurements, and was clipped to the bell, mounted at approximately one bell diameter away near the center axis. The recordings were made early in the study, before the valve tuning procedure was developed, and all tuning slides were left at the full in position. An attempt to compare the externally recorded sounds with the impedance curves was made, with the following cautions: Dynamic level was not measured or controlled, and varied between some notes and between instruments. The tuning slides were not set at the same positions for the impedance measurement and the external recording. Therefore no correlation between recorded sound and impedance data should be made. However, a graph which includes both the impedance curve and the recorded sound spectra can help illustrate the regime of oscillation concept. Three example curves
for the Besson Bb instrument are shown in Figure 47, Figure 48, and Figure 49. The recorded audio for each note is color matched to the indicators for oscillation regime.

The measurement method used in this study has been found to give reasonable and consistent results. In order to draw firmer conclusions about the open and valved note comparison, a larger number of older instruments could be tested using this portable and non-damaging technique. Further work might also include better measurements of the external spectrum and comparison and correlation of such measurements with impedance data. Given the current state of available technology, a dynamic, animated presentation of external audio spectrum in real time, with controlled dynamics and overlaid on a measured impedance curve would provide more insight into the relationship between the internal impedance spectrum and the external tone produced by the brass instrument.
Figure 47: Besson Bb V0 Recorded Audio with Impedance Curve
Figure 48: Besson Bb V12 Recorded Audio with Impedance Curve
Figure 49: Besson Bb V23 Recorded Audio with Impedance Curve
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## APPENDIX

### APPENDIX A – LIST OF MIESSE’S KNOWN PUBLISHED WORKS:

<table>
<thead>
<tr>
<th>Title</th>
<th>Date</th>
<th>Op</th>
<th>Dedication</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Wild Bird (Song, 4 voices)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philippine Dance (Unique, new)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand March of the Phi Delta Phi (Two-Step March)</td>
<td>1902</td>
<td>20</td>
<td>Dedicated to the Legal Fraternity Phi Delta Phi</td>
</tr>
<tr>
<td>The Departed (A Funeral Dirge)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annie Laurie (Vari. - Brilliant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impromptu Marselette (Brilliant)</td>
<td>1899</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Belles of Lancaster (Waltz, new)</td>
<td>1898</td>
<td></td>
<td>To the Ladies of Lancaster, Ohio</td>
</tr>
<tr>
<td>Mt. Pleasant Echoes (Waltz, new)</td>
<td>1891</td>
<td></td>
<td>To Mrs. Leon Miesse, Lancaster, Ohio</td>
</tr>
<tr>
<td>Sounds from the Hock-Hocking (Waltz)</td>
<td>1881</td>
<td>4?</td>
<td>To Miss Aurelia Sorber, Greenville, Ohio</td>
</tr>
<tr>
<td>Flight of the Butterflies (for piano) (caprice)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zaidee (Song)</td>
<td>1872??</td>
<td>8</td>
<td>To My Cousin C T Dondore</td>
</tr>
<tr>
<td>Burdett Organ Waltz</td>
<td>1883</td>
<td></td>
<td>To Miss Theresa Burkley, Chillicothe, Ohio</td>
</tr>
<tr>
<td>Wedding March</td>
<td>1885</td>
<td></td>
<td>To Bride and Groom</td>
</tr>
<tr>
<td>Allen Schottische</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priscilla Polka</td>
<td>1885</td>
<td>6</td>
<td>Composed and Affectionately Dedicated to Mrs. Priscilla M Harper of Greenville, Ohio by her Brother Gabriel Miesse, Jr. MD</td>
</tr>
<tr>
<td>Rosecran’s Victory (Schottische)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soldier’s Prayer (Instrumental)</td>
<td></td>
<td></td>
<td>In Memory of Our Soldiers in Blue</td>
</tr>
<tr>
<td>Lullaby</td>
<td>1905</td>
<td>26</td>
<td>Dedicated to the Young Mother</td>
</tr>
<tr>
<td>Sweet Bye and Bye</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Jolly Boy</td>
<td>1906</td>
<td></td>
<td>Dedicated to Terrance Malone, Lancaster, Ohio</td>
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<tr>
<td>Mechanics Band March</td>
<td>1905</td>
<td>20</td>
<td>Dedicated to the Lancaster Mechanics Band, Lancaster, Ohio</td>
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<tr>
<td>Grand March Lucille</td>
<td>1906</td>
<td>24</td>
<td>Dedicated to Eva Lucille Samson, Lancaster, Ohio</td>
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</table>
January 26th, 1879, we came to Lancaster, Franklin County, Ohio. This was Sabbath, and at night we held our first meeting. Our home was with Doctor Gabriel Mesie and wife. They were among the most influential citizens of this old aristocratic town. He was a member of the Lutheran Church and had attended the Caroll camp meeting and heard us preach there, and he had arranged for us to be his guests when we came to hold meetings at Lancaster. We were entertained at his elegant home and had all the comforts and attention that we needed.

The conversion of Dr. Mesie was a very remarkable one. At the Caroll camp meeting he had been deeply convicted, but thought he was sick, and so stated to his family. After returning from the camp meeting he searched for some medicine in his office, that would give him relief, but could find none. He told his wife he must die; and three times he told his family just when it would occur, but death did not come.

Dr. Mesie was a fine musician; he played the organ and led the singing and gathered many of the young people around him. He was very popular in the community and a great favorite among the young people.

After a little time his wife was converted, but Dr. Mesie would not yield, though he attended all the meetings. Finally the young people who sang with him said: "Dr. Mesie, if you will go to the altar we will go with you." He at first refused to go with them, but finally said, "Well, if it will do you any good I will go."

Many of the young people were converted that night, but Dr. Mesie was not. His wife said he tossed in wakefulness all that night. The next day we saw little of him. At the tea table he said: "Mr. and Mrs. Frame, and wife, you will please excuse me from going to meeting this evening; I am very sick; I have rheumatism all through me." We smiled and said "we could not excuse him."

Though a very courteous gentleman, he said, manifesting some irritation, "I don't think it anything amusing because a man has rheumatism." But as we would not excuse him, he went to meeting that night, and when the invitation was given for seekers he hesitated a time and then came, and throwing himself across the seekers' bench, cried out with a loud voice, "God have mercy on me, a sinner."

The altar was thronged, and we were talking to the seekers and instructing them when Dr. Mesie said to Esther, "Sing 'Let it Cleanse Me Now.'" This was music and a hymn of his own composing. She commenced singing, and soon Dr. Mesie rose to his feet and shouted so as to be heard all over the audience, "I am well of the rheumatism, I am well of the rheumatism; the Lord has saved me."

The revival spirit compassed the town and such crowds came that two such houses would not have accommodated the people; indeed such conviction and feeling was there in the community that the number of people who would come could only have been limited by the size of the house. I believe if there had been room we should have had an audience of five thousand people.

There were many very interesting conversions and incidents occurred in these meetings, but we cannot take time to relate them all. There were more than two hundred conversions while we remained and many came to Christ after we had left. I give below some extracts from letters received with regard to the meetings. The first extract is from a letter just after we had gone away to Columbus, Ohio, where we had an engagement.

"Dear Mr. and Mrs. Frame, we concluded to inform you of the progress in our meetings. The success is great - fifty more converts ere the week goes by. Fifteen have been converted now. We have visited Dr. Mesie, the leader of our praying band. He has secured the names of eighty young converts to his "Golden Pillar," "or praying band." We have remained faithful and our prayers have been answered, our visit to the doctor was one of exceeding joy to us. He is delighted that you have brought him to the cross. The doctor has done a good work in bringing sinners to the Lord. On last Sabbath night he brought twelve old sinners to the mourners bench. The cry of "amen" was heard from every one as they fell upon their knees, imploring God to have mercy upon them. God be with you, we shall ever remember you in our
prayers. Yours in the love of Christ.' "Ella Rheinholt, "Lizzie Prentice "Capitola Leonard."

"Lancaster, O., Feb. 18th, 1874[1879?]. Mr. and Mrs. Frame, Dear Friends: Your letter came to
hand last evening, was delighted to hear from you, and your safe arrival. The greetings and singing you
received at the depot were such as will never be forgotten by those who were there. I can assure you that
there were many eyes in tears at your departure. I never in my life witnessed such friendship; for two, who
are absent from this little praying band of eighty souls developed while you were among us. Their earnest
prayers are come again and tell us more of Jesus. The young converts are working like beavers, and Satan
is very angry, but we keep our distance and punch him occasionally with a long pole, minus hook and bait.
"Dr. G. 'Messie."

This town of Lancaster is an old town, and one of the most conservative of any in the State of
Ohio. A great many very prominent old families and their relations have their home here. The Shermans,
the Ewings, the Messies, and many others. I copy a little note from a correspondent to one of the
Cincinnati: papers. "The revival under the supervision of the Evangelists Nathan and Esther Frame, is a
success. The meetings, both morning and evening, are filled to repletion. There never was such a meeting
in the city before. It appears that every man will know his wickedness and weakness ere these series of
meetings closes." ........
APPENDIX C – PIANO/VOCAL SUMMARY

Tempo markings as given in the piano vocal score. Summaries derived from lyrics.

Act 1

Pg 1-6  **Overture:** 4/4 Moderato b; 2/4 Allegretto bb; bbb; bb; ###; 2/4 Con Spirito ###; _; #; 2/4 Allegretto b; _; 2/4 Tempo b; bb; b

Pg 1-8  1. **In The Park:** Opening Chorus: 4/4 Piu Allegretto bb; Tempo di Marcia bb, SATB
   The whole company in a jolly mood, express general happiness at being in the park, enjoying the nearby sea and ships, good German fellowship.

Pg 9-10  **It Really Is Astounding:** 2/4; ¾; 2/4; Allegretto ###; Louisa, SATB
   Short verse, Louisa finds a large fishing fly at the end of her line, which is not a whale! (“Fly” seems to be a running pun – the insect vs running away)

Pg 10-14  2. **Let Us Now Wait:** 6/8 bbbb; Gottlieb, Tenor, Bass
   Waiting for the ‘tale’, and a bit about Schlobber ?? (Not sure what this is about)
   **G** Not Scored **You will see what you shall see:** Louisa, Delightful, Gottlieb, chorus. Singing and dancing about how happy they are. References to Teutons, Yeagers, and lusty Germans, sauerkraut, pretzels, cheese and beer.

Pg 15-17  3. **O Ye Gods:** 4/4 Moderato #; Schermania solo
   Schermania asks Gods to let her wed Jowest, which is what is in her heart, not Limburger, who is the match her father prefers.

Pg 17-20  3(a) **Mine Gracious Here Is A Perplexity:** 2/4; 4/4; Recitative, ####; bbbb; ###; _; 2/4 Allegro, _; Hans, Tutti
   The whole group knows Schermania does not want to marry Limburger, and will all help carry out the scheme to prevent it.

Pg 20-26  3(a) **Now To The Reservation:** ¾ Tempo di Waltz ###, Allegro agitato, tempo di Marcia; 2/4, 3/4 Allegro Agitato ###; 4/4 Tempo do Marcia ##; Schermania solo, Hans, SATB
   Schermannia knows she must hide on the reservation. Hans calls Indian chief Gobbledem with a horn blast, the company urges her to go while the rest of the scheme is worked out.

Pg 27-30  4. **I’ll Trust My Fate To Him:** 6/8 Moderato ##; #, ##; 2/4 ##; _; b; Schermania solo, SATB. Hans, Delightful
   Schermania resolves to go with Gobbledem, and sings of the brooding solitude in the forest which she will experience while hiding.
   **Not Scored No 7a** short singing exchange between Schermania and chorus about a troubling spell in her heart concealing.....

Pg 30-34  5. **You Are Consumptive:** ¾ 2/4 Allegretto b; ##; Dialogue song. General, Hans, Louisa, SATB
   The General enters while on a hunt, and joins the company in drinking beer. This song starts with a pun – General thinks they are consumptive (tuberculosis) because they are coughing to hide the escape of Schermania, but they say they are “consuming” - eating and drinking.
   **G** Not Scored **No 8 Said Heel** A set of silly lines about deer hunting, a house without roof, a preacher, a lawyer, and taking a handkerchief to an opera, each short line followed by the words ‘said he’ with a nonsense, or German word chorus between each little story.

Pg 35-38  6. **I Am Here And She Is There:** 2/4 Piu Allegretto #; General, SATB
The General is really thinking his daughter has run away with Jowest, and is looking for her while on the hunt. Since she is not here, he will dance with the company instead. When he does find her, he will make her dance homeward.

Not Scored No 9 Not Like in Germany the general laments that in Germany, a young man would not steal away a wife, and a daughter would respect her father.

Dance: 2/4 Piu Allegretto 
Scored only, no lyrics
4/15 unscored/scored

Act 2

O What Is That I Hear?: 2/4 Agitato ##; 3/8 b; Schermania solo / General
Schermania awakens in the chief’s hut, alarmed at hearing her fathers approaching whistle, asks the chief to hide her outside on the crag.

An Indian Hut: 3/8 Moderaevaluate b; General solo
The General arrives frightened by and ‘captured’ by the chief, thinking he can reverse the situation with trinkets.

1(a). Here’s Pipes and Here’s Tobacco: 2/4 Con Spirito _; General solo
He sings about the gifts for Gobbledem

1(b). Out In The Back Yard: 4/4 Moderavaluate _; General solo
The General takes the chief out behind the hut, he sings about dancing heal and toe. This dance is another direct take-off from The Little Tycoon.

Not Scored No 2 Both Done it Well: Schermania comments on the dance, Hans and the company find her on the crag
Not Scored No 2A Don’t make a mistake: Hans sings that a young man should be careful if he wants to be alone with his girl, then to Schermania, that she should marry the one she loves and not the one her father wants. Each of his lines is followed by the chorus singing ‘Don’t make a mistake.’

O The Anxious Moments Suffered: 4/4 Andantino #; Schermania solo
Schermania sings of her anxiety, worried about being found by her father, and wondering where Jowest is

Tell Me O Ye Forests Stately: ¾ Moderato #; Jowest solo
Jowest asks the forest where his love might be hiding – he fears for her safety

Love Like Thine and Mine: ¾, Pathetic #; 2/4 _; ¾ #; Jowest and Schermania duet
They see one another, and are happy, pledging their love to each other, delighting in each others company.

The Deuscher Militaire – A March Song: 4/4 Tempo Marcia #; General, Gottlieb, Johannas and Hallahan / chorus
The General’s hunting company arrive, are joined by Gobbledem, sing and dance the marching song

I Conquered It: 2/4 Moderavaluate b; General solo, SATB
The sea is large, a dangerous passage from Japan or China, the General will do battle with Indians instead. The second part of this song is left out of the score, it involves some dance and ‘indian’ nonsense words.

We are Coming: short song about the whole company swarming about the sweet queen.
Not Scored No 5a The observation: the General discovers Schermania and Jowest hiding on the crag through his telescope. The second half of this tune becomes ‘A Teuton’s Daughter’

Pg 23-25
4(a). A Teuton’s Daughter: 4/4 Moderato b; 6/8 Allegretto b; General SATB
Schermania should remember her father’s nobility and not swap herself away.

Pg 26-29
4(a). That Was A Foolish Fly: 6/8 Allegretto bbbb; General SATB
It was foolish for them to ‘fly’, for the boxing contest (between Limburger and Jowest) will settle the matter.

P
Not Scored No 5a Don’t you know me: Schermania reveals herself to her father, and states that she won’t go with Johannas if he wins.

Pg 29-33
5. Closing Chorus: 2/4 Piu Allegro b; Ensemble, Hallahan
Chorus sings during the boxing match, which ends in a draw
Not Scored, and crossed out of libretto

No 6 You vas do id you know:
Budwise and ensemble sing to the combatants that they must fight.

Dance
Scored only, no lyrics
Not scored, crossed out of libretto

No 7 Now to Park!
Which is described as a repeat of the opening chorus.
7/20 unscored/scored

Act 3
Not Scored No 1 Whirlpool: a happy little waltz number to open the act.
Not Scored No 2 O Say!: short song about making cheese and brewing beer (Budwise). Interrupted by Katherine’s entrance

Pg 1-5
1 Was Glad To Come: 4/4 Moderato _, ¾ Con Spirito _, 2/4 ,3/4; Katarina and chorus
Katarina Limburger joins the ensemble at the park, and sings of her troubles getting there, on boats and slipping in the mud, getting her shoes covered in smelly mud and catching a cold, sneezing during the song.

Not Scored No 3A I never saw a stone rejoice: stones haves ears (eavesdropping) mentions several puns regarding stones, including Stonewall Jackson

No Scored No 4 Trip Tra: crossed out of libretto
A song composed for the occasion by Katherine about a fly on someone’s nose.

Pg 5-8
2. Our Plans Are All Defeated Now: 4/4 Moderato b, bb; Hans, Schermania duet
They first lament the failure of the contest – Jowest did not win, but soon agree to try another scheme – make one good thing out of two.

Pg 9-12
3. Why Should I Pine: ¾ Tempo di Waltz b, _, bb, b; Schermania solo
In the first verse, Schermania asks why she should be sad, since she knows Jowest loves her. He enters, she sings another verse, realizing that there are still possibilities.

Pg 12-14
4. Young Fellow As The Earth Revolves: 6/8 Moderato #; General, Jowest, Schermania
The General will not give up, Jowest will not give up, Schermania realizes they are as separate as earth and sea (concludes with all three singing their own verses simultaneously).

Not Scored No 7 Hello: Dance number, about smelly shoes and some news, includes ad lib ‘trip dancing’

Not Scored No 8 Catch on: Between the General and Kat

Pg 15-19
5. The Brewers Song: 4/4 Piu Allegro bb; Leading Brewers and chorus
The brewers sing about how good their business is, how they don't like prohibition. They sing about the high position they hold in the community because of the importance of beer.


The company want to tell the brewers about the recent happenings.

6(a) A Beauteous Maiden Fair And Free: 6/8 Piu Allegrsetto bbbbb; SATB

Chorus sings three verses to explain: A beautiful maiden wants to marry her choice; she loves a rich brewer, but her father disapproves; some one else loves Schermania, the two fought to a draw. So the brewers are asked for advice on what to do now.

7. Here Is A Mess: 2/4 Piu Allegretto b, _, b; Three Leading Brewers and chorus

The brewers think: the two lovers could commit suicide, the rivals could kill each other. They finally suggest another contest with swords.

8. I Have Control Of Thee Now: ¾ Tempo di Waltz ##; General, Schermania, SATB

The General and Schermania argue – she wants Jowest and does not like the idea of this new contest. He thinks it is a good idea, and she must obey his wishes. They are both angry. Schermania finally gives in.

Not Scored No 10a Schpare Ribs: Budwise and Gobbledem have a playful sword fight, and General and chorus sing about the unsavory meat from this slaughter.

Not Scored No 10a So It Was: Budwise invited the two rivals to commence the agreed sword fight for Schermania, perhaps they can fake a little blood to settle things.

9. Let Peace Reign: ¾ bbb; SATB w/Hans

It seems that the company decide to fake wounds on the combatants and give up the sword fight, and sing about how all young women should be able to choose their own husbands. This song contains about half of a song written in the libretto called ‘kill me’ where Schermania would rather she be killed than the two rivals fight.

8/18 unscored/scored

Act 4

1. I’m Doctor Federgoose: 6/8 Allegretto ###; Federgoose solo

As he arrives at the General’s villa, the doctor’s introductory song – everyone calls on him when they need help, but he wants them to pay first, because many don’t want to pay at all.

Not Scored Hoopla: General, Federgoose, two maidservants. Short song about fun drinking and being sociable together.

Dialogue Song: 4/4 b; General, Federgoose, Delightful

A short song concluding the frolic of the General and Doctor with two hand maidsen, and introducing Delightful.

2. Ha, Ha, Delightful: 2/4 Quasi Recitative bb, Con Expresso; General, Federgoose, Delightful

She sings to the two old men about having caught them flirting with the maids – sings about kissing between old lips and young being delightful.

3. In My Mothers Garden: 4/4 Andantino #, dolce; Johannas solo w/chorus

Johannas enters and sings fondly about his memories of his mother’s garden and how he would care for it.
2. The Serenade: ¾ Tempo di Waltz _; chorus w/Jowest and friends
Jowest and friends sing about silently coming through the night, and all of the things and dreams which happens in the night time.

3. The Elopement: 4/4 Piu Allegretto _, ###; Jowest and Schermania duet
Jowest sings to Schermania under her window, he is there to take her away. She comes, bids farewell to home, they elope.

4. Halahans March and Song/ Dance: 2/4 Con Spirito bbbb; Halahan, SATB
Halahan, the gardener, sings in Irish dialect about how he works hard in the garden, how he deals with the cats. He is keeping the secret of the elopement, and worries about the General finding out. Perhaps he will pretend that the doings in the yard last night involved cats instead of Jowest and Schermania so he doesn't have to lie. Ends with 32 bar dance

5. War On The Cats: 2/4 Piu Allegretto bbbb; General, Halahan
They decide to try and get rid of the cats on the villa grounds.

6. Love In Two Roses: ¾ Con Expresso bbb; Johannis, Delightful
After a long spoken exchange in the villa garden, which includes an intricate pun about love, tomatoes and turnips. Johannis and Delightful sing to each other, realizing they are in love.

7. March: Turner Waltz and Song
2/4 b, _ , bb, b; Scored as march, (dance) with no lyrics
Not Scored No 9a The Reception: The General, Katarina and Turner maidens are anticipating the reception, and Budwise comes in after drinking too freely.
Not Scored No 9 a His Toilet: Budwise tries to explain his drinking.

8. Not Scored No 9a But Let her Alone: The General explains Schermania’s absence to the company.

9. Grand Reception Chorus: crossed out of libretto The guests reminisce about Kaiser Wilhelm and Germany, Then seem to relate what is about to happen in a ridiculous fake Japanese dialect (this is a take-off from The Little Tycoon).

10. Finale: 2/4 Moderato #, ####; Grandioso ###; 4/4 Tempo di March ##,
Allegro; Louisa, Halahan, Feddergoose, Gottlieb, General, SATB, Hans, Leading Brewers, Katarina, Ensemble.
Closing number – all sing about the happy ending. The finale is preceded by a long span of dialog only, in which Jowest and Schermania appear in disguise, are discovered, the elopement is revealed, and all is resolved.

9/20 unscored/scored
Brackets indicate authors song grouping by scene (does not include unscored songs)

P indicates an unscored song with important plot elements

G indicates an unscored song with German content
APPENDIX D – OBSERVATIONS OF GRAPHICAL ACOUSTIC TEST RESULTS

Is V0 more “in tune” than all valved positions?
Conn An: V0 is generally centered among the valved curves ***
Conn Bb would not tune, so V0 is far flat of all others
Besson, both A and Bb, V0 is close to V2 on An just sharp of V23, so, centered a little on the flat side. on Bb V0 V2 is generally flat of all others
Heald: An V0, is flat of all others. Bb, V0 is generally centered
Lyon-Healy, Bb only, V0 is generally well centered
Holton Stuart: V0 for An is somewhat centered, Bb V0 on the flat side of center
Meredith, An, V0 is generally centered. Bb V0/V2 is flat-to-centered
Getzen, V0 is generally on the flat edge
Both of the more modern Meredith and Getzen the set of valve combination curves is more “well-behaved” and more tightly grouped.

EFP sets:
Qualitative observation:
Conn and Besson instruments have poorest agreement with EQT tuning lines and generally more variation. Instrument agreement with the EQT pitch and less variation typically occurs in chronological order, with the newer instruments having better performance (flat lines with less variation and less deviation from the EQT)

REGIME HARMONIC CURVES 1st and second regimes:
INHERENT: V23 is flat (16.1), V12(10.6) and V123(21.6) are sharp
Conn: V12 is always more flat than V23. V123 is the sharpest
Besson: An, these three follow the inherent. In Bb, V12 is always flattest, then V23, then V123
Heald: Same as Besson (An V12 was not run)
Lyon Healy, Bb only roughly follows inherent
Holton Stuart, roughly follows inherent, but some crossover of V12 and V123
Meredith both roughly follow inherent
Getzen: V12 and V23 almost coincide. V123 is sharp of both

Measured Pitch vs EFP
Conn A V0, V2, V123 are a bit sharp
Conn Bb: Would not tune to Bb exactly. All of the MPS curves are scattered compared to EFP
For both Conn keys, the EFP curves are not as tightly grouped as other instruments. V23, V13, V123 are off to the sharp side.
Besson A: MPS separated in roughly the inherent arrangement, the EFP pulls them back in to a tight grouping.
Besson Bb: MPS has V23, V13 and V123 set way out sharp but very tightly grouped for EFP
Heald A: MPS has V23, V13 and V123 set way out sharp but very tightly grouped for EFP. This is the only instrument where the trend in the higher harmonics is towards flat side instead of sharp.

Heald Bb: V12, V23 and V123 in MPS somewhat follow inherent, and are brought into tighter alignment in the MFP

Healy Bb: V12, V23 and V123 in MPS somewhat follow inherent, and are brought into tighter alignment in the MFP

Holton A and Bb: V12, V23 and V123 in MPS somewhat follow inherent, and are brought into tighter alignment in the MFP not as tight as the Healy instrument

Meredith A and Bb: V12, V23 and V123 in MPS somewhat follow inherent, and are brought into tighter alignment in the MFP

Getzen Bb: Doesn't quite follow inherent tuning, and the EFP is not as tightly grouped as Meredith or Healy.

Peak Heights
Conn:A shows a lot of variation in heights – not smooth for all valve combinations. Bb Less variation for V1 and V2, not as bad for the others as the Conn A.
Besson peak height variation is the worst as much as 15 dB for a 25dB peak height, and in opposite direction from one peak to the next. From one regime to the next would probably offer great difference in feedback to the player, which was commented on by the test player – tones in the series difficult to play. This was one regime to the next, ascending and descending.
Heald Bb is much smoother than Conn or Besson. A has some minimal variation from monotonic.
Healy Bb minor variations from monotonic, mostly at low peak numbers and not all valve combinations
Holton A has some relatively large variations, Bb is much smoother.
Meredith both keys are very smooth and tightly grouped
Getzen smooth and tightly grouped

Peak Spacings
Conn A shows the EQT dip at peak 6 for most combinations and peak 8, although some combinations are a rise in freq and not a drop
Conn Bb similar to A, although not quite as widely varying.
Besson A trends very horizontal except V2.
Besson Bb varies widely, also shows the EQT dips at peak 6 and 8
Heald A has a saw tooth variation every other peak.
Heald Bb is similar with the EQT peak 6
Healy Bb is somewhat sawtooth
Holton A and Bb are fairly inconsistent and variable
Meredith A and Bb are slightly more orderly, and A shows the EQT at peak 6
All so far, except the Conn, V13, V23 and V123 all coincide with each other fairly close.
Getzen Bb shows the EQT peak 6, and is not notably sawtooth