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Report on the Master of Sacred Music Written Project Submitted by

Pamela Kordan

in Partial Fulfillment of the Requirements for Investiture

Kol Chazanit: Alternatives for women cantors to the vocal requirements and expression of traditional chazanut.

Pam's thesis reflects a serious interest in traditional chazanut and exhibits her strong personal desire to explore its expressive possibilities for the female voice. Being the only such study on the topic, to my knowledge, Pam's efforts are to be applauded.

The basic supposition put forth is that since traditional chazanut has been the exclusive artistic domain of men and the male voice, significant changes are needed to allow the contemporary woman cantor to achieve full expression in this art form. Citing numerous examples from the classical vocal works of the eighteenth and nineteenth centuries, Pam demonstrates how different the male and female voices are in terms of expressive capabilities with special focus on tessitura and ornamental execution. A great deal of space is devoted to the details of acoustic properties of the human voice as they relate to specific qualities of the female instrument versus its male counterpart.

Pam's conclusion is that the woman cantor must re-interpret, in fact, re-write the traditional repertoire to conform to the musical principles by which the female voice most naturally functions. She offers several examples of her own creations in this manner to support her thesis.

The questionnaires sent to the female membership of the American Conference of Cantors provide some interesting information with regard to feelings and opinions of those women in the field as professionals.

One feels, however, that the most important questions were not asked. Such as, do you, as a woman cantor, feel you received adequate exposure to and instruction in the traditional style? Did you receive adequate encouragement to pursue this art form? If your cantorial role models had offered encouragement and training in your youth, would your abilities in this area be any different than they are at present?

Pam's proposal is at the least provocative, in that it urges all cantors, not only women, to explore their own individual creative needs with regard to chazanut. After all, not all traditional chazanut was sung the same way by all cantors of yerteryear. In fact, just the opposite is true. Nearly every cantor of merit who

came to these shores in the early part of the century published his own volume of chazanut. Although there were many similarities among them, each found his own individual voice. Every cantor, woman or man, should do the same. Pam offers one approach. May all cantors be encouraged to do the same, once they have adequately mastered the traditions of our sacred art form.

Respectfully submitted,
Cantor Don Gurney
Faculty Advisor

October, 1990

KOL CHAZANIT: Alternatives for women cantors to the vocal requirements and expression of traditional chazanut

Pamela Lynn Kordan

Project Submitted in Partial Fulfillment of
Requirements for Master of Sacred Music Degree

Hebrew Union College-Jewish Institute of Religion
School of Sacred Music
New York, New York

March 16, 1990

Advisor: Cantor Don Gurney

"The human voice is the organ of the soul."

Longfellow

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I wish to thank Cantor Israel Goldstein, Cantor Lawrence Avery, Cantor Robert Abelson, Cantor Benji-Ellen Schiller, Cantor Joseph Ness, Cantor Don Gurney, Cantor Moishe Ganchoff, Olympia Dukakis and Michael Trimble, whose guidance and advice has not only been indispensable but thoroughly enlightening throughout the months of research for this project.

I also wish to extend my deepest respect and gratitude to the memory of those composers and cantors who wrote and sang this treasury of great liturgical masterpieces. The music and expression has been my source of inspiration.

TABLE OF CONTENTS:

INTRODUCTION

> "After the supper they hold the sacred vigil which is conducted in the following way. They rise up all together and standing in the middle of the refectory form themselves first into two choirs, one of men and one of women, the leader and precentor chosen from each being the most honoured amongst them and also the most musical. Then they sing hymns to God composed of many measures and set to many melodies, sometimes chanting together, sometimes taking up the harmony antiphonally, hands and feet keeping time in accompaniment, and rapt with enthusiasm reproduce sometimes the lyrics of the procession, sometimes of the halt and of the wheeling and counter-wheeling of a choice dance. Then when each choir has separately done its own part in the feast...they mix and both together become a single choir, a copy of the choir set up of old besides the Red Sea in honour of the wonders there wrought...It is on this model above all that the choir of the Therapeutae of either sex, note in response to note and voice to voice, the bass of the men blending with the treble of the women, create a harmonious concent (symphonia), music in the truest sense..."[1]

I am exploring a subject in this project that, to my knowledge, has not been dicussed before: Alternatives for women cantors to the vocal requirements and expression of traditional chazanut. I was unable to find any documentation on this subject and, as of yet, there has been no book written specifically on the subject of women in the Cantorate. My specific concern in this paper is to consider the heritage of traditional chazanut from a distinctly female perspective in order to integrate into this musical style a female vocal expression and the unique spiritual perspective and energy of women in the Cantorate today.

The history of civilization of the ancient Orient contains ample documentation about the role women played in the sacred and secular music of the time. Written records as well as pictorial displays testify to the various activities of women as dancers, singers and instrumentalists.[2] There is no doubt that in olden times, prior to the establishment of the organized Temple service, and even in the First Temple, women regularly participated in the ritual as singers and instrumentalists.[3] Originally, women also belonged to the levitical music guild as is apparent from 2 Chronicles 35:25.[4] Apart from dancing, the women's part in the cult might have been identical with those of the levitical musicians. Up to the time of David, women were the predominant performers of the reproductive arts. Miriam is the prototype of these women in early Jewish rites (Exod. 15:20).[5] Clues for participation of female singers in worship are found even in the earliest period of Jewish history. "It is said of Noah's wife:

> "Naʿamah was a woman of a different stamp, for the name denotes that she sang (manʿemet) to the timbrel (tof) in honor of idolatry"[6]

Naʿamah's songs (in this case roundelays), still served pagan rites. However, there is no basic difference between these songs and those performed later in honor of Yahveh."[6] The biblical story of the Jews returning from Babylonian captivity contains definite proof that the levitical choir used female singers already in the First Temple.[8] Philo's

writings have furnished quite indubitable evidence pertaining to the role of women in sacred singing.[9] In addition, it is beyond a doubt, according to Alfred Sendry's documentation, that women and maidens participated as singers in the Davidic and Solomonic music organizations. Even after the return from the Babylonic exile, at least in the first period of the Second Temple, they might have held the same functions, until they were removed and replaced by singing boys.[10] In general, the singing of women is appreciated by the talmudic literature as one of the most beautiful divine gifts.[11]

The development of the anti-feminine sentiment of the priestly caste and the ani-feminine tendency of the later priestly scribes influenced the gradual displacement of women from any ritual functions and effaced or so transformed our original sources that any record of the roles women shared in the sacred service were obscured forever.[12]

The only other historical information recorded on women's participation in the Cantorate is in the European communities of Nurenberg and Worms of the 13th century, where women cantors conducted services for women in sections of the synagogue that were either adjacent to the male sections or at times connected by a gallery.[13] Women that were musically talented and knowledgeable in the liturgy were engaged to lead these services. Two of these women are remembered by name: Richenza of Nurenberg and Urania of

Worms.[14] The epitaph on the tombstone of Urania reads: "This headstone commemorates the eminent and excellent lady Urania, the daughter of R. Abraham who was the chief of the synagogue singers. His prayer for his people rose up to glory. And as to her, she, too, with sweet tunefulness, officiated before the female worshippers to whom she sang the hymnal portions. In devout service her memory shall be preserved." [15]

Although the above would indicate that women have performed in Jewish religious services in various capacities in ancient times and as recently as the 13th century, there is no precedent for women having performed traditional chazanut, an improvisational liturgical style that developed at a much later date, exclusively for the male voice.

In this project I am presenting musical arrangements that I have written based on original liturgical compositions of traditional chazanut for the purpose of developing a vocal language through which I can, as a woman cantor, better respond to the sentiment of the liturgical text. I have attempted to do this by interweaving alternative vocal writing into the original compositions, a new vocal expression that is more suited to my vocal instrument as a woman.

Because this project was experimental in nature, I needed to create a format from which to proceed: I organized an outline of study, incorporating different types of research that would, hopefully, prepare me to begin the

process of arranging and composing the musical literature. I began interviewing cantors, cantor/composers, composers, arrangers (male and female), physicians, voice teacher, Michael Trimble and actress, Olympia Dukakis. Each of these people has given me unique insights which have had a direct impact on my approach to arranging and composing the music for this project.

A collection of medical data, results of my survey, a study of operatic prayer composition, a discussion of female vocal and expressive considerations and my musical arrangements and original compositions are all included in the following chapters.

I have endeavored to present a kernel from which a new form of female religious expression might begin to develop. I hope the work I have done will inspire other to continue the process.

Through theological and musical exploration, Judaism can belong to all who desire it. I rejoice in the diversity of expression, in woman, in man, in God! Let us rejoice in our differences as equals, not separate ourselves by the illusory mechitzah. The choice is here. God has not limited us, we have limited ourselves. A new reality, a new dimension of spiritual fulfillment awaits all of us.

Chapter I: Medical and Scientific Data

> "It is indispensable, for the singer, to properly take and control the exhalation of his breath; for breathing is, so to speak, the regulator of singing."[1]
>
> Manuel Garcia II

This chapter contains a number of articles which I have researched and collected specifically for the purpose of presenting scientific and medical explanations of the physiological functions of the male and female singing voices. The articles includes discussions of such relevant subjects as voice registers; acoustical phenomena of both male and female voices; male falsetto; effects of menstruation on the singing voice; longevity of the voice; and an article of great importance to educate those persons who have very little knowledge or experience with the function of the professional singing voice, called, "The Professional Voice: Part I. Anatomy, Function, and General Health", written by Robert Thayer Sataloff, M.D., one of the leading Ear, Nose and Throat physicians of today who specializes in the care of the professional singer. I had the privilege of interviewing Dr. Sataloff for this project.

In addition to my interview with Dr. Sataloff, I interviewed Dr. Wilbur Gould, noted otolaryngologist and founder of the Vocal Dynamics Laboratory of Lenox Hill Hospital in New York City and recognized as one of the leading "singer" doctors in the world.

The Voice Foundation, founded in 1969 by Dr. Wilbur Gould, is the only organization of its kind in the United States specializing in research, education and public information regarding diagnosis, treatment and prevention of disorders of the human voice. The work of the Foundation is international in scope. Dr. Gould and Dr. Sataloff presently serve as co-chairmans of the Foundation. The office is located on 57th Street in New York City. Once a year, The Voice Foundation, in conjunction with other professional musical institutions and medical colleges and organizations, including The Juilliard School, Jefferson Medical College, University of Wisconsin and The Curtis Institute of Music, sponsors a symposium on the care of the professional voice. This symposium attracts M.D.'s and Ph.D.'s from around the world who research in depth the enormous spectrum of the phsyiological functions and the professional uses of the human voice.

The transcripts of these symposiums which include both a scientific research section and a medical section are published by The Voice Foundation. In addition, The Journal of Voice, now the official publication of The Voice Foundation, publishes articles written and submitted by many of the participants in these symposiums. These transcripts have been a fantastic resource for this project. I have included selected articles in Appendix I, because they were somewhat difficult and time-consuming to obtain; those who are interested in reading them will now have immediate

access to them. I do request, however, that no further duplication of these articles be made by anyone. I was personally granted the right to make these copies to be used only for this research paper, but not for, under any circumstances, any additional duplication.

I interviewed, by telephone, one of the very active participants in The Voice Foundation symposiums, Dr. Harry Hollien. He resides in Gainsville, Florida. He has spent many years of concentrated research on the physiological function and professional uses of the human voice and was very helpful in leading me to both his own articles and to others that he felt were relevant in one way or another to the topic of my project.

These articles and interviews provide a substantiation of the fact that there are recognized physiological and functional differences between male and female voices.

One really cannot pursue a project of this type without including a certain amount of discussion regarding vocal production. As I have said previously, with such demanding vocal criteria required as an integral part of the prayer expression in the style of traditional chazanut, the chazan, whether female or male, should strive to acquire the proper physical function in order that he/she could express the text with as many vocal colors as possible, developing, within one's own range of vocal talent, the required set of vocal criteria.

"The lungs and diaphragm and the whole breathing apparatus must be understood by the singer, because the foundation of singing is breathing and breath control....A singer must be able to rely on her/his breath, just as he/she relies upon the solidity of the ground beneath his/her feet".[2]

Let us consider, at this point, a discussion of the Valsalva Maneuver because this aspect of pulmonary and thoracic mechanics appears to be evident as an essential function in the vocal technique of the Eastern European Ashkenazic Chazanim, of the Golden Age of Chazanut, which is historically, the period of time during which most of the music that I am presently exploring was written and originally sung.

I interviewed Dr. Maurice Sheetz, who is a pulmonary and critical care medicine Fellow at St. Luke's/Roosevelt Hospital in New York City. He was able to identify and define for me, by listening to recordings of Cantors of the Golden Age of Chazanut, including Gershon Sirota; Yossele Rosenblatt; Zavel Kwartin; Pierre Pinchik; Leib Glanz; David Koussevitsky; Moishe Ganchoff; David Roitman and Mordecai Hershman; and recordings of opera singers of the great era of Bel Canto, including Enrico Caruso; Mattia Battistini; George Thill; Fernando De Lucia; Nellie Melba, Louisa Tetrazzini; Lilli Lehmann; Zinka Milanov and Rosa Ponselle, a particular audible breathing function that we, as singers, would call a type of "breath support" technique, the

Valsalva or Valsalva-like Maneuver, common to the vocal singing of each of the above-named artists. Dr. Sheetz described this function as a "...controlled expiration of the breath against a closed glottis." The opposite, the Mueller Maneuver, which consists of inspiration against a closed glottis, can also be heard, incorporated into the singing technique of these great singers. One can hear very clearly the incorporation of the Valsalva Maneuver on the recordings of all of these singers, as a breath pressure cut-off, or as a type of audible "grunt", at the end of the singing phrase, and with the Mueller Maneuver, an audible, short "grunt" at the beginning of a phrase, a method of "setting" or leaning the breath and singing against the chest, establishing the "apoggio" or breath "prop".[3] The apoggio is the deep breath regulated by the diaphragm; no singer can really get high notes or vocal flexibility or strength of tone without the attack coming from this seat of respiration.[4] This type of breath support function allowed the Cantors and opera singers of that unique period in vocal history to develop a remarkable ability to use the eight criteria of Bel Canto singing, therefore endowing these singers with a vast spectrum of vocal, emotional and spiritual expression. One still hears this kind of singing technique on the recordings of Cantor Moishe Ganchoff and in the performances of Cantor Israel Goldstein and Cantor Robert Abelson. These eight criteria of the art of Bel

Canto singing are: 1) legato; 2) staccato; 3) soft; 4) loud; 5) high; 6) low; 7) coloratura; and 8) trills.

Louisa Tetrazzini, one of the most famous of Bel Canto coloratura sopranos explains this breath-pressure function in her book by saying that she kept the pressure of the breath against her sternum at all times and because the pressure of the breath was held there, that allowed her vocal cords to remain free to vibrate. Dr. Sheetz described it, rather colorfully, as follows: Its like saying that at one end of your body you've this tremendous pressure of breath against your sternum, but at the same time you are learning to relax the muscles from the neck up...There are these little muscles that surround the vocal cords, the ones in the back that change the length and tension of your cords are called the arytenoids and what is happening is that you build up pressure against your sternum; then you have to learn how to relax those muscles (the ones surrounding the vocal cords) so that you can open your throat at the same time you release that expiration or pressure, so that you do not release all of it directly against your vocal cords at the same time. It's more analagous to banking a pool ball off a cushion, you know, instead of going directly through, I mean you somehow divert it so that air goes through in a controlled amount, really as little as possible. Yes, its like taking a pool shot, instead of taking the ball directly into the pocket, you bank it off"....

In all of the books on singing written by the great singers and teachers of the Bel Canto era including Enrico Caruso, Lilli Lehmann, Emanuel Garcia and Blanche Marchese, this particular function is described as essential to the necessary control of the breath-support system of the singer. This recorded "grunt" on the cut-off, according to Dr. Sheetz, is audible evidence of a physical procedure known as the Valsalva Maneuver.

In Johan Sundberg's book on the science of the singing voice[5], he spends a third of the book discussing breathing, what he calls subglottic pressure, involving the balance of equal and opposite muscular activity required to produce not only the healthy singing tone but the different dynamics possible to the vocal organ.

To actually observe the Valsalva-like Maneuver function, one can watch a baby cry. When a baby cries, the abdominal wall moves in on inhalation and presses out on exhalation, whereas when the baby is resting or sleeping, the abdominal wall moves out for inhalation and in for exhalation. The actual breathing function is reversed. Caruso describes it as follows: "To take a full breath properly the chest must be raised at the same moment the abdomen sinks in. Then with the gradual expulsion of the breath a contrary movement takes place....It is this ability to take in an adequate supply of breath and retain it until required that makes or, by contrary, mars all singing...This

art of respiration once acquired, the student has gone a considerable step on the road to Parnassus."[6]

Lilli Lehmann describes proper respiration as follows: I had learned this: ...to draw in the abdomen and diaphragm, raise the chest and hold the breath in it by the aid of the ribs; in letting out the breath gradually to relax the abdomen."[7]

Another essential aspect of breath control is learning how to release as little breath as possible while singing. Lilli Lehmann describes it by saying..."I began to pay special attention to emitting the smallest possible amount of breath." Giovanni Battista Lamperti was another of the great teaching masters of the art of Bel Canto. He states, in his book, Vocal Wisdom, that the problem of the singer is to balance giving the breath and holding the breath at the same time. All, he states, problems with singing are a mismanagement of the breath. He discusses what he calls the force of the compressed breath and how to handle it. He states that...."the breath is the ocean--the voice is the boat that floats on the ocean! Nature gave us the voice--we cannot change it--but we can educate the breath and learn to control it. This--constitutes the whole method of singing."[8]

While I was singing in Europe, I was introduced to a very interesting and effective vocal exercise, legend has it that it was an exercise that Caruso used, for controlling the emission of the breath: One holds a candle flame close

to the mouth, and attempts to sing at different dynamic levels while keeping the candle flame absolutely steady. In doing this, the singer learns to control the emission of the breath with the musculature of the intrathoracic pressure and diaphragmatic function. If done properly, it is a very useful exercise.

The Valsalva-like Maneuver allows the male singers to use the "sob" or "krechtz" very effectively as another tool for emotional and spiritual expression. As I discussed previously in this paper, the use of the "krechtz" is not natural to the female voice as a tool of expression.

If one listens and then compares the singing of Cantor Pinchik and Cantor Sirota, one hears that Cantor Pinchik does not possess as great a natural vocal instrument as Cantor Sirota. Despite this fact, however, Cantor Pinchik, nevertheless, could perform all of the expressive requirements and criteria that Cantor Sirota could demonstrate. The criteria could be achieved through the implementation of the same breath-support function. Whatever each of their limitations might have been, they had one thing in common: that is, the use of the Valsalva-like Maneuver, which is audible on the recordings of both Cantors. They are both using the same breath-pressure/breath-release function to achieve their expressive singing styles.

When one reads and compares all of these books on singing from the Bel Canto era, one is convinced that there

was, at that time, a traditional way that one learned to sing. There was a required aesthetic that one recognized and that one strived to attain, to the best of one's ability. There exists the phenomenon that the era of Bel Canto and the Golden Age of Chazanut ran parallel to each other, occurring within the same historical time frame. One wonders what conditions were present that allowed this to happen: That such great singing, the greatest singing in history, should thrive simultaneously in two different worlds of expression, in the world of Jewish prayer and in the world of Italian opera. One also wonders what would have been produced in the musical world of Jewish prayer if women, at that time, had also been serving as Cantors.

Chapter II The Survey and Its Results

In order to amass and review a number of responses in regard to the potential value of my thesis topic from the viewpoint of the female cantors working in the field, I devised the enclosed survey which I sent to sixty-one invested female Cantors, listed in the ACC membership directory. Of the sixty-one surveys sent, I have received, to date, thirty-seven responses.

The feed-back I received from these women was very interesting, very thoughtful, and generally, very supportive. The survey responses are included in this project as Appendix II.

After reviewing each of the returned questionaires, I decided to include some of the responses to question number five (5) and question number six (6) of the original questionaire in this chapter to provide an overview of the general success of the survey results:

Question number five (5): What is your vision for the evolution of training women in the style of traditional chazanut?....

Answers:

"The tessitura is different for a soprano than for a tenor. Although both are high voices there is a difference in the area of the voice that is most comfortable to sing

in....I often have to transpose music and change certain notes and phrases to have it fit my voice....Music, that is traditional chazanut, must be written for the female voice according to the nusach. Until the traditional branch of our religion and their professional organization accepts women as cantors this task will be difficult to overcome."

"Tough question...I have heard just a couple of women sing traditional chazanut with a real traditional flavor. They either grew up with it or had a natural gift for the feel of it. I don't think women can learn traditional chazanut easily without a good dose of it and the truth is that men have always performed it. If women are sensitive to music and bring their hearts and souls to the calling, then the feeling may be achieved ultimately, and perhaps a new "womanly" flavor will evolve naturally. Women should be encouraged to familiarize themselves with the liturgy through and through and relate it to the ebb and flow of the nusach."

"I think a style will slowly evolve that will suit women's voices better. With efforts like yours being made, I guess there are infinite possibilities."

."A difficult question...I really don't know, because we don't have any role models. To keep the style authentic we must rely on past greats but somehow adapt it to our voices and needs."

"Traditional chazanut recitatives are difficult to sing, especially for lower female voices, as they must be

transposed, thereby losing some of the interpretive brilliance....Traditional chazanut is also difficult to master because we no longer hear this kind of music around us. We are the keepers of this flame and I think we should adapt it to our own voices and ears."

"In terms of interpreting prayers, I would lean more toward Sam Adler's historical analysis--that "traditional chazanut" was the product of a certain historical condition ("ghetto mentality") and there is a need to express the American Jewish experience in a musical style appropriate to living in freedom and openness."

Question number six (6): Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression, using their individual voices, to best express the prayer texts?

Answers:

"I believe that the Cantorial field needs talented arrangers to cut and paste and add certain phrases, especially in this area of traditional chazanut. There is no value in a student studying repertoire that is in a tessitura beyond them, once the material suits the voice, the student will better be able to interpret."

"...depends upon the Judaic background and liturgical grounding of the students. Composing from ignorance will not produce quality phrasing and stylistic development of the texts."

"Finding what doesn't work for you is an important step towards finding what does. Traditionally, nusach provides the outline, while the cantor has the freedom to improvise. I think cantors need to be taught better how to do this, as well as encouraged in more structured composition."

"It's always wonderful when Cantors express themselves through their own compositions. Not everyone is gifted in that area, but it certainly should be encouraged not only for vocal reasons but because creativity should always be valued in and of itself."

"Although not everyone has talents in the area of composition, I could have used more experience in cantorial improvisation--it might have helped to loosen me up!"

"Yes, I do. One of the greatest lacks at HUC is the de-emphasis on improvisation which is the Cantor's starting point at composition. It also provides the keva/kavannah balance that any Jewish service should ideally offer."

"...most certainly, but only after they have studied the correct way to approach the texts. In my years at HUC I felt this "improvisation" skill was really lacking. By your last year in school you should be encouraged to improvise."

"I think if the students at HUC were taught the art of improvisation more completely, it would enable us and encourage us to compose for ourselves."

"I did not have difficulty singing in the traditional style as I had the original sound in my ear, however, the "krechtz" is not appropriate..."

"Pam, I am very glad you are doing this project. It is one dear to my heart...I have thought of doing something similar myself on many occasions.....pick up a tape by a woman called Bat Sheva. She demonstrates all of the problems inherent in women singing chazanut like a man. She chests everything, which is the male vocal production (until or unless they sing in the falsetto). In the female voice, it is possible to accomplish the "krechtz" sound in the chest register--not so in the upper register. She does indeed simulate the male sound and technique--but in her voice, it sounds rather vulgar. Even though she sings with quite a lot of panache and no small amount of feeling, it never sounds quite right....My own belief is that women should not try to imitate what men do --rather they should cultivate their own sweet sound, their own feelings for the traditional chants and substitute ornaments which are more appropriate in the female voice than the "krechtz". Also, certain pieces should always be transposed to flatter the female voice rather than strain it to the limits."

I intentionally transcribed these quotations anonymously, in order to establish a more objective presentation for the reader.

This survey allowed me to tap into the consciousness of the women cantors in the field; I wanted to get a feel for what their vision might be for the future of traditional chazanut in an egalitarian prayer expression, how relevant and useful such a process of exploration and experimentation

might be to the integration of the spirituality of women into the Cantorate.

Chapter III: Vocal Tradition for Women: Where Do We Start?

> "Our body is simultaneously the instrument and the resonance box upon which we have to learn to play. Our muscles are the strings which we must learn to tune, tighten and loosen, one to the other, and our soul is the director of our art."[1]
> Madame Lilli Lehmann

Women have no vocal tradition in the style of traditional chazanut. So where does one turn to study good vocal writing specifically for women: vocal writing that would possibly suggest a type of vocal expression familiar to and including certain vocal/emotional criteria already present in the singing tradition of Eastern European chazanut; vocal writing that could possibly be incorporated into the established expression of traditional chazanut as a way for women to better respond to the sentiment of the prayer, using variations of vocal writing, more suited to the vocal instrument of a woman? The answer for me was to begin studying the great vocal writing of master composers, including Bach, Mozart, Bellini, Bizet and Verdi, how they specifically set prayer to music, and how they handled the vocal line in prayer for each female voice "fach" or category. In the operatic and oratorio tradition, women have an established, recognized great vocal history spanning hundreds of years; women have had the opportunity to communicate the widest spectrum of emotions through a very special array of vocal colors and vocal expressive devices,

representative of great vocal writing for the female voice. This vocal control is cultivated over many years of serious study, through the process of a traditional style of classical vocal training. I chose opera as my medium of exploration instead of, for instance, gospel singing, because the vocal criteria and expression required by the composers and thus the great operatic singers of the Bel Canto and early verismo eras in the operatic and oratorio repertoire is paralleled by the great Ashkenazic Chazanim of the late 1800's and early 1900's in their compositions and remarkable vocalism. The only place we find such criteria required of the female voice and expression is in the opera and oratorio. One must remember that just as the Cantors wrote for themselves (or others wrote specifically for them, i.e. Cantor Moishe Ganchoff told me that Rappaport composed Eylu Devarim specifically for Mordechai Hershman), composing settings of prayers to suit their own vocal abilities and religious expression, many of the operatic composers wrote individual roles for specific women: the composers often designed a role for the individual vocal abilities of a specific female singer, creating a vocal line through which the artist could best express herself. The prima donna had always played a central and creative role in the development of opera: The operas Norma by Bellini and Anna Bolena by Donizetti were composed for the vocal genius of Guiditta Pasta; the capabilities of Schroder-Devrient, Stolz and Jeritza were vitally inspiring at various times to

Wagner, Verdi and Richard Strauss, respectively.[2] In our own day Luciano Berio entrusted Cathy Berberian with music that leaves a great deal to her own improvisation. Donizetti wrote his most famous tragic opera, Lucia di Lamermoor for Fanny Persiani; Giuseppina Strepponi created the role of Abigaille in Verdi's first real success, Nabucco, a role he composed for her.[3] Just as these composers wrote for individual women and individual expression so the great chazanim of Eastern Europe wrote for themselves, using a musical vehicle, the eclectic, improvisational vocal style of traditional chazanut, to express their individual religious sentiment through their own individual vocal virtuosity.

I examined the vocal writing of the great operatic and oratorio composers, based upon, as a format of analysis, the following textual and vocal considerations: 1) Tessitura (range): i.e. how the range reflected the text: Was the high voice used more for emotional moments or outbursts of expression and the middle voice used more for recitative-type expression; 2) Passagio: i.e. does the composer write repeated notes in the passagio for the female voice; if so, when and how is it used; 3) Vowels/Diction: Are certain vowels avoided in certain parts of the range; how are the vowels used to express the text in different tessituras; 4) Phrasing: Use of legato, staccato, contour (rests vs. motion), runs, sustained notes; 5) Dynamics: How is the text expressed through the use of piano, forte, sforzando,

crescendos and diminuendos (if written by the original composer and not by the editors); and 6) Tempi/Rhythm: How is the tempo and rhythm used to enhance to meaning of the text; and 7) Embellishments: How are the vocal embellishments (coloratura, trills,) used to emphasize the emotional expression of the text.

Each of the particular examples of prayer settings I chose to study reflects a defined religious sentiment. I reiterate here that these selections were written by great composers who responded to the needs of the female voice and at the same time were able to capture the dramatic intent essential to the opera as a whole. I now list each of these settings and the particular response reflecting the expression, respectively:

1) "Erbarme dich"...(Have mercy upon me...) from the St. Matthew Passion by J.S. Bach: A prayer of supplication;

2) "Ave Maria"...from Otello by Verdi: A prayer of general supplication. This is one of the most beloved and most famous arias in the operatic repertoire;

3) "Alleluja"...from Exsultate, jubilate, Motet, K. 165 by Mozart: A song of praise;

4) ...s'ancor si piange (from within the aria "Tu che le vanita"; from Don Carlo by Verdi: A desperate supplication;

5) "Pie Jesu"...from Requiem by Faure: A gentle supplication;

6) "Possente"...prayer of the High Priestess from Aida by Verdi; a hymn of praise, affirmation, beseeching.

7) Numi, pieta...(from within the aria "Ritorna Vincitor") from Aida by Verdi: Passionate supplication.

8) "Casta Diva"...from Norma by Bellini: Praise, supplication, thanksgiving;

9) "Madonna benedetta"...from La Boheme, Act IV by Puccini: A personal prayer, a chant, a supplication;

10) Vous me donnerez (from within the aria "Je dis, que rien ne m'epouvante") from Carmen by Bizet: This is one of the great moments in opera, a supplication of exquisite beauty;

11) "Libera me"...from the Requiem by Verdi: declamatory supplication to hushed, impassioned supplication;

12) "Requiem eternam"...Requiem by Verdi: ethereal supplication, incorporating a remarkably lyrical vocal line with the classic female vocal device, i.e. the high pianissimo.

Another interesting observation: I know of no other place in opera, except at the end of "Vissi d'arte", the famous aria for Tosca by Puccini, in which a woman speaks directly to God, passionately questioning God, asking God why such a horrible fate has befallen her (which indeed it has)...."Why, why, o God, have you paid me back this way?" In the opening of the aria, Tosca says she has lived for art and love, daily performing good deeds; why, then, she cries, do you abandon me now? Puccini presents Tosca as a woman who turns directly to God in her moment of despair. She

does not pray for mercy, she asks God, "why"? This expression is very unusual, certainly for women in opera.

In terms of present-day composition, Cantor Lawrence Avery's setting of Ribono Shel Olam[4] is very effective and sensitive vocal writing, composed specifically for a woman's voice; and Dr. Samuel Adler, in a telephone interview, explained to me that he composed both "Ahavat Olam" from Shir Chadash and "Sim Shalom" from Shiru Ladonoy specifically for a woman's voice. After studying both pieces, I found both selections to be composed with a female aesthetic and female vocal criteria in mind. He also composed several beautiful prayers for both Rachel and Leah in his opera The Wrestler which I reviewed at the Oxford University Press office on Madison Avenue in New York City.

This particular exploration gave me an insight into an aspect of female vocal expression that could not be discovered through any other vocal medium. Opera still grants the highest recognition for excellence in singing.[5] The musical selections numbers 1 through 12 are included in Appendix III.

My own original composition of B'rach Dodi is included in Appendix IV.

CHAPTER IV Alternatives to the Traditional Male Vocal Expression

> "Nature attaches to each sentiment ditinctive characteristics, a timbre, an accent, a modulation of the voice, etc. If one prayed or threatened in timbres, with modulations and accents other than those required by threats or prayers, far from intimidating or touching tender feelings, one would succeed only in making oneself ridiculous. Each individual has equally, in proportion to one's nature and one's position, a distinct way of feeling and expressing oneself."[1]
>
> Manuel Garcia II

Women have emerged from 1000's of years of silence into a Jewish worship experience, as Cantors, from which they have no past upon which to draw nor a tradition of liturgical female vocal expression to explore. Except for the historical data acknowledging the religious roles of women in the culture of Ancient Israel[2] and a few isolated documented accounts of the activity of women in religious roles during the early part of this millennium,[3] all of which were discussed in the introduction to this paper, women have no tangible, original roots of communal religious expression in Rabbinic Judaism upon which they can continue a process of growth and development. Women are starting from scratch, to coin a cliche. Women are embarking on a very personal, spiritual journey of rediscovery.

Women are immersed in the style and expression of tradtional chazanut during the four years of cantorial studies at Hebrew Union College. Women encounter this particular style of vocal writing, that has developed over

many years exclusively for the male voice: written by men, for men, representing male vocalism and male expression. Women at the college attempt to adapt their vocal instruments and expression to fit a particular set of male vocal and expressive criteria already established in these compositions, sometimes with success and other times with difficulty.

What then is a possible motivation for composition in prayer? We certainly have numerous musical settings of the same liturgical text, composed by many cantors of different historical periods. Why did they compose this music for themselves? Did they feel differently about the text? Did they want to try something new? Did they want to exercise their individual vocalism as an extension of their expression? Did they want to create a vocal line that allowed them a variable range of tessitura?

This compositional urge, I believe, is an attempt to accomodate the soul through the accomodation of the voice. As Longfellow states so eloquently: "The human voice is the organ of the soul". It is a very special type of freedom of individual expression and is now one of many possible ways for women cantors to begin exploring and discovering their sensibilities in worship through this type of improvisational musical expression.

I believe that prayer is a dynamic force, that it is organic by its very nature, and for that reason, inspires great and inexhausible creativity. The vocal expression of

the Cantor then, is a combination of intellectual, emotional, psychological and spiritual responses to the liturgical text. If this is true, which I believe it is, then another question arises: Is there a difference between the "tools" with which a woman can express herself vocally and musically and those with which a man can express himself vocally and musically? I believe there is indeed.

Let me note here that this situation presents a totally unique set of circumstances, because, from my experience, I have not encountered any other vocal musical medium, requiring the type of vocal criteria and expression implicit in this style of cantorial singing, that would not differentiate between male and female vocal writing and expression. The music composed by Bach, Verdi, Mozart, Bizet, Mendelssohn, just to mention a few, was designed at all times for either the male or the female voice, of one category or another. The distinction has always been recognized in the area of classical vocalism and expression. The fact that many women are requiring of themselves the ability to imitate the male style of expression and vocalism and to fulfill the criteria required by this musical expression in its present form is, for many, unrealistic and frustrating. The style may be accessible to some and not at all to others. Some individual pieces may work very well in a woman's voice, but, much of it should be explored and appreciated for its beauty, originality and unique style of expression, bearing in mind that the expectation should be

one of absorbing a particular style of expression rather than imitating the exact notation as it appears on paper. The fact that the music of Jewish prayer has been written and sung solely by men for so long, neccesitates this particular type of defense on which this project is based.

The integration of female expression and the unique characteristics of the woman's singing voice will add new color, energy and spirituality, another dimension of Jewish response, into a traditionally eclectic musical style of prayer expression.

I will now explain the musical and textual changes I made in the following original liturgical compositions: 1) Asher Bidvaro by Moishe Ganchoff; 2) Eylu Devarim by J. Rappaport; 3) Sh'ma Yisrael by Leib Glantz; and a slight adjustment to 4) Meloch by Yossele Rosenblatt. Each section or measure of the original music that I rewrote is numbered and has the corresponding number on the same section or measure of music in my own arrangement. In this way, I can refer to a specific number, allowing the reader to refer to the appropriate number in both the original and the arrangement of each composition in order to make comparisons and observations. As I do so, I will incorporate a discussion of passagio; diction; vowel placement; tessitura; cover; falsetto; voice registers; and the use of "krechtz" or "sob".

I am basing many of my changes in vocal line on certain recognized and established physiological and functional

differences in the male and female voice, discussed in part in Chapter I and discussed further below; and on my own observations and study of the operatic and oratorio tradition for women, as discussed in chapter III.

A thorough knowledge of the use of the voice, its strengths and weaknesses, will aid in the vocal freedom necessary to the exploration of female expression in prayer. The message of the prayer, the text painting, is carried on the vocal line by the Cantor and in order to strive toward integration of female spirituality into a traditionally male style, women must have a certain knowledge and control of their own vocal tools. Consider that women's voices have specific characteristics just as men's voices do:

In general, the male singer has thicker vocal cords from top to bottom than the female singer; a man also has a naturally greater vital breath capacity than a woman.[4] For example, a man's vocal cords will be thicker than a woman's of the same voice weight and category: i.e. lyric tenor vs. lyric soprano or dramatic tenor vs. dramatic soprano. Because the vocal cords are thicker , the male singer has to apply more sub-glottic pressure[5] to cause the vocal cords to vibrate. Therefore a male singer singing a specific pitch in the passagio (e-flat", e",f" and f#") is producing a steady stream of breath pressure that is greater than the stream of breath pressure produced by a female singer when singing the same pitch in the passagio.[6] Because a more intense pressure is already established in this tessitura of

the voice of the male singer, it is easier for him to repeat syllables on a particular pitch in this tessitura. In addition, the male singer has the natural acoustical phenomenon called the "covered tone" which occurs as the male voice passes through the passagio, an effect that a female singer does not have. The female voice passes, if properly produced, from the middle register to the head register with much less of an aural effect, and with less subglottic pressure. In order to speak in that tessitura the female singer must create additional pressure against her vocal cords, often producing a harsh, white or open quality which can sound strained and unnatural to the listener. We must also remember that women do not speak in that range of the voice, whereas men can and often do. The basic female singing voice is an octave above the male singing voice, so the acoustical phenomenon that occurs as the woman's voice passes into the head register is dramatically different in effect than the sound of the male voice in the same tessitura. It is also noted that the back of the throat of the female singer is much more open than the male singer's throat as she passes through the passagio into the head register[7] and therefore, must force an artificial closure of that throat position in order to produce clear, repeated diction in that tessitura, distorting the healthy, natural vocal mechanism and producing an unpleasant or unpleasing sound.[1] This type of vocal writing for women is virtually non-existent in any of

the operatic or oratorio examples that I examined during my research, not limited to the examples included here. I did find two examples of this type of expressive technique (*) incorporated only at very dramatic moments, often at crucial, climactic points in the musical drama, at moments of great despair, anger, pain or hysterical ecstacy. But, again, it is extremely rare and is found only in the more dramatic repertoire.

This expressive technique of repeating words in the passagio, either on one continuous note or moving between two or three notes is very common compositional technique in traditional chazanut; it is very effective in the male voice but not in the female voice, for the reasons discussed above.

I rewrote all such musical passages in Eylu Devarim, numbers (2), (4), (6), (7), (8) (9), (10), (12), (13) and (14); and in Sh'ma Yisrael, numbers (1), (2), (4), (5), (6), (7), (8), (9), (10), (11), (12) and (13); most of the changes, as one can see, in the Sh'ma Yisrael were an attempt to vary the range and colors of expression for the soprano voice by incorporating both the middle and the upper registers through the use of coloratura. In a piece like the Sh'ma Yisrael where the text is minimal, I made every attempt to bring the tessitura down into the middle voice in the sections where text was denser so that it could be better understood and used the head voice and upper range, incorporating a more brilliant timbre with coloratura

passages, to enhance the more emotionally expressive sections, where less diction was required. The only change I made in the Meloch was a measure of seven repeated f" 's in the 5th bar of the composition, numbered (1), respectively. I moved the text, "..al kol haolam..." down to the middle register, a',a',a',b',c"; so that these words would be better understood and I also avoided the repetition of the passagio notes.

I wish to avoid any confusion at this point between the use of the terms "head voice", "chest voice" and "registers". They are not the same thing. Let me give you an example. If women were to speak as Julia Childs or, for that matter, as Jesse Norman or the late Elizabeth Schumann do, then we would be using the "head voice" as our speaking function. Most of us, however, speak in our "chest voice"; it has become, certainly in the last fifty years, socially. a more acceptable way of producing our speaking voices, despite the fact that it is not as healthy a function for a woman, and certainly not as healthy for the professional singer. A register, on the other hand, is most commonly described as a phonation frequency range in which all tones are perceived as being produced in a similar way and which possess a similar voice timbre.[8] Dr. Harry Hollien (1974) defines register in the following way: "a vocal register is a totally laryngeal event; it consists of a series or a range of consecutive voice frequencies which can be produced with nearly identical phonatory quality;...there will be

little overlap in fundamental frequency and...the operational definition of a register must depend on supporting perceptual, acoustic, physiologic and aerodynamic evidence."[9] In the male voice, one distinguishes between normal, or modal register, which is used for lower phonation frequencies, and falsetto register.[10]

When a man is singing high notes full voice, if he relaxes his diaphragmatic lean, or loses his support for a second, he does what we call cracking. Cracking is breaking from full voice back to an unsupported sound. An unsuported sound where the breath releases and passes through the vocal cords without any resistance of any kind in the support system, produces what we call the falsetto. A falsetto is simply the fluttering of the edges of the vocal cords without any equalization process or resistance in the support system at all. If a woman loses, for a moment, her breath lean, a variety of things can happen because the female voice is , by nature, produced by singing with more of the edges of the vocal cords vibrating, rather than, as in the male voice, more pressure against a larger area of the vocal cords.[11] If she cracks, she can produce a shrill, thin sound, she might even shriek, or her voice will stop singing altogether. In the male voice, however, if he cracks he will crack into falsetto and he will continue singing in the falsetto function. The falsetto is an incredibly effective expressive vocal "tool" when used

creatively by the male singer. We hear it used with great expertise by Yossele Rosenblatt, Gershon Sirota, Mordechai Hershman and by many of the other great Cantors of that period. Sometimes, a male singer can begin a tone in the falsetto, blend into a full voice tone and then decrescendo, creating a beautiful painissimo effect. If a male cantor or opera singer feels tired, or not in great voice, he has the opportunity to use the falsetto very effectively, simply as a way to rest or save his voice. These are possibilities that a woman does not have available to her. Anything that one might call a falsetto in the female voice would be so thin that it would be unusable. A woman, then, even for the finest pianissimo, filo di voce or split tone has to maintain her support for all vocal expression. Her function does not allow her this resting technique.

In the following quaotation by Lilli Lehmann, she reiterates the belief in the existence of falsetto in the male voice but not in the female voice and also points out how the use of a particular singing effect, such as the falsetto in the male voice, comes in and out of vogue, depending on the era of singing: "Most male singers--tenors especially--consider it beneath them, generally, indeed, unnatural or ridiculous, to use the falsetto, which is a part of all male voices, as the head tones are a part of all female voices. They do not understand how to make use of its assistance, because they often have no idea of its existence, or know it only in its unmixed purity, that is,

its thinnest quality. Of its proper application, that is, its necessary admxiture with chest resonance, they have not the remotest conception. Their singing is generally in keeping with their ignorance."[12]

There is one story that when Rossini heard the famous French tenor Duprez sing a high C, the first time "dal petto", translated "from the chest", he complained bitterly about how hideous it was and how he hated it, how he hated when male singers tried to take their chest voice or their full voice up into the upper reaches of their range. He preferred the use of falsetto or the supported falsetto or the mixed tone.

During the first quarter of the twentieth century, there came into vogue something called the "le petit ton inferieur", "the small inferior tone". This was a falsetto tone that preceeded a full tone. The male singer would deliberately make a falsetto attack and then in closing the glottis tightly enough, produce the full tone. This action of closing the vocal cords tightly would then cause a sudden resistance of the breath. This resistance would then be equalized and felt, localizing the pressure in the diaphragm. This is an application of Newton's third law of motion which states that for every action of a force there is an equal and opposite reaction. This resistance, resulting from the closure of the glottis causes this physical reaction, felt immediately as a response in the diaphram, gained the name in Italian "il punto d'apoggio"; In modern times it has come to be called just "apoggio",

referring to a more generalized support across the diaphramatic area. In Spain, however, it is still called "el punto de'apoyo". This type of support technique, beginning with "le petit ton inferieur" and activating the diaphragm with the closing of the glottis became very popular. As more and more volume was required, this function turned into the "krechtz" or "sob" that we associate with the singing of the great cantors and opera singers of past and present.

This register break that occurs when a man shifts from the falsetto into the normal or modal register creates the effect that we call the "krechtz" or "sob".[13] This abrupt and very audible vocal effect, used effectively and extensively by the great Ashkenazic Cantors and equally by many of the great Italian opera singers of the same historical period, including Enrico Caruso and Benjamino Gigli, is not a vocal effect that works successfully either functionally or expressively, in the female voice. The female voice has four recognized registers: the chest register, the middle register, the head register and the whistle register.[14] A woman has to set up an artificial or unnatural breath pressure condition to approximate this dramatic shift downward from the head register into the middle register, for a "sob" effect. It occurs more naturally when she breaks from the middle register into the chest register. Women do not, however, sing in the chest voice as a general rule, because the expressive possibilities in that part of the female voice are extremely

limited. Even in Broadway singing, where "belting" is a commonly used singing technique for women, the majority of the expressive vocal writing for the female voice is still found in the head voice. "In the woman's voice the middle register takes in the notes from E on the first line fot he staff about to middle C. The head voice begins at middle C and runs up to the end of the voice, sometimes to B-flat" or C", where it joins the second head register, which I have heard ascend into a whistle in phenomenal voices...In the high register the head voice, or voice which vibreates in the head cavities, should be used chiefly. The middle register requires palatal resonance, and the first notes of the head register and the last ones of the middle require a judicious blending of both. The middle register can be dragged up to the high notes, but always at the cost first of the beauty of the voice and then of the voice itself, for no organ can stand being used wrongly for a long time."[15]

The widest spectrum of expressive possibilities for the female voice lies within the parameters of the head voice. Needless to say, the chest voice can be used for a special effect on occasion, but the head voice, certainly throughout the hundreds of years of operatic development, has proven to endow the female singer with the most variety of expressive possibilities. Liturgical composition for woman's voice therefore,demands an exploration of the possibilities of the upper notes of the female voice, the intention being to discover more and more ways to express a wider range of

emotion and possible religious sentiment. When properly cultivated and developed, the female singer has at her disposal the uniquely beautiful high pianissino, the "filo di voce", the thrill of finely-tuned of high coloratura spun on the thread of the voice and the brilliance of the well-produced trill with which to enhance the expression of the text at hand. These "tools" should be explored very deliberately and consciously and carefully interwoven into the texture of the vocal line. I attempted to do this in my arrangement of Leib Glantz's Sh'ma Yisrael.

Upon first glance, it appears that this wonderful composition may be accessible not only to the high tenor voice but also to the soprano voice. This may be true for some, but on further examination, one finds that the expressive coloratura phrases all lie in the area of the passagio. Again, the climactic expressive effect that can be achieved by the tenor voice in this part of his range, due to the fact that it is acoustically an extension of the speaking range, the acoustical phenomenon of "covering" occurring in the passagio of the male voice, and the added subglottic pressure neccessary to achieve diction in this tessitura are all natural (however properly cultivated) to his vocal function as a man and are not, as I have explained nautral to the vocal function of a woman. Therefore, I took these sections of music and arranged them to incorporate a wider vocal range, using the upper range to express more emotional color, (1), (2), (5), (6), (10), (13); and the

middle range (produced from the head voice) to allow enunciation of text to be easily understood, (9), (11). This leads me directly into a discussion of diction.

Writing of the vocal line for liturgical texts must accomodate the clear communication of that text to the listener. As I have stated previously, the singing voice of the man is very much an extension of his speaking voice. Women, on the other hand, tend to speak in the chest voice and then adjust to the head voice when they begin to sing. The male singer is more easily understood in the upper part of his voice than the female singer because he is heard an octave lower by the listener. A tenor can sing different syllables, vowels and consonants, in a higher tessitura, even high notes, and will be understood much more easily than a woman singing in that same higher tessitura. The head voice of the woman takes on certain overtones that also interfere with diction. When a woman attempts to exaggerate her pronunciation in the upper voice it can cause a reaction in the root of the tongue, in the throat or in the jaw and can interfere with the breath support system in the body. Because of this interference, the higher notes can become pinched, tight and unpleasant in quality and timbre.

Perhaps, therefore, if the writing were such that there was enough time for breath, relaxation and enunciation to control this reactive process, the voice would adjust to the tessitura. Women need more time to repeat vowels and consonants, particularly in the passagio. This again has to

do with the fact that less pressure is required by the female singer to produce these tones, and when an extra pressure is exerted to compensate for the diction, the tone will suffer. In my own arrangements, I wrote the vocal line lower in range to accomodate the repetition of the denser part of the text and allowed the voice to soar into the upper range, for a more intense emotional response. The expression of emotion can be increased in the upper ranges of the female voice and should be explored with the intention of discovering ways to express a wider range of emotional response to text.

Let me state here that the problems with diction that arise for women cannot necessarily be alleviated by simply transposing a piece of music. Often the sentiment of the liturgical composition is lost when transposed. So, the approach to the music must be more experimental in nature, as I have attempted in this project.

We have no way of knowing, at this point, what effect singing music that forces the voice to function unnaturally in the passagio will have on the longevity of the female voice. This is a genuine concern and needs to be dealt with by those who will attempt to rearrange sections of this music for the female instrument. Caruso's following statement applies even more so to the expression of prayer texts: "Certainly no singer can be called a great artist unless his diction is good, for a beautiful voice alone will not make up for other deficiencies. A singer endowed with a

small voice or even one of not very pleasing quality can give more pleasure than a singer possessing a big, impressive voice, but no diction."[16]

The production of vowels in the different registers of any voice directly effects the quality and timbre of the sound produced. One of the most famous voice teachers of the Bel Canto era was Mathilde Marchesi, the daughter of the famous Manuel Garcia. She was the teacher of the great Nelllie Melba, and taught only women. She would not allow any of her female students to sing an "i"(ee) vowel on any note in the passagio or above. She felt it was a detriment to the health of the female vocal apparatus and unaesthetic.[17] Giovanni Lamperti states that a woman must never vocalize on any vowel but "ah" in the passagio and head register.[18] The theory is that because of acoustical frequency levels in the female voice in the passagio and above, the shape of the throat and the position of the soft palate are not conducive to producing comfortably this extremely horizontal vowel. The voice becomes very thin in sound on an "i" vowel in the upper register, losing all of the open throated sound that gives beauty and color to the voice. In examining fourteen Bellini arias, I found four examples of "i" vowels on notes in the passagio, but <u>none</u> in the head register. Mozart and Verdi used the "i" vowel for very specific dramatic and emotional effects on high notes: In the <u>Magic Flute</u> by Mozart, Pamina is near death, on the verge of suicide. Mozart writes a high B-flat" pianissimo

on the word "liebe" in the phrase "...der liebe gluck..." at which point Pamina is weak, despondent and has lost all hope. Many sopranos, in their attempt to avoid this "i" vowel will change the words to "...der ganzes gluck.." which changes the effect that Mozart specifically wanted to achieve: a thin, helpless, frail sound.

Verdi uses the "i" vowel in two of his arias from La Traviata, "Sempre Libera" and in the final phrase of Violetta's closing aria "Addio del passato". In "Sempre Libera" Violetta sings "...follie..." on a high A-flat" and again in the same aria "...gioire..." on high G". Both are expressions of hysterical outbursts. Verdi uses the "i" vowel for a more penetrating, intense sound, very appropriate at those moments in the opera. In "Addio del passato" the final word of the aria is "fini". Indeed, Violetta is on her deathbed. The final high pianissimo of the aria is sung on a high A", creating an unbeleivably sympathetic expression for the character of Violetta. The sound is exactly as Verdi intended it: thin, weak and fragile in its delicate beauty. Verdi was composing just at the beginning of the verismo period in opera and began experimenting with this type of vocal expression.

To avoid singing the more penetrating vowels on high notes, I rewrote certain sections of Asher Bidvaro with this very purpose in mind. In doing so, I also changed the vocal color that was for me unpleasing aesthetically. Compare numbers (3), (4) and (5) of the original composition and my

own arrangement. By bringing the tessitura down for those phrases, I feel I was able to make the diction clearer and changed the color of the voice to a warmer and more expressive effect for the overall textual impact.

This entire experiment has given me a much deeper connection with the liturgical texts and a clearer understanding of the unique bond between the word and the music. The liturgy and music together form an intimate relationship in which they appear, at times, to be spiritually inseparable.

CONCLUSION

I have attempted in this paper to explore the possibility that by rewriting or rearranging the vocal line in traditional chazanut, this wonderful music can be made more accessible to the female cantor. The freedom to do this will perhaps also bring about the use of improvisation among women cantors, thus encouraging them to open new avenues for infusing a spirituality and expression into prayer that emanates forth only from the female soul.

My research has led me to inquire into the possibilities for the female voice as explained by voice teachers, otolaryngologists, pulmonologists, operatic composers, reknowned actresses, librettists, cantors, both male and female; and contemporary composers and arrangers.

This research has opened up an awareness for me personally that this music is indeed accessible to me in every way and I feel certain that other female cantors will agree with me if they find the subject interesting enough for experimentation and study.

I have sought Thy nearness,
With all my heart have I called Thee,
And going out to meet Thee
I found Thee coming toward me.

Judah Halevi

APPENDIX I: Medical and Scientific Articles

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The Professional Voice: Part I. Anatomy, Function, and General Health

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The subtle complexities and exacting demands of professional voice users create an exciting challenge and special responsibility for the otolaryngologist/head and neck surgeon. Professional voice users include not only singers and actors, but also politicians, attorneys, clergy, educators (including some physicians), telephone operators, and others. They encompass a broad range of vocal sophistication and voice needs, but they have in common that they depend on vocal endurance and quality for their livelihoods. Professional singers are discussed at length in this article because they make the greatest demands on their voices and require the most sophisticated analysis. Mastery of the science and art of caring for singers generally provides the physician with sufficient expertise to treat other professional voice users.

Most people appreciate singers' talent, but very few understand their craft. Although physicians frequently are called upon to care for professional singers with voice difficulties, most have little or no training in sophisticated analysis and treatment of subtle problems of the voice. Most successful singers work and study for years to master their art. Some of them earn hundreds of thousands of dollars with their voices. Consequently, physicians are faced with the challenge, responsibility, and liability of providing accurate diagnoses and treatment. This may be accomplished through thorough, systematic, inquiry and analysis based on understanding of the anatomy, physiology, psychology, and psychoacoustics of voice production. Hypochondriasis is uncommon among serious singers. In general, failure to establish a diagnosis for a professional singer with a voice complaint is a result of lack of expertise on the part of the physician rather than an "imaginary" complaint on the part of the singer.

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ANATOMY

The anatomy of a singer is not limited to the region between the trachea and the hyoid bone. Practically, all body systems affect the voice. The larynx receives the greatest attention because it is the most sensitive and expressive component of the vocal mechanism, but anatomic interactions throughout the patient's body must be considered in treating the professional voice.

The larynx

A detailed discussion of laryngeal anatomy is beyond the scope of this article. However, it is helpful to think of the larynx as being composed of three anatomic units: mucosa, intrinsic muscles, and extrinsic muscles. The thin, lubricated upper respiratory epithelium covering the vocal folds forms the areas of contact between the vibrating vocal cords. Intrinsic muscles are responsible for abduction, adduction and tension of the vocal folds. Extrinsic laryngeal musculature maintains the position of the larynx in the neck. Since raising or lowering the larynx may alter the tension or angle between laryngeal cartilages, the extrinsic muscles are critical in maintaining a stable laryngeal skeleton so that the delicate intrinsic musculature can work effectively. In the trained singer, the extrinsic muscles maintain the larynx in a relatively constant position. Training of the intrinsic musculature results in vibratory symmetry of the vocal folds producing regular periodicity. This contributes to what the listener perceives as a

"trained" voice. The vocal folds may be thought of as the oscillator of the vocal mechanism (1).

The supraglottic vocal tract

The supraglottic larynx, tongue, lips, palate, pharynx, nasal cavity, and possibly the sinuses shape the sound quality produced at the level of the vocal cords by acting as a resonator. Minor alterations in the configuration of these structures may produce substantial changes in voice quality. The hypernasal speech typically associated with a cleft palate or the hyponasal speech characteristic of severe adenoid hypertrophy are obvious. However, mild edema from an upper respiratory tract infection, pharyngeal scarring, or muscle tension changes produce less obvious sound alterations. These are immediately recognizable to a trained vocalist or astute critic, but often elude the laryngologist.

The tracheobronchial tree, lungs and thorax

In singing, the lungs supply a constant stream of air that passes between the vocal folds and provides power for voice production. Singers often are thought of as having "big chests." Actually, the primary respiratory difference between trained and untrained singers is not increased total lung capacity, as popularly assumed. Rather, trained singers learn to use a higher proportion of the air in their lungs, thereby decreasing their residual volume and increasing their respiratory efficiency (2).

The abdomen

The abdominal musculature is the so-called "support" of the singing voice, although singers generally refer to their "diaphragm" as their support mechanism. The diaphragm generates inspiratory force. Although the abdomen can perform this function in some situations (3), it is primarily an expiratory-force generator. The abdominal musculature receives considerable attention in vocal training. The purpose of abdominal support is to maintain an efficient, constant power source and inspiratory-expiratory mechanism. There is opposition among voice teachers as to the best model for teaching support technique. Some experts recommend positioning the abdominal musculature under the rib cage, while others prefer distension of the abdomen.

Either method may result in vocal problems if used incorrectly; but distending the abdomen (the inverse pressure theory) is especially dangerous because it tends to force the singer's muscular effort in a downward and outward direction, which is ineffective. Thus, singers may exert considerable effort, believing they are practicing good support technique, without obtaining the desired effect. Proper abdominal training is essential to good singing, and the physician must consider abdominal function when evaluating vocal disabilities.

The musculoskeletal system

Musculoskeletal condition and position affect the vocal mechanism and may produce stress, resulting in voice dysfunction. Stance deviation, such as from standing to supine, produces obvious changes in respiratory function. However, lesser changes, such as distributing one's weight over the calcaneum rather than forward over the metatarsal heads (a more athletic position) alter the configuration of the abdominal and back musculature enough to influence the voice. Tensing arm and shoulder muscles promotes cervical muscle strain, which can adversely affect the larynx. Careful control of muscle tension is fundamental to good vocal technique. In fact, some methods use musculoskeletal conditioning as the primary focus of voice training.

The psychoneurological system

The psychological constitution of the singer impacts directly upon the vocal mechanism. Psychological phenomena are reflected through the autonomic nervous system, which controls mucosal secretions and other functions critical to voice production. The nervous system is also important for its mediation of fine muscle control. This fact is worthy of emphasis because minimal voice disturbances may occasionally be the first signs of serious neurologic disease.

FUNCTION

History

Knowing about the singer's background is necessary for thorough evaluation of the singing voice, and the otolaryngologist who sees singers only on occasion cannot reasonably be expected to remember all the pertinent questions. Although some laryngologists feel that a lengthy inquiry is helpful in establishing rapport with professional singers, many of us who see a substantial number of singers per day within a busy practice need a thorough, but less time-consuming alternative. As with dizzy patients, a history questionnaire for professional

singers can be extremely helpful in documenting all the necessary information, in helping singers sort out and articulate their problems, and in reducing the amount of time the clinician spends writing. During the last few years, the author has developed a questionnaire (4), which has proven helpful (Appendix). The singer is asked to complete the form in the waiting room before seeing the doctor. No history questionnaire is a substitute for direct, penetrating questioning by the physician. However, the author has found that the direction of most useful inquiry can be determined from a glance at the questionnaire. Obviating the need for extensive writing permits the physician greater eye contact with the patient and facilitates rapid establishment of the close rapport and confidence that is so important in treating professional singers. The physician is also able to supplement initial impressions and historical information from the questionnaire with seemingly leisurely conversation during the physical examination required for professional singers. The use of the historical questionnaire has added substantially to the efficiency, consistent thoroughness, and ease of managing these delightful, but often complex patients.

Age

Serious vocal endeavor may start in childhood and continue throughout a lifetime. As the vocal mechanism undergoes normal maturation, the voice changes. The optimum time to begin serious vocal training is controversial. For many years, most people advocated delay of vocal training and serious singing until near puberty in girls and after puberty and voice stabilization in boys. However, in a child with earnest vocal aspirations and potential, it is reasonable to start specialized training early in childhood. Initial instruction should teach the child to vocalize without strain and avoid all forms of voice abuse. It should not permit premature indulgence in operatic bravado. Most experts agree that singing during puberty should be minimized or avoided altogether, particularly in boys. Recent studies indicating the contrary are highly controversial. Voice maturation may occur at any age from the early teens to the fourth decade of life. There is a dangerous tendency for young singers to attempt to sound older than their vocal years, frequently causing vocal dysfunction.

All components of voice production are subject to normal aging. Abdominal and general muscular tone frequently decrease, lungs lose elasticity, the thorax loses its distensibility, the mucosa of the vocal tract atrophies, mucous secretions change character, nerve endings are reduced in number, and psychoneurologic functions differ. Moreover, the larynx itself loses muscle tone and bulk and may show depletion of submucosal ground substance in the vocal folds. The laryngeal cartilage ossify and the joints may become arthritic and stiff. The hormonal environment is altered. Vocal range, intensity and quality all may be modified. Vocal fold atrophy may be the most striking alteration. The effects of aging seem more pronounced in female singers. Excellent male singers occasionally extend their careers into their seventies (5,6). However, some degree of breathiness, decreased range and other evidence of aging should be expected in elderly voices.

Complaint

Careful questioning as to the onset of vocal problems is needed to separate acute from chronic dysfunction. Often an upper respiratory tract infection will bring a singer to the physician's office, but penetrating inquiry may reveal a chronic vocal problem that is the singer's real concern. It is important to discover acute, chronic or mixed problems before beginning therapy so that both patient and physician may have realistic expectations and be able to choose the best therapy.

The specific nature of the vocal complaint can provide a great deal of information. Just as dizzy patients rarely walk into the physician's office complaining of "rotary vertigo," singers may be unable to articulate their symptoms without guidance. They may use the term "hoarseness" to describe a variety of conditions that the physician must separate. Hoarseness is a coarse or scratchy sound most often associated with abnormalities of the vocal folds such as laryngitis or mass lesions. Breathiness is a vocal quality characterized by excessive loss of air during vocalization. In some cases, it is due to improper technique. However, any condition that prevents full approximation of the vocal cords can be responsible. Such causes include vocal cord paralysis, a mass lesion separating the leading edges of the vocal cords, arthritis of the cricoarytenoid joint, arytenoid dislocation and senile vocal cord atrophy. Fatigue of the voice is inability to continue to sing for extended periods without change in vocal quality. The voice may fatigue by becoming hoarse, losing range, changing timbre, breaking into different registers or by other

uncontrolled aberrations. A well-trained singer should be able to sing for several hours without developing vocal fatigue. Fatigue is often caused by misuse of abdominal and neck musculature or "over-singing," singing too loudly too long. Vocal fatigue may be a sign of general tiredness or serious illnesses such as myasthenia gravis. Volume disturbance may manifest as inability to sing loudly or inability to sing softly. Each voice has its own dynamic range. Within the course of training, singers learn to sing more loudly by singing more efficiently. They also learn to sing softly, a more difficult task, through years of laborious practice. Most volume problems are secondary to intrinsic limitations of the voice or technical errors in singing, although hormonal changes, aging, and neurologic disease are other causes. Superior laryngeal nerve paralysis will impair the ability to sing loudly. This is a frequently unrecognized consequence of herpes infection (K. Adour, personal communication) and may be precipitated by an upper respiratory tract infection. Most singers require only about half an hour to "warm up the voice." Needing prolonged warm-up time, especially in the morning, is most often associated with reflux laryngitis. Tickling or choking during singing is associated with laryngitis or voice abuse. Often a symptom of pathology of the vocal fold's leading edge, it should contraindicate singing until vocal cord examination. Pain while singing can indicate vocal cord lesions, laryngeal joint arthritis, infection, or gastric acid irritation of the arytenoid; but it is much more commonly caused by voice abuse with excessive muscular activity in the neck rather than acute pathology on the leading edge of a vocal cord, and it does not require immediate cessation of singing pending medical examination.

Date of next important performance

If a singer seeks treatment at the end of a busy season and has no pressing engagements, management of the voice problem should be relatively conservative and designed to assure long-term protection of the larynx, the most delicate part of the vocal mechanism. However, the physician and patient rarely have this luxury. Most often, the singer needs treatment within a week of an important engagement, and sometimes within less than a day. Singers fall ill shortly before performances, not due to hypochondria or coincidence, but rather from the immense physical, emotional, and psychological stress of the pre-performance period. The singer is frequently working harder and singing longer hours than usual, and moreover, may be under particular pressure to learn new material and to perform well for a new audience. Furthermore, the singer may be sleeping less than usual because of additional time rehearsing or because of the discomforts of a strange city. Caring for voice complaints in these situations requires highly skilled judgment and bold management.

Professional singing status and goals

In order to choose a treatment program, the physician must understand the importance of the singer's voice in a long-term career plan, and, if relevant, the importance of the upcoming performance and the consequences of canceling that performance. Injudicious prescription of voice rest can be almost as damaging to a vocal career as can injudicious performance. Although to a singer the voice is the most important commodity, other factors distinguish the few successful artists from the multitude of less successful singers with equally good voices. These include musicianship, reliability and "professionalism." Canceling a concert at the last minute may damage seriously a performer's reputation. Reliability is especially critical early in a singer's career. Moreover, an expert singer often can modify a performance to decrease the strain on the voice. No singer should be allowed to perform in a manner that will permit serious injury to the vocal cords; but in the frequent borderline cases, the condition of the larynx must be weighed against other factors affecting the singer as an artist.

Amount and nature of vocal training

It is important to establish how long a singer has been singing seriously, especially if an active performance career predates the beginning of vocal training. Active amateur singers frequently develop undesirable techniques that are difficult to modify. Extensive voice use without training or premature training with inappropriate repertoire may underlie persistent vocal difficulties later in life. The number of years a singer has been training the voice may be a fair index of vocal proficiency. A person who has studied voice for a year or two is somewhat more apt to have gross technical difficulties than is someone who has been studying for 20 years. However, if the training has been intermittent or discontinued for some time, technical problems are common. In addition, methods vary among voice teachers. Hence, a student who has had many

teachers commonly has numerous technical insecurities or deficiencies responsible for vocal dysfunction. This is especially true if the singer has changed to a new teacher within the preceding year. The physician must be careful not to criticize the patient's current voice teacher in such circumstance. It often takes years of expert instruction to correct bad habits.

People speak more often than they sing, yet most singers report little speech instruction. Even if a singer uses the voice flawlessly while practicing and performing, voice abuse at other times may result in damage that affects singing.

Type of singing and environment

The "Lombard effect" is the tendency to increase vocal intensity in response to increased background noise. A well-trained singer learns to compensate for this tendency and to avoid singing more at unsafe volumes. Singers of classical music usually have such training and frequently perform with only a piano where the balance can be controlled well. However, singers performing early in their careers in large halls, with orchestras, or in operas tend to over-sing and strain their voices. Similar problems occur during outdoor concerts because of the lack of auditory feedback. This phenomenon is seen even more among "pop" singers.

Pop singers are often in a uniquely difficult position. With little training they enjoy great artistic and financial success but have stressful demands on their time and their voices. They are often required to sing in large halls not designed for musical performance, amidst smoke and other environmental irritants, accompanied by extremely loud background music. One frequently neglected key to survival for these singers is the proper use of monitor speakers. These direct the sound of the singer's voice toward the singer on the stage and provide acoustical feedback. In addition to the usual investigation, it is important to determine whether the pop singer utilizes monitor speakers, and whether they are loud enough for the singer to hear.

Amateur singers are often no less serious about their music than are professionals, but generally they have less ability to compensate technically for handicaps produced by illness or other physical disability. It is rare that an amateur suffers a great loss from postponing a performance or permitting someone else to sing it instead. In most cases, the amateur singer's best interest is served through conservative management directed at long-term maintenance of good vocal health. A great many singers who seek physicians' advice are primarily choral singers. They often are enthusiastic amateurs, untrained, but dedicated to their musical recreation. They should be handled like amateur solo singers, educated specifically about the Lombard effect, and cautioned to avoid the excessive volume so common in a choral environment.

One good way for a singer to monitor loudness is to cup the hand to the ear. This adds about 6 dB (7) to singers' perception of their own voice and can be a very helpful guide in noisy surroundings. Young professional singers are often hired to augment amateur choruses. Feeling that the professional quartet has been hired to "lead" the rest of the choir, they often make the mistake of trying to accomplish that goal by singing louder than others in their sections. Such singers should be advised to lead their section by singing each line as if they were soloists giving a voice lesson to the two people standing beside them, and as if there were a microphone in front of them recording their performance for their voice teacher. This approach usually will not only preserve the voice, but will also produce a better choral sound.

Rehearsal

Vocal practice is as essential to the singer as exercise is to the athlete. Proper vocal practice incorporates scales and specific exercises designed to maintain and develop the vocal apparatus. Simply singing songs and giving performances without routine studious concentration on vocal technique is not adequate for the performing singer. The physician should know how long and how often the singer practices. Most serious singers practice for at least one to two hours per day. If a singer routinely practices in the late afternoon or evening but frequently performs in the morning (religious services, etc.), one should inquire into what warm-up procedures are used preceding such performances. Singing "cold," especially at unaccustomed hours of the morning, may result in the use of minor muscular alterations to compensate for vocal insecurity due to inadequate preparation. Such crutches can result in voice dysfunction. Similar problems may occur from instances of voice use other than formal singing. School teachers, telephone receptionists, salespeople, and others who speak extensively often derive great benefit from 5 or 10 min of vocalization of scales first thing in the morning. Al-

though singers rarely practice their scales too long, they frequently perform or rehearse excessively. This is especially true immediately before a major concert or audition, when physicians are most likely to see acute problems. When a singer has hoarseness and vocal fatigue and has been practicing a new role for 14 h a day for the last 3 weeks, no simple prescription is going to solve the problem. However, a treatment regimen can usually be designed to carry the singer safely through any musical obligations.

Voice abuse in singing

A detailed discussion of vocal technique in singing is beyond the scope of this article. However, the most common technical errors, involve excessive muscle tension in the tongue, neck, and larynx, inadequate abdominal support, and use of excessive volume. Inadequate preparation can be a devastating source of voice abuse, and may result from limited practice, limited rehearsal of a difficult piece, or limited vocal training for a given role. The latter error is tragically common. In many situations, voice teachers are to blame, especially in competitive academic environments. Both singer and teacher must resist the impulse to show off the voice in works that are either too difficult for the singer's level of training or simply not suited to the singer's voice. Singers are habitually unhappy with the limitations of their voices. At some time or another most baritones wish they were tenors and walk around proving they can sing high C's and "Vesti la giubba." Singers with other vocal ranges have similar fantasies. Attempts to make the voice something that it is not, or at least that it is not yet, are frequently harmful.

Voice abuse in speaking

Dissociation of one's speaking and singing voice is probably the most common cause of voice abuse problems in excellent singers. Too frequently, all the expert training in support, muscular control and projection is not applied to a singer's speaking voice. Unfortunately, the resultant voice strain is impacted on the singing voice as well as the speaking voice. Such damage is especially prone to occur in noisy rooms and in cars, where the background noise is deceptively high. Backstage greetings after a lengthy performance can be particularly devastating. The singer usually is exhausted and distracted. The environment is often dusty and dry, and there generally is a noisy crowd. Similar conditions prevail at post-performance parties, where smoking and alcohol worsen matters. These situations should be avoided by any singer with vocal problems and should be controlled through awareness at other times.

Three particularly destructive vocal activities are worthy of note. Cheerleading requires extensive screaming under the worst possible physical and environmental circumstances. It is highly undesirable for anyone considering serious vocal endeavor. This is a common conflict in younger singers because the teen who is high school choir soloist frequently turns out to also be student council president, yearbook editor, captain of the cheerleaders, etc. Conducting, particularly choral conducting, can also be deleterious. An enthusiastic conductor, especially of an amateur group, frequently ends up singing all four parts intermittently, at volumes louder than the entire choir, for lengthy rehearsals. Conducting is a common avocation among singers, but must be done with expert technique and special precautions to avoid voice injury. Teaching singing may also be hazardous to vocal health. It can be done safely; but it requires skill and thought. Most teachers teach seated at the piano. Late in a long, hard day, this posture is not conducive to maintenance at optimal abdominal and back support. Usually, teachers work with students continually positioned to the right or left of their keyboard. This may require the teacher to turn the neck at a particularly sharp angle, especially when teaching at an upright piano. Teachers also often demonstrate vocal materials in their students' vocal ranges, rather than their own. If a singing teacher is hoarse or has neck discomfort, or if soft singing control deteriorates at the end of a teaching day (assuming that the teacher warms up before beginning voice lessons), voice abuse should be suspected. Helpful modifications include teaching with a grand piano, sitting slightly sideways on the piano bench, or alternating student position to the right and left of the piano to facilitate better neck alignment. Retaining an accompanist so that the teacher can stand rather than teach from behind a piano, and many other helpful modifications are possible.

GENERAL HEALTH

Singing is an athletic activity and requires good conditioning and coordinated interaction of numerous physical functions. Maladies of any part of

the body may be reflected in the voice. Failure to exercise to maintain good abdominal muscle tone and respiratory endurance is particularly harmful in that deficiencies in these areas undermine the power source of the singing voice. Singers generally will attempt to compensate for such weaknesses by using inappropriate muscle groups, particularly in the neck, which result in vocal dysfunction. Similar problems may occur in the well-conditioned vocalist in states of fatigue. These are compounded by mucosal changes that accompany excessively long hours of hard work. Such problems may be seen even in the best singers shortly before important performances in the height of the concert season.

There is a popular, but untrue, myth that great opera singers must be obese. However, the vivacious, gregarious personality that often distinguishes the great performer seems to be accompanied frequently by a propensity for excess, especially culinary excess. This excess is as undesirable in the vocalist as it is in most other athletic artists, and it should be avoided from the start of one's vocal career. However, attempts to effect weight reduction in an established singer are a different matter. The vocal mechanism is a finely tuned, complex instrument and is exquisitely sensitive to minor changes. Substantial fluctuations in weight frequently result in deleterious alterations of the voice, although these are usually temporary. Weight reduction programs for established singers must be monitored carefully, and designed to reduce weight in small increments over long periods of time. In addition, appropriate and attractive body weight is becoming particularly important in the opera world as this formerly theater-based art form moves to television and film. A history of sudden recent weight change may be responsible for almost any vocal complaint.

Singers usually will volunteer information about upper respiratory tract infections and "postnasal drip," but the relevance of other maladies may not be obvious. Consequently the physician must seek out pertinent history. Acute upper respiratory tract infection causes inflammation of the mucosa, alters mucosal secretions and makes the mucosa more vulnerable to injury. Coughing and throat-clearing are particularly traumatic vocal activities and may worsen or provoke hoarseness associated with a cold. Postnasal drip and allergy may produce the same response. Infectious sinusitis is associated with discharge and diffuse mucosal inflammation, resulting in similar problems, and may actually alter the sound of a singer's voice. Futile attempts to compensate for disease of the supraglottic vocal tract in an effort to return the sound to normal frequently result in laryngeal strain. The expert singer compensates by monitoring the technique rather than the sound, or singing "by feel" rather than "by ear."

Dental diseases, especially temporomandibular joint dysfunction, introduces muscle tension in the head and neck, which is transmitted to the larynx directly through the muscular attachments between the mandible and the hyoid bone and indirectly as generalized increased muscle tension. These problems often result in decreased range, vocal fatigue and change in the quality or placement of a voice. Such tension often is accompanied by excess tongue muscle activity, especially pulling the tongue posteriorly. This acts through hyoid attachments to change the tension on the laryngeal skeleton, disrupting the delicate balance of intrinsic and extrinsic laryngeal musculature.

Reflux laryngitis is common among singers because of lifestyle requirements. Singers frequently perform at night. They generally refrain from eating before performances because a full stomach compromises effective abdominal support. They compensate at post-performance gatherings late at night and then go to bed with full stomachs. Chronic arytenoid and vocal cord irritation by gastric juice may be associated with dyspepsia, but the key features are a bitter taste and halitosis upon awakening in the morning, often a scratchy sore throat or a feeling of a "lump in the throat," the need for prolonged vocal warm-up, and hoarseness. The physician must be alert to these symptoms and ask about them routinely; otherwise the correct diagnosis will often not be made.

Hearing loss is often overlooked as a source of vocal problems. Auditory feedback is fundamental to singing. Interference with this control mechanism may result in altered vocal production, particularly if the singer is unaware of the hearing loss.

Any condition that alters abdominal function, such as muscle spasm, constipation, or diarrhea, interferes with support and may result in a voice complaint. These symptoms may accompany infection or anxiety.

The human voice is an exquisitely sensitive messenger of emotion. Highly trained singers learn to control the effects of anxiety and other emotional stresses on their voices under ordinary circum-

stances. However, in some instances this training may break down, or a performer may be inadequately prepared to control the voice under specific stressful conditions. Pre-performance anxiety, or stage fright, is the most common example; but insecurity, depression, and other emotional disturbances are also generally reflected in the voice. Anxiety reactions are mediated in part through the autonomic nervous system and result in a dry mouth, cold clammy skin and thick secretions. These reactions are normal, and good vocal training coupled with assurance that there is no abnormality or disease generally overcomes them. However, long-term, poorly compensated emotional stress and exogenous stress (from agents, producers, teachers, parents, etc.) may cause substantial vocal dysfunction and may result in permanent limitations of the vocal apparatus. These conditions must be diagnosed and treated expertly. Hypochondriasis is uncommon among professional singers, despite popular opinion to the contrary.

Endocrine dysfunction

Endocrine problems are worthy of special attention. The human voice is extremely sensitive to endocrinologic changes. Many of these are reflected in alterations of fluid content of the ground substance just beneath the laryngeal mucosa. This causes alteration in the bulk and shape of the vocal folds and results in voice change. Hypothyroidism (8–12) is a well recognized cause of such voice disorders, although the mechanism is not well understood. Hoarseness, vocal fatigue, muffling of the voice, loss of range and a feeling of a lump in the throat may be present even with mild hypothyroidism. Even when thyroid function tests are within the low-normal range, this diagnosis should be entertained, especially if thyroid-stimulating hormone levels are in the high-normal range or are elevated. Thyrotoxicosis may result in similar voice disturbances (12).

Voice changes associated with sex hormones are encountered commonly in clinical practice and have been investigated more thoroughly than have other hormonal changes. Although there appears to be a correlation between sex hormone levels and depths of male voices (higher testosterone and lower estradiol levels in basses than in tenors (13), hormones are most relevant in men during the maturation process. When castrato singers were in vogue, castration at about age 7 or 8 resulted in failure of laryngeal growth during puberty and voices that stayed in the soprano or alto range and boasted a unique quality of sound (14). Failure of a male voice to change at puberty is uncommon today and usually is psychogenic. However, hormonal deficiencies such as those seen in cryptorchidism, delayed sexual development, Klinefelter's syndrome, or Frolich's syndrome may be responsible (15). In these cases, the persistently high voice may be the complaint that brings the patient to medical attention. Voice problems related to sex hormones are seen most commonly in female singers. Although vocal changes associated with the normal menstrual cycle may be difficult to quantify with current experimental techniques, there is no question that they occur (16–19). Most of the ill effects are seen in the immediate premenstrual period and are known as "laryngopathia premenstrualis." This condition is common and is caused by physiologic, anatomic, and psychologic alterations secondary to endocrine changes. The vocal dysfunction is characterized by decreased vocal efficiency, loss of the highest notes in the voice, vocal fatigue, slight hoarseness, and some muffling of the voice, and it is often more apparent to the singer than to the listener. Submucosal hemorrhages in the larynx are common (19). In many European opera houses, singers are excused from singing during the premenstrual and early menstrual days. This practice is not followed in the United States. Although ovulation inhibitors have been shown to mitigate some of these symptoms (18), in some women birth control pills may deleteriously alter voice range and character even after only a few months of therapy (20,23). When oral contraceptives are used, the voice should be monitored closely. Under crucial performance circumstances, oral contraceptives may be used to alter the time of menstruation, but this practice is justified only in unusual situations.

Estrogens are helpful in postmenopausal singers but should not be given alone. Sequential replacement therapy is most physiologic. Under no circumstances should androgens be given to female singers even in small amounts if there is any reasonable therapeutic alternative. Androgens cause unsteadiness of the voice, rapid changes of timbre and lowering of fundamental voice frequency (24,29). The changes are irreversible. Preparations with progestins should be used instead of androgen preparations. In rare instances, androgens may be produced by pathologic conditions such as ovarian or adrenal tumors, and voice alterations may be the

presenting symptoms. Pregnancy frequently results in voice alterations known as "laryngopathia gravidarum." The changes may be similar to premenstrual vocal symptoms. They may also be perceived as desirable changes. In some cases, alterations produced by pregnancy are permanent (30,31).

Although hormonally induced changes in the larynx and respiratory mucosa secondary to menstruation and pregnancy are discussed widely in the literature, the author has found no reference to the important alterations in abdominal support. Muscle cramping associated with menstruation causes pain and compromises abdominal contraction. Abdominal distention during pregnancy also interferes with abdominal muscle function. Any singer whose abdominal support is compromised substantially should be discouraged from singing until the abdominal disability is resolved. Hormonal disturbances in other segments of the diencephalic-pituitary system may also result in vocal dysfunction. In addition to the thyroid and the gonads, the parathyroid, adrenal, pineal and pituitary glands are included in this system. For example, pancreatic dysfunction may result in xerophonia, as in diabetes mellitus. Thymic abnormalities can lead to feminization of the voice (32).

Exposure to irritants

Any mucosal irritant can disrupt the delicate vocal mechanism. Allergies to dust and mold are aggravated commonly during rehearsals and performances in concert halls, especially older concert halls, because of the numerous curtains, backstage trappings and dressing room facilities that are rarely cleaned thoroughly. Nasal obstruction and erythematous conjunctivae suggest generalized irritation. The drying effects of cold air and dry heat may also affect mucosal secretions, leading to decreased lubrication and a "scratchy" voice and tickling cough. These symptoms may be minimized by nasal breathing, which allows inspired air to be filtered, warmed and humidified. Nasal breathing rather than mouth breathing whenever possible is proper vocal technique. A history of recent travel could suggest other sources of direct mucosal irritation. The air in airplanes is extremely dry, and airplanes are noisy (33). Singers must be careful to avoid talking loudly and to maintain nasal breathing during air travel. Environmental changes can also be disruptive. Las Vegas is infamous for the mucosal irritation caused by its dry atmosphere and smoke-filled rooms. In fact, the resultant complex of hoarseness, vocal "tickle," and fatigue is referred to as "Las Vegas voice." A history of recent travel should also suggest "jet lag" and generalized fatigue, which may be potent detriments to good vocal function.

Smoke

The deleterious effects of tobacco smoke on mucosa are indisputable. It causes erythema, mild edema and generalized inflammation throughout the vocal tract. Both smoke itself and the heat of the cigarette appear to be important. Marijuana produces a particularly irritating, unfiltered smoke, which if inhaled directly, causes considerable mucosal response. The serious singer should be advised not to smoke. Some singers are required to perform in smoke-filled environments and may suffer the same effect as the smokers themselves. In some theaters, it is possible to place fans upstage or direct the ventilation system so as to create a gentle draft toward the audience, clearing the smoke away from the stage.

Drugs

A history of alcohol abuse would suggest the probability of poor vocal technique. Intoxication results in poor coordination and decreased awareness, which undermine vocal discipline designed to optimize and protect the voice. The effect of small amounts of alcohol is controversial. Although many experts oppose it because of its vasodilation and consequent mucosal alteration, many singers do not seem to be adversely affected by small amounts of alcohol such as a glass of wine preceding a performance. However, many singers have mild allergies to certain wines or beers. If singers develop nasal congestion and rhinorrhea after drinking beer, for example, they should be made aware that they probably have a mild allergy to that particular beverage and should avoid it prior to singing.

Singers frequently take antihistamines to help control "postnasal drip" or other symptoms. The drying effect of antihistamines may result in decreased vocal cord lubrication, increased throat clearing and irritability leading to frequent coughing. Antihistamines may be helpful to some singers, but they must be used with caution.

When a singer is already taking antibiotics at the time of seeking the attention of a physician, it is

important to find out the dose and the prescribing physician, if any, as well as whether the singer frequently self-medicates with inadequate courses of antibiotics. It is not uncommon for singers to develop "sore throats" shortly before performances and to start themselves on inappropriate antibiotic therapy, which they generally discontinue following their performance.

Diuretics are also popular among some singers. They are often prescribed by gynecologists at the request of the singers to help deplete excess water in the premenstrual period. Unsupervised use of these drugs may result in dehydration and consequent mucosal dryness.

The physician must inquire about any hormone use, especially of oral contraceptives. Women frequently will not mention them when asked if they are taking any medication. Vitamins are also frequently not mentioned. Most vitamin therapy seems to have little effect on the voice. However, high-dose vitamin C (5–6 g/day), which is used by some people to prevent upper respiratory tract infections, seems to act as a mild diuretic and may lead to dehydration and xerophonia (34).

Cocaine use is increasingly common, especially among pop musicians. It can be extremely irritating to the nasal mucosa, causes marked vasoconstriction, and may alter the sensorium, resulting in decreased voice control and a tendency toward vocal abuse.

Foods

Various foods are said to affect the voice. Traditionally, milk and ice cream are avoided by singers before performances. In many people, they seem to increase the amount and viscosity of mucosal secretions. Allergy and casein have been implicated, but no satisfactory explanation has been established. In fact, many laryngologists doubt that the phenomenon exists at all. Nevertheless, the experience of a great number of singers and voice teachers is responsible for the admonition: restriction of these foods in a singer's diet before singing may be helpful in some cases. Chocolate may have the same effects, and should be viewed similarly. Singers should be asked about eating nuts. This is important not only because some people feel they produce effects similar to those of milk products and chocolate, but moreover because they are extremely irritating if aspirated.

Singers frequently are distracted by thoughts of a performance as they walk out the door with a handful of nuts, which they may eat while in transit. The irritation produced by aspiration of a small organic foreign body may be severe and impossible to correct rapidly enough to permit performance. Highly spiced foods may also be direct mucosal irritants. In addition, they seem to aggravate reflux laryngitis. Coffee and other beverages containing caffeine also aggravate gastric reflux and seem to alter secretions and necessitate frequent throat clearing in some people. Fad diets, especially rapid weight-reducing diets, are notorious for causing voice problems. Lemon juice and herbal teas are both thought to be beneficial to the voice. Both may act as demulcents, thinning secretions, and may very well be helpful.

When inquiring about foods, it is also useful to know whether the singer eats immediately before singing. A full stomach may interfere with abdominal support or may result in reflux of gastric juice during abdominal muscle contraction.

Surgery

A history of laryngeal surgery in a professional singer is a matter of great concern. It is important to establish exactly why the surgery was done, by whom it was done, whether intubation was necessary, and whether ancillary speech training was instituted if the lesion was associated with voice abuse (vocal nodules). If the vocal dysfunction that brought the singer to the physician's office dates from the immediate postoperative period, significant surgical trauma must be suspected.

Otolaryngologists frequently are asked about the effects of tonsillectomy upon the voice. Singers may come to the physician following tonsillectomy and complain of vocal dysfunction. There is no question that removal of tonsils can alter the voice (35,36). Tonsillectomy changes the configuration of the supraglottic vocal tract. In addition, scarring alters pharyngeal muscle function, which is trained meticulously in the professional singer. Singers must be warned that they may have permanent voice changes following tonsillectomy. These can be minimized by dissecting in the proper plane to lessen scarring. It generally takes 3–6 months for the singer's voice to stabilize or return to normal following surgery. As with any procedure for which general anesthesia may be needed, the anesthesiologist should be advised preoperatively that the patient is a professional singer. Intubation should be

done with great care and with nonirritating plastic rather than rubber tubes.

Surgery of the neck, such as thyroidectomy, may result in permanent alterations in the vocal mechanism through scarring of the extrinsic laryngeal musculature. The strap muscles are important in maintaining laryngeal position and stability of the laryngeal skeleton and should be retracted rather than divided whenever possible. A history of recurrent or superior laryngeal nerve injury may explain a hoarse, breathy or weak voice. However, in rare cases a singer can compensate even for recurrent laryngeal nerve paralysis and have a nearly normal voice. Thoracic and abdominal surgery interfere with respiratory and abdominal support. Following these procedures singing should be prohibited until pain has subsided and healing has occurred sufficiently to allow normal support. Frequently, it is advisable to institute abdominal exercises prior to resuming vocalizing. Singing without proper support is worse for the voice than not singing at all. The author requires that his singers be able to do ten sit-ups before resuming singing following abdominal or thoracic surgery. Other surgical procedures may be significant if they necessitate intubation or if they affect the musculoskeletal system so that the singer has to change stance or balance. For example, balancing on one foot after leg surgery may decrease the effectiveness of the singer's support mechanisms.

An efficient, comprehensive history frequently reveals the etiology of a singer's problem even before a physical examination is performed. However, a specialized physical examination, often including objective assessment of voice function, is essential.

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APPENDIX
Patient History: Singers

Robert Thayer Sataloff, M.D., D.M.A.
1721 Pine Street
Philadelphia, PA 19103

Name _____ Age ___ Sex ___ Race ___

Height _____ Weight _____ Date _____

(If you are not currently having a voice problem, please skip to question #3)

1. How long have you had your present voice problem? ____
   Who noticed it? _____
   Do you know what caused it? _____
   Did it come on slowly or suddenly? _____
   Is it getting: Worse ____, Better ____, or Same ____?
2. Which symptoms do you have? (Please check all that apply.)
   ____ Hoarseness (coarse or scratchy sound)
   ____ Fatigue (voice tires or changes quality after singing for a short period of time)
   ____ Volume disturbance (trouble singing) softly ____ loudly ____
   ____ Loss of range (high ____, low ____)
   ____ Prolonged warm-up time (over ½ hr to warm up voice)
   ____ Breathiness
   ____ Tickling or choking sensation while singing
   ____ Pain in throat while singing
   ____ Other (please specify) _____
3. Do you have an important performance soon? Yes ____ No ____ Date(s): _____
4. What is the current status of your singing career?
   Professional ____ Amateur ____
5. What are your long term career goals in singing?
6. Have you had voice training? Yes ____ No ____ When did you begin? _____
7. Have there been periods of months or years without lessons in that time? Yes ____ No ____
8. How long have you studied with your present teacher?

   Teacher's name:
   Teacher's address:

   Teacher's telephone number:
9. Please list previous teachers and years during which you studied with them:
10. Have you ever had training for your speaking voice? Yes ____ No ____
11. How many years did you sing actively before beginning voice lessons initially? ____

EFFECTS OF MENSTRUATION ON THE SINGING VOICE

PART I: HISTORY AND CURRENT STATUS

W.S. Brown, Jr. and Harry Hollien

A few years ago Harry Hollien and I became interested in the effects of menstruation on the voice, particularly on the singing voice. Soon afterwards Helen Isenberger (Luther College) and most recently, Jean Hakes (Brooklyn College) joined our research team. For the past two years, we have presented our findings at this symposium and, shortly, we will present the results of our most recent investigations.

This topic is by no means a new one. Accounts of the effects of menstruation on the female voice have been appearing in our literature for at least the past twenty-five years -- and female singers have been concerned with this problem for a much longer period of time.

The literature presents mixed views as to the seriousness of the problem. Early European studies presented convincing evidence that female professionals should refrain from strenous vocal exercises during the "danger period" in the menstrual cycle -- i.e., primarily a few days before and during the actual menses. More recent reports of studies conducted in the United States are less enthusiastic about the problem. Undoubtedly the most convincing element of all are the subjective reports of "premenstrual tension" from female professionals who must live with a problem that interferes with their careers.

The "premenstrual tension" -- with its associated cramps, swelling, nausea, muscular fatigue and depression -- appears to occur just prior to and during the first days of the menses; it is a commonly reported condition in the female population. Likewise, a sampling of the gynecological literature provides evidence that it may also affect the laryngeal tissues. The most commonly reported vocal sympton related to "premenstrual tension", appears to be that of hoarseness (Frable, 1961). The relationships of interest may be understood by consideration of Figure 1. As may be seen, the estrogen concentration reaches a first peak approximately by the mid-point of the menstrual cycle, or specifically, by day 14 of a typical 27 day cycle. It is at this point when ovulation occurs -- the egg is released into the fallopian tube. The estrogen concentration reaches a second peak approximately by the 80% point of the cycle, or specifically day 21. As the estrogen level begins to decline throughout the premenstrual period (approximately during the final 14% of the cycle), and into the menses, the laryngeal tissues begin to absord water -- a condition which, in turn, leads to mucinous edema (or vocal fold swelling). Moreover, activity of the thyroid gland is heightened during this period (Pressman and Keleman, 1970) and, since the arteries of the larynx and thyroid gland arise from a common vessel, a concomitent increase in the blood supply to the vocal folds also occurs. These vascular changes, along with the edema, presumably result in

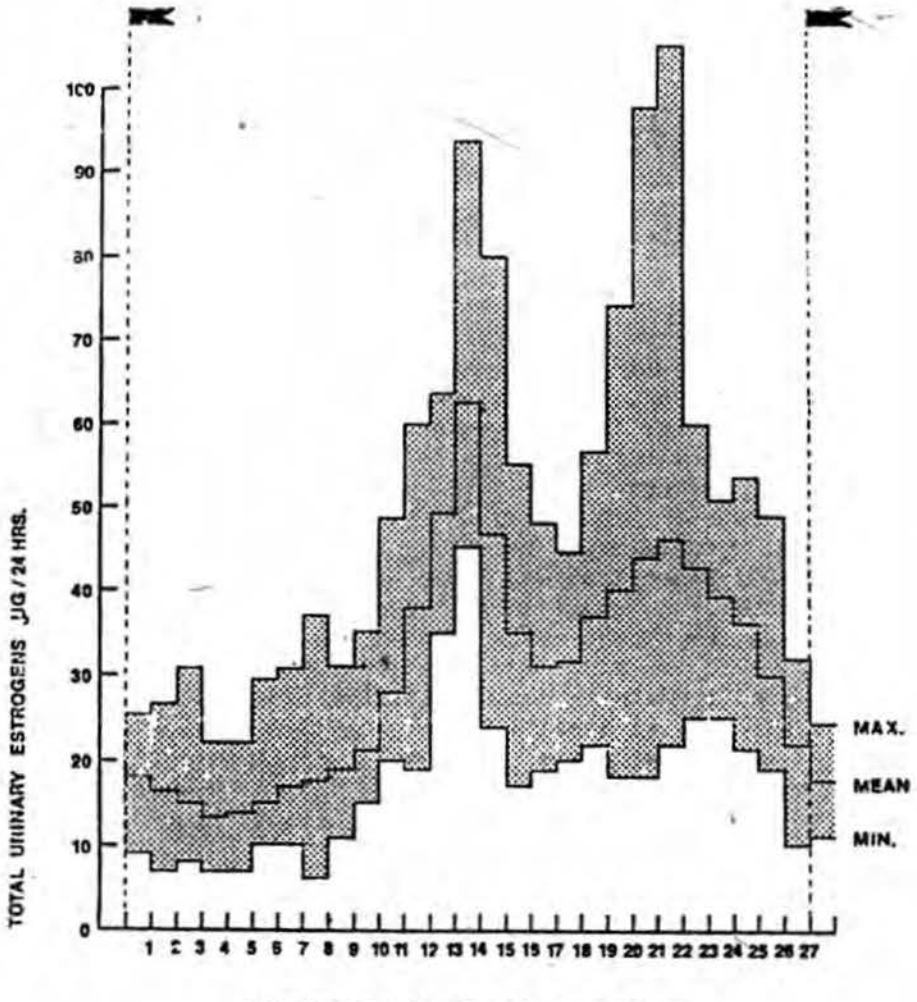

Fig. 1. Total urinary estrogen excretion throughout the menstrual cycles of 15 women aged 19-49 years, showing mean, maximum and minimum values. Time between onset bleeding and the mid-cycle peak was 10 to 18 days (mean 14 days), and between the peak and onset of the next menstruation was 11 to 16 days (mean 13 days). Sketch adapted from the studies of Brown, J.B. and Beischer, N.A. in Obstertrical and Gynecological Survey, 27, 1972.

an increase in the mass of the female vocal folds with concomitant phonatory changes -- i.e., hoarseness, reduction in vocal range, and other limiting phonatory behaviors. (Some authors would include the lowering of fundamental frequency in this list but neither Hollien, nor Titze, accept a mass/frequency relationship in laryngeal operation.)

Even though anecdotal (physiological) evidence exists in support of the common complaints of the professional woman, the findings of relevant research are not nearly as conclusive. In Europe, where the opera has its traditional roots, early studies were reported which came to the aid of the professional singer. For example, Flach, et al. (1969) reported pre- and inter-menstrual (menses) voice changes for 104 of 136 professional singers studied; of these the majority (80) exhibited changes which interfered with proper control of the voice. These findings prompted Flach to warn the singer not to attempt larger, more exposed operatic parts immediately before or during menstrual flow. Further, Lacine (1968) examined 100 singers of the opera just prior to and during the menses. Of this number, eighty-one reported noticeable difficulties in voice production associated with menstruation; i.e., weakness of the voice, vocal stoppages, hoarseness and even diplophonia. Laryngosocpic examinations were conducted during the "critical time" in the menstrual cycle and approximately two-thirds were found to exhibit swelling of the vocal folds, congestion of the folds, dilated blood vessels and even tiny hemorraghes on the folds. Lacina concluded that, "It is unquestionable that vocal strain during the menstrual period leads to premature deterioration of the voice and impairment of vocal quality". He recommended that professional opera singers rest their voices for two or three days during these critical times in the menstrual cycle. Jurgen Wendler (1972) also carried out phoniatric observations on 30 females subjects equally divided among singers, actresses, and women who made no special demands on their voices. His procedure (completed at various times in the menstrual cycle) included laryngoscopic observations, auditory judgements of vocal utterances and electroacoustic measurements. Wendler confirmed the suspected reduction of vocal efficiency just prior to and during menses and recommended phoniatric checks for all females whose careers demanded high vocal efficiency. Finally, Brodnitz (1971; 1979), Luchsinger (1965) and Perello (1962) all report similar acoustic and physiological changes just prior to and during the menses -- at least for many of their professional patients. Indeed, Brodnitz (1979), suggests that, "Avoidance of any vocal strain during the menstrual period is highly advisable to prevent lasting damage to the voice."

The impact of these reports was so compelling that most major European opera houses permit female singers to excuse themselves from performing during the last few days prior to, and the first days of, the actual menses. These periods have become known as "respect days" (Brodnitz, 1971). In the United States, however, the so called "respect days" usually are not observed and many professional women continue to "strain" their voices during those critical days in order to meet performance and contractual demands.

To add to the confusion, more recent reports (primarily by U.S. authors) tend to be less negative relative to the effects of the menstrual cycle on the voice. For example, Whitehead, et al. (1974) reported data on twelve untrained adult females whom he had phonate four vowels daily over a

period which encompassed their menstrual cycles. A statistically significant increase in aperiodic components within the vowel spectra -- a condition commonly associated with vocal hoarseness -- was found during premenstruation. To the contrary, Silverman and Zimmer (1978) carried out spectral analysis on sustained productions of three vowels produced by 20 untrained undergraduates at ovulation (mid-cycle) and just prior to menses. Their data suggested that a typical individual would be no more hoarse at premenstruation than at ovulation.

The speaking fundamental frequency level/menstrual relationship also has been examined. For example, neither Coleman and Hyler (1981), who sampled a population of untrained females, or Wilson and Purvis (1980), who studied trained singers, could find evidence of significant changes in speaking fundamental frequency associated with specific points or periods throughout the menstrual cycle and we agree. As reported at this symposium the past two years, we failed to find relationships for either speaking fundamental frequency or total singing range when correlated with specific periods throughout the menstrual cycle for populations of non-professional young adult females or university students majoring in vocal music (Brown and Hollien, 1981, 1982). Fianlly, on the basis of more recent findings, Flach and his associates (1980) apparently have reversed their previous position. In their recent study, they were unable to demonstrate significant correlations between voice change and the menstrual cycle for a total of 187 student singers. Hence, they concluded that, "physiological and endocrine determined changes in the efficiency of the singer should not be overrated."

Thus, the controversy goes on and on. Nevertheless, it is apparent that many female professionals suffer some sort of a condition just prior to, or during, menses, one which interrupts normal, unstrained singing. The most convincing evidence to support this involves reports by the female singers themselves. For example last year, we carried out a survey at this symposium which was designed to assess the number of professional women who experienced premenstrual tension just prior to and/or during the menses. We passed out approximately 60 questionnaires of which 35 were returned. Of the 35 respondants, 28 of them complained of menstural problems ranging from minor vocal discomforts to the inability to perform at all for two to three days prior to and/or during the menses.

The reports from the women who have completed our questionnaires must be considered valid. While it is conceded that we may be sampling a higher percentage of those singers who experience difficulty (due to the fact that more of them would respond to our questionnaire than those women who do not), these are the real concerns of women who have to deal with the problem on a continuing basis. That is, for most of these women, there are several days each month during which certain physiological changes prevent normal use of the larynx. For some, these changes are minor, for others they are serious. For all, the question remains relative to the lasting damage that can be caused by the abusive operation of the voice during these "critical" times.

Yet the fact remains that there is a seeming inconsistency between the reports of many female singers and the research which has attempted to define/delineate the problem -- there are numerous (potential) reasons for

these seeming contradictions. For example, Brodnitz (1979) has criticized several recent studies (which found little or no evidence of vocal aberrations associated with menstruation) by stressing that these investigations utilized phonated vowels rather than sung tones. He suggests that they were not sampling the typical phonatory behaviors of the singer stating that "during the menstrual period, a women may be able to produce such vowel sounds at comfortable levels, but may have considerable difficulty at a higher range or large volume." Moreover, Brodnitz argues that data collected on young women with untrained voices (or when they are using their voices normally) should not be generalized to professional artists since trained singers place substantial demands on their vocal mechanism -- and that they do so daily.

Another factor which leads to confusion is the fact that data tend not to be obtained from large and/or appropriate samples of women. In order for adequate research materials to be collected, subjects must attend experimental sessions two to three times per week for several months (menstrual cycles). These long experimental periods and demanding tasks lead to incomplete data and/or small sample research.

Worst yet, obtaining physiological data from professional women presents an even more formidable task. For example, our group has discussed the possibility of obtaining blood samples for analysis during each recording session in order to correlate changes in the hormonal system (specifically estrogen and progesterone) with particular vocal aberrations. However, the identification of a reasonably large population of professional women who would submit to this procedure several times a week (for one or two months) is a nearly impossible task. Moreover, major funding would be needed to finance such an operation. Even carrying out laryngoscopic examinations at critical times during the month would be a major effort. Indeed, even through an ideal study, somewhat subjective results would occur. The observation of professional singer's vocal folds just prior to and after performances during the "critical times" in their menstrual cycle would be most desirable.

To conclude, we are not suggesting that the problems associated with conducting experiments of this nature should curtail interest and/or research in this area. We are only stressing these limitations in order to provide insight for future approaches to this problem. Indeed, in the studies to be reported in the next paper -- one by Helen Isenberger -- we have attempted to avoid many of the stated limitations. However, these studies also exhibit limitations and they must be considered as we interpret their results, and prepare for future research.

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EFFECTS OF MENSTRUATION ON THE SINGING VOICE

PART II: FURTHER DEVELOPMENTS IN RESEARCH

Helen Isenberger, W.S. Brown, Jr. and Howard Rothman

INTRODUCTION

The relationship between the reproductive organs and the voice has been a mystery down through the ages -- a taboo topic that people are still uncomfortable discussing. Because of the very personal nature of the subject it has never been systematically researched. However, times change and students are more open minded and sophisticated, and wish to know all they can about their voices. Moreover, voice teachers are more knowledgeable and curious to discover the scientific basis for certain vocal problems.

PURPOSE

The purpose of the present studies was to examine further the possible connections between the reproductive system and the singing voice. This research expands on the previous protocols of Brown and Hollien (1981,1982) to include certain additional physiological measures, particularly body weight and body temperature. Data was collected from a unique population of singers -- those with an irregular menstrual cycle or amenorrhea. After years of teaching, one begins to suspect that the female student with an irregular menstrual cycle has the greatest vocal problems, the major ones being:

1. The "crack" in the voice, which is the most complex: the crack occurs when the larynx cannot make a smooth transition between the chest voice and the head voice; the voice breaks and sounds out of control and often not on pitch;

2. Breathiness and weakness in a given area that persists even after several years of vocal training;

3. Inability to phonate on given pitches, the tone simply stops;

4. Lack of flexibility: the student is not able to sing scales and/or arpeggios quickly and easily, and is unable to support the tone with the breath.

It is interesting to note that these symptoms are very similar to the ones described by Brown and Hollien (1981, 1982) in earlier papers about singers with normal menstrual cycles. The difference here is that the female with a normal cycle experiences these aberrations once a month, just

prior to and/or during the first few days of menstruation, whereas the student with an irregular menstrual cycle has vocal difficulties continually.

Consideration of these problems suggested the following questions:

1. How does the speaking fundamental frequency of the voice vary with basal body temperature?

2. What is the effect, if any, of hormonal imbalance on the singing voice.

3. What stabilizing changes, if any, occur in the voice when the menstrual cycle is regulated?

4. What therapies might prove effective with the aforementioned problems?

PROCEDURES

Brown and Hollien (1980, 1981) outlined several methodological considerations for future research in this area. Certain of those suggestions were incorporated in the following protocol:

A. Sixteen female singers from ages 18 to 22 years with irregular menstrual cycles were recorded in a sound treated room every Monday, Wednesday and Friday for a period of two months. Their vocal experience ranged from no formal voice lessions to three and one-half years of vocal training.

B. A quality Sony reel-to-reel (TC270) tape recorder was used for all recordings.

C. During each recording session, each student: gave her name and the date of the recording; read the Rainbow Passage; sang a low note which represented the 10% point up from the lowest note they could phonate; and sang a high note representing the 90% point up from the lowest note they could phonate.

D. In addition, each student sang chromatic scales and phrases from songs through that part of their voices which gave them the most difficulty.

The purpose of reading the Rainbow Passage was to establish the student's average speaking fundamental frequency. The purpose of singing the high and low notes was to observe the possible changes in the phonational range throughout the two-month recording period. All the tape recordings were analyzed by the IASCP Fundamental Frequency Indicator, FFI-8 (Hollien and Harrington, 1977), which yielded an average speaking fundamental frequency for each of the readings.

Since some of the students did not menstruate during the first semester of recording, the data collected was incomplete. Therefore, during the

second semester of recording, basal body temperature and body weight were added to the protocol. We recorded body weight, since it might indicate an edemic condition or water retention. We recorded basal body temperature because many gynecologists agree that it is the best indicator of fluctuating hormones. (See Footnote 1.)

RESULTS

Figures 1 through 8 present graphs which display the results of the data collected on the students with irregular menses. On the left side of each graph is the fundamental frequency variation without body temperature or body weight. The right side of each graph shows the variation of all three components. The line near the top of each figure designates the normal body temperature of 98.6°. It was a rare occasion when anyone of the students had a temperature of 98.6°. If they did, they felt they were running a fever. Also shown on each graph are the dates of the first and last recording and the periods when menstruation occured.

Body Weight, Body Temperature and Fundamental Frequency

Figures 1 through 4 display the results for four of the subjects which were most typical of all sixteen subjects, and of the vocal problems mentioned above. Notice the extreme fluctuation of all three components -- body weight, body temperature and the fundamental frequency of the speaking voice. For these students, generally when the body temperature went up, the fundamental frequency increased. When the body temperature went down, the fundamental frequency lowered. These trends would indicate that the fluctuating hormones (shown by the fluctuating body temperature) and the fundamental frequency of the speaking voice have a definite relationship.

In particular, Subject 1 (see Figure 1) had a great deal of difficulty phonating between B♭ and F♯ above middle C. Her body temperature was 96.9° and body weight was 104 lbs. Her voice exhibited frequent cracks. Subject 2's voice was breathy, weak, and had an extremely low speaking fundamental frequency (see Figure 2). She exhibited breaks in her voice during a passagio which was recorded the 14th day of the menses -- her body temperature was 97.8°, and her body weight was 143 lbs. Subject 3 (see Figure 3) had the lowest speaking fundamental frequency when compared to all the subjects. Also, her high and low notes were unpleasant sounds. Subject 4 (see Figure 4) had studied voice for two years and because of the extreme breaking of the voice, gave up private voice lessons. Her body temperature was 97.6°, her body weight 118 lbs.

Blood Tests

To find which hormones were fluctuating, it would have been necessary to take blood tests three times a week, when we recorded the students voices. This proved to be impossible as fasting is required before blood is drawn, the venous puncture might become infected, and the entire procedure is extremely costly. We did, however, take one blood specimen from each of the sixteen students. On the advice of Dr. Nai Sian Jiang, head of the Endocrine Laboratory at Mayo Clinic, each student's blood was tested for levels of testosterone. Testosterone is a male harmone and when found in

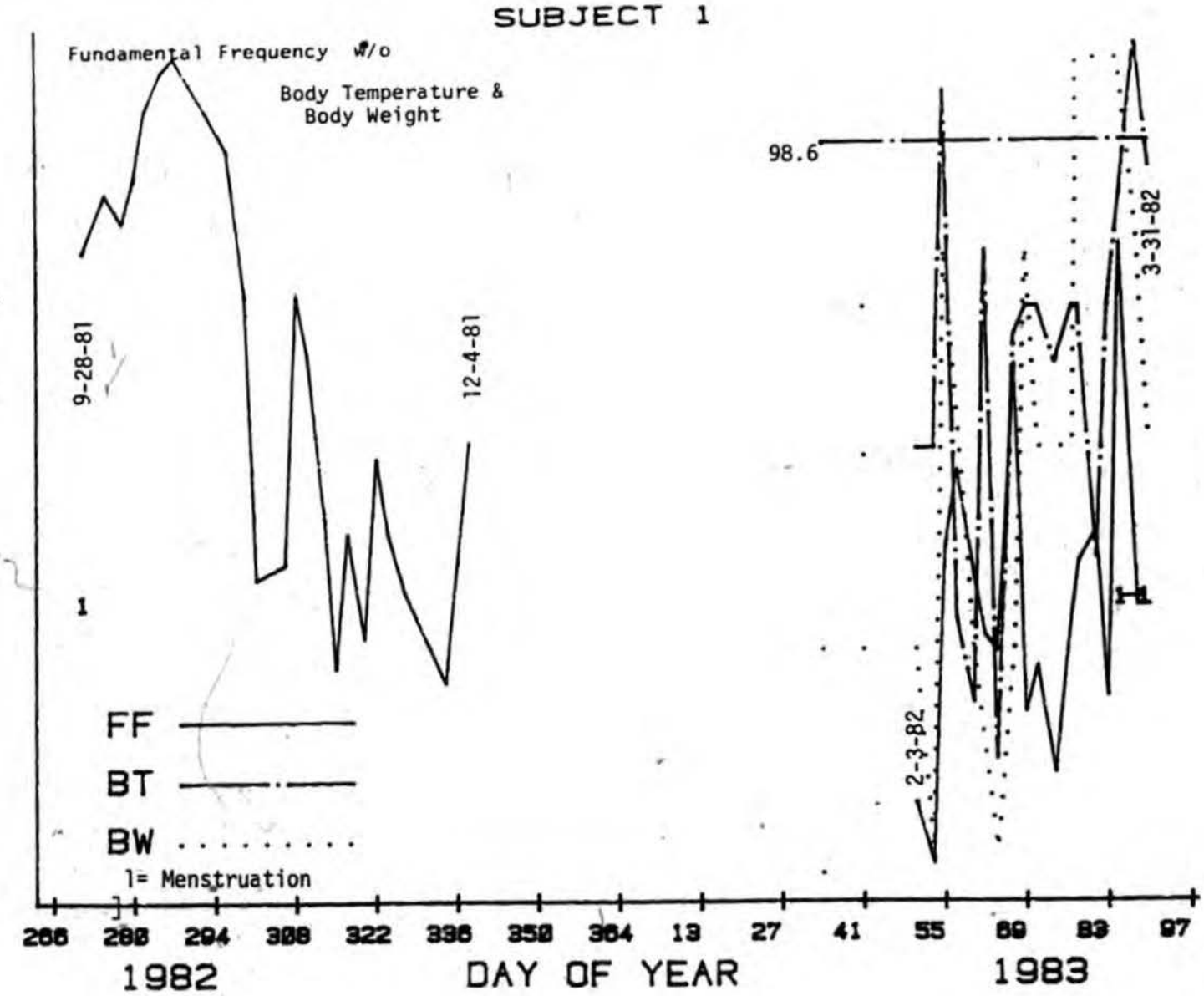
SUBJECT 1
Fundamental Frequency w/o
Body Temperature &
Body Weight
98.6
9-28-81
12-4-81
3-31-82
2-3-82
1
FF
BT
BW
1= Menstruation
266
288
294
308
322
336
350
364
13
27
41
55
69
83
97
1982
DAY OF YEAR
1983

FIGURE 1

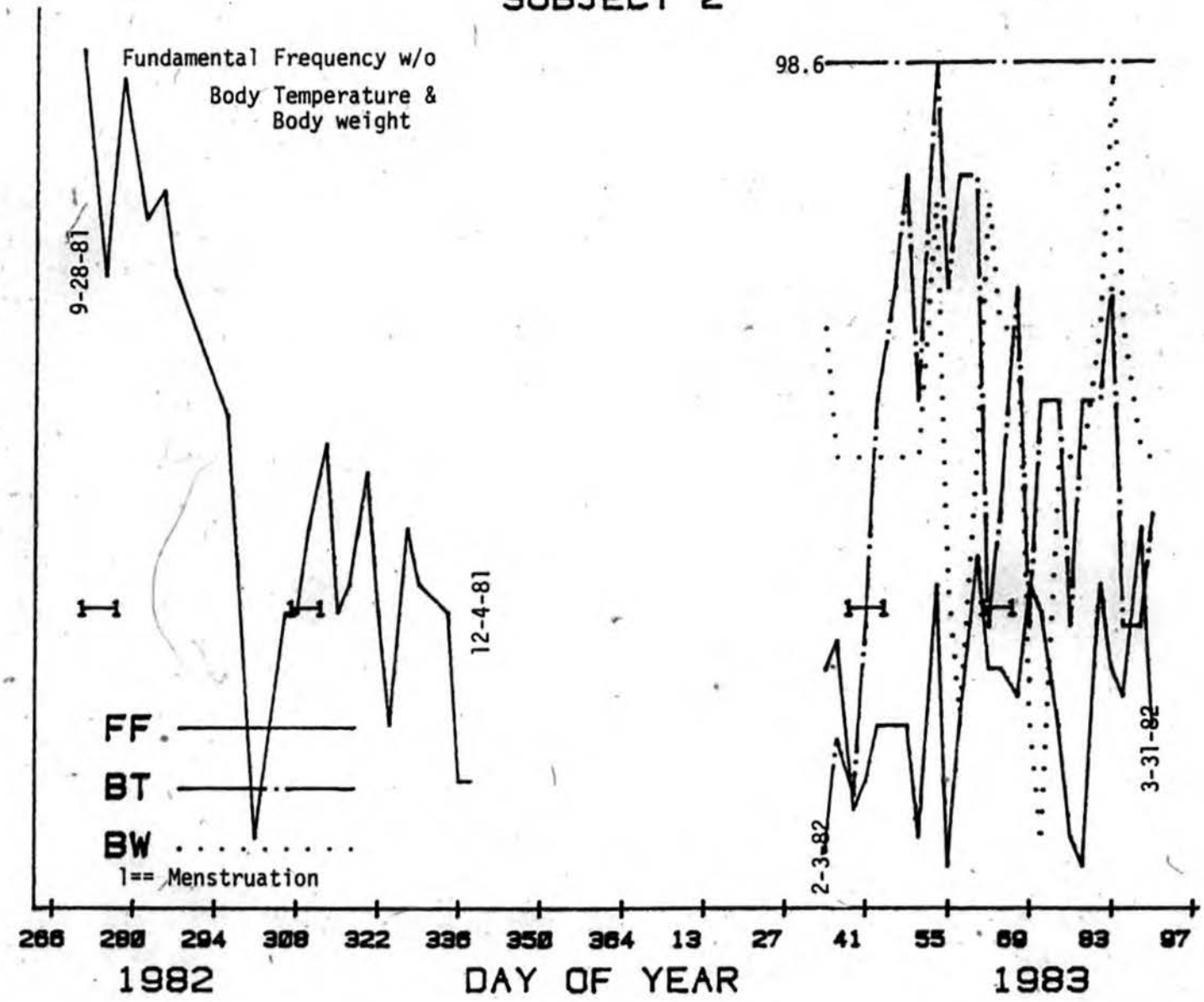

FIGURE 2

SUBJECT 4

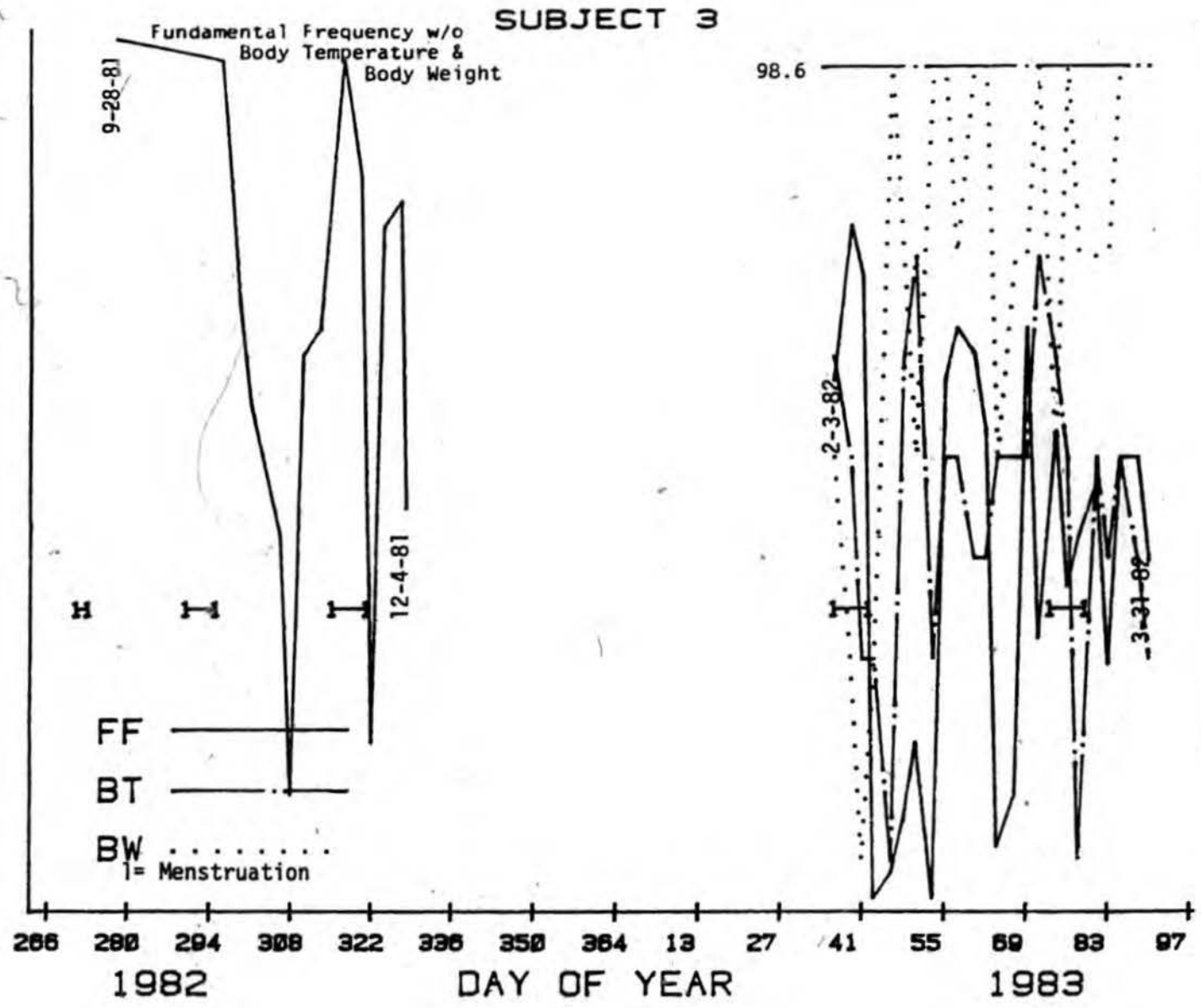
SUBJECT 3
Fundamental Frequency w/o
Body Temperature &
Body Weight
9-28-81
12-4-81
2-3-82
3-31-82
98.6
FF
BT
BW
1= Menstruation
266
280
294
308
322
336
350
364
13
27
41
55
69
83
97
1982
DAY OF YEAR
1983

FIGURE 3

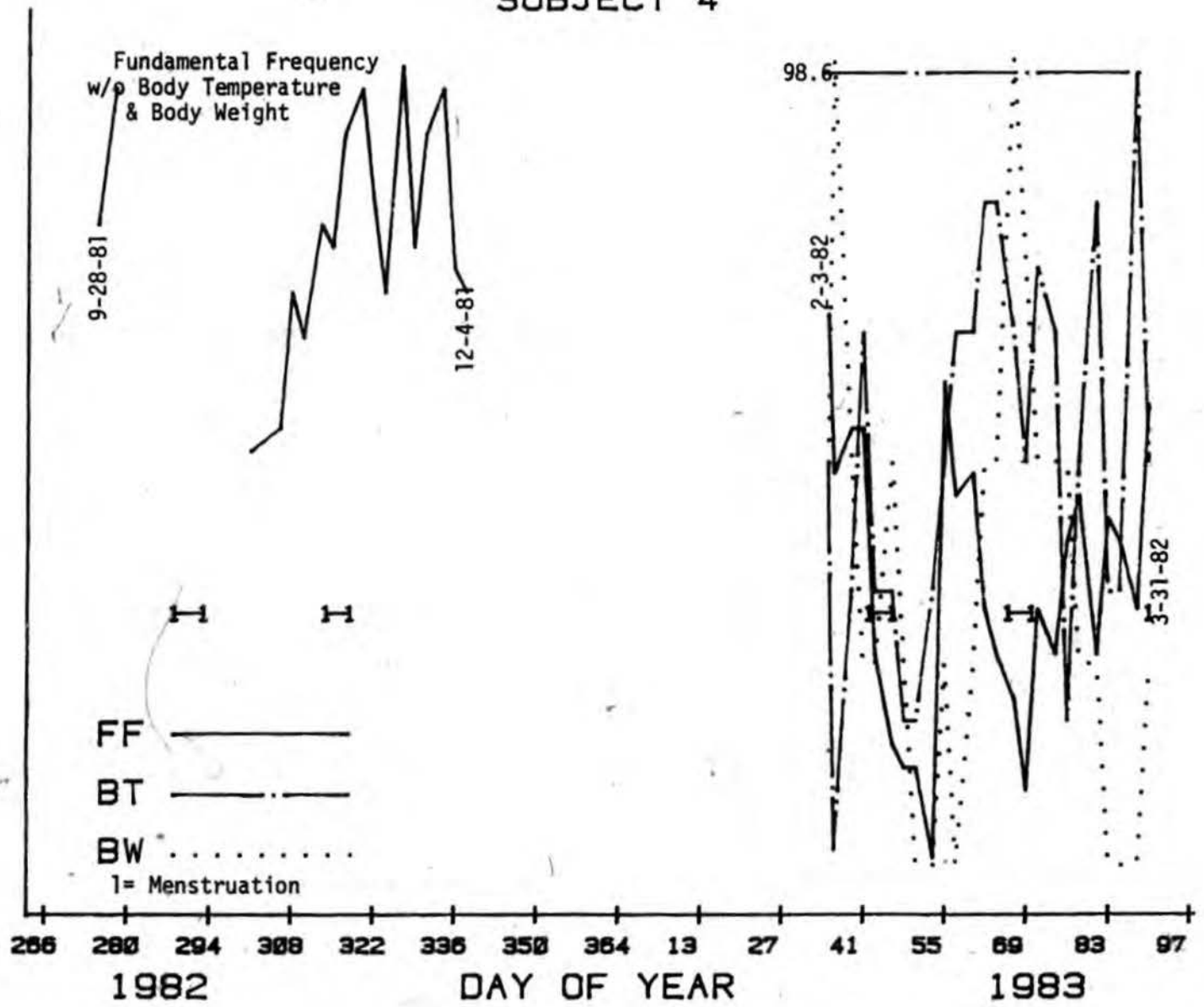
SUBJECT 4
Fundamental Frequency
w/o Body Temperature
& Body Weight
9-28-81
12-4-81
98.6
2-3-82
3-31-82
FF
BT
BW
1= Menstruation
266
280
294
308
322
336
350
364
13
27
41
55
69
83
97
1982
DAY OF YEAR
1983

FIGURE 4

excess in a female it has a virilizing effect upon the voice (See Footnote 2).

When the results of the testosterone tests from our sixteen students were analyzed, we found that the mean or average testosterone level in these students was 63 nanograms per 100 milliliters with a standard deviation of 17 nanograms. Then blood samples were taken from ten female voice students whose menstrual cycle was regular. This enabled us to establish a norm -- a standard of comparison. The mean or average was 47.8 nanograms with a standard deviation of 12.8 nanograms. There was a statistically significant difference (0.05 confidence level) between the mean values for these two groups of students. Therefore, it seems possible that the higher than normal testosterone level in our students with irregular menses would be the variable, or a least a major variable, that throw their hormones out of balance, causing the associated vocal aberrations.

The Pill

To find the answer to the question of what stabilizing effects, if any, would occur if the menstrual cycle could be regulated, we again enlisted the help of the Mayo Clinic and Dr. Ruth Callum (gynecologist). Five of our voice students with irregular cycles and two months of tape recordings, took physical exams, which included the breast exam, pelvic exam and a Pap smear. All were reported as being in very good health. The doctors told all of them the possible side effects of going on the birth control pill (Ortho-Novum, which is lowest in potency). They were instructed to start taking the pill on the last day of their menses. Of the five, one dropped out of the study because she feared the side effects, and one never menstruated. Thus, we were left with three students who did go on the pill. This is admittedly a small sample, but the results are nevertheless interesting. These students were recorded every Monday, Wednesday and Friday until the school year ended in May of 1982, using the same protocols described above.

The results are displayed on Figures 5 through 8 and indicate that the pill stabilized the body temperature somewhat and the speaking fundamental frequency was raised to a higher pitch. Keep in mind that these students were on medication for only a few short weeks.

Subject 5 (see Figure 5) was a freshman vocal student whose voice seemed to be clearer and stronger after medication. Subject 6 (see Figure 6) had the most startling results as her body temperature remained at 98.6 for over a week and her voice was definitely clearer and stronger. Subject 7's (see Figure 7) gravelly speaking voice was somewhat better after medication. She went off the pill completely after she menstruated and the fluctuating components returned. Subject 8 (see Figure 8) took progesterone, under the drug name Pronera, five days every month starting in January 1982. She took this throughout the second semester. Her body temperature still fluctuated greatly and the fundamental frequency seemed somewhat lower. She never menstruated.

Spectral Analysis

Utilizing the same subjects, that is, those in the pre- and post-medication group, we also began a long term spectral analysis on the high sustained tones which represented the 90% point of their total singing range and the low sustained tones which represented the 10% point of their total singing range. So far we only have data on one subject to report. During the pre-medication period, as was true for fundamental frequency, body weight, and body temperature, there was a wide variation in total spectral energy which had no correlation with any specific time in the menstrual cycle. However, after medication the spectral analysis indicated that the noise level followed the variation in body weight, body temperature and fundamental frequency.

The combined results demonstrated that after medication this individual showed "typical premenstrual tension" in the singing voice as evidenced by the four factors of interest. That is, during ovulation -- which occurs at mid-cycle -- body weight, body temperature, fundamental frequency and spectral noise all increased as well as just prior to the menses, or the premenstrual period. This is consistent with the specified periods where most females report having menstrual problems.

CONCLUSIONS AND SUGGESTIONS FOR THERAPY

In consideration of all these data, we feel that in cases where it is evident that there are extreme imbalances of hormones, perhaps the pill is the best answer for helping to balance the hormonal system. This, in turn, may help to regulate menstruation and stabilize the voice. The voice should be monitored closely, however, and all such therapy programs should be prescribed and carried out by an appropriate physician.

There are, however, other therapies that may prove to be even better when more systematic research is completed. For example, Speroff and Vande Weile (1971) have mentioned several studies which enabled patients to ovulate, thereby helping to start menstruation. Some administered gonadotropins -- Zandek implanted 20 mg of estradiol. Kupperman used intravenous injections of Premarin -- these types treatments seem like extreme measures to help a student sing better and, of course, must be done under a physician's care. M. Ermini (1979) found that if the body is producing too much prolactin, the drug, Bromo Ergo Criptine, may help to regulate the menstrulate cycle. R.T. Sataloff (1981) points out that too little thyroid could cause similar vocal problems and taking Synthroid may help. Last, but not least, is proper vocal exercise. We feel that vocal exercises carried out over a sufficiently long period (several years) may bring about considerable improvement.

For future research in the realm of finding something to help these students, Luchsinger and Arnold (1959) stress that there is a gross anatomical relationship between the chief hormonal gland (hypothalamus) and the mid brain, which reflects the continuous interaction between hormonal function and the mental processes. Could the menstrual cycle be regulated with the correct psychological stimuli? And as Owen (1975) pointed out -- the cyclic ebb and flow of estrogens have a diverse effect on metabolism.

Could proper diet help regulate menstrual cycle?

All this information is but an infinitesimal scratch on the amount of research yet needed to be done. The greatest problem seems to be in finding the population willing to help with such research. These present data should, however, help to understand somewhat better the relationship between menstruation, the female hormone system, and their effects on the singing voice.

FOOTNOTES

1. During a typical 28 day cycle, the estrogen level reaches a peak on or around the 14th day when ovulation takes place. Then it decreases slightly before reaching another peak around the 21st day, when progesterones begin to dominate (Frable, 1961). At the beginning of menses the basal body temperature drops.

2. Speroff and Vande Weile (1971), Damste (1967) and Heineman (1976) all described this virilizing effect that testosterone has on the female voice. Damste (1967) viewed these conditions with the laryngoscope and came to the conclusion that the voice change due to these male hormones altered the connective tissue of the vocal folds. Also, an important role was played by the vocal ligaments in giving rise to the different registers of the voice. In a normal female, a mid-register is produced by blending the chest and head registers; the blend consists of a well controlled balance between the two antagonistic muscles, the thyroarytenoid increasing the tonus and contraction of the folds, while the crycothroid caused their stretching. It is easy to understand that any changes in the vocal ligaments may disrupt the delicate mechanism of register blending. The overshooting was heard as cracks. Also, at times, there was an incomplete closure of the cartilagenous parts of the cords. The posterior portion of the glottis appears incompletely closed during phonation causing the tone to be breathy and weak. Damste concluded that by the action of androgens the connective tissue of the vocal folds increase in length or in extensibility.

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SPECTRAL CHARACTERISTICS OF VOICE REGISTERS IN FEMALE SINGERS

Carol Schoenhard, Harry Hollien and James W. Hicks, Jr.

INTRODUCTION

The teacher of singing who scientifically investigates vocal behavior is sometimes asked what "all that science" has to do with coaching a singer to develop better line in Deutsche lieder -- or the stamina demanded by an operatic role. The answer is as simple as that provided by the football coach about his activities: "the better you understand the plays of an opposing team, the better you can counter them." The student singer constantly is presenting new "plays" or sounds to the vocal coach -- all of which must be analyzed. It is in this process of analyzing sung tones and in the determination of potential phonatory modification that knowledge based on scientific evidence is relevant. Indeed, a successful approach to the teaching of singing must incorporate 1) the products of science, 2) the tools of imagery and 3) the perceptual determination of good voice quality. Therefore, the focus of this investigation is on vocal registers as they appear in the female singing voice, for the purpose of better understanding their isolating qualities. It is only by this means that the teacher can: 1) control the phenomenon, 2) assist students in avoiding vocal abuse and 3) remove register effects from the voices of singers.

The extent of the controversy to be reviewed can be appreciated by consideration of Morner, Fransesson and Fant (1964) who list 107 different names that have been used to identify one register or another. Further, even though Johnson (1982) eloquently argues the "no register" (or one register only) position, we must insist that voice registers do exist -- at least in the student singer (see Hollien and Schoenhard, 1983) -- and that it is quite valid to study them.

Definitions appear to be in order. Garcia's (1840) classic and oft quoted definition can be useful: he says that registers are: "... a series of succeeding sounds of equal quality, a scale from low to high produced by the application of the same mechanical principle, the nature of which differs basically from another series of succeeding sounds of equal quality produced by another mechanical principle." Advancing slightly in specificity, Hollien and his associates (1974, 1976) extend Garcia's definition by postulating a second set of "vocal tract" based registers that are parallel to, or overlap, vocal registers of laryngeal origin. Titze (1980) addresses this issue when he points out the dangers in not operationally defining entities such as voice registers with respect to the relevant levels and dimensions, "from the neuromuscular level to the biomechanical level, to the kinematic level ... to the aerodynamic and to the acoustic levels, and finally to the perceptual level." We agree with him -- and also with Hollien (1974) who, in the same vein, stressed that voice registers -- if they are to be adequately conceptualized -- must be

(operationally) defined with respect to both their laryngeal and their vocal tract components. Finally, we believe that it has become apparent that singers' registers constitute entities that are different in many respects from speaker's registers (Hollien and Schoenhard, 1983). They are related, it is true, but, because of the different contexts in which they occur, they mst be studied and dealt with on differing levels/bases.

Relevant Literature

Considerably more research has been carried out on the male singer than on the female. For example, Colton (1972) reported spectral contrasts of the modal and falsetto productions of trained and untrained singers. He found that the modal productions exhibited a greater number of partials with significant energy whereas the falsetto phonations exhibited greater energy in the fundamental frequency. Similar findings have been published by other investigators (Sonninen, 1961; Van Den Berg, 1963). In a somewhat related study Russo (1978) reported that those male register-related singing productions judged "best," were associated with equal strength in the first three partials; those judged poorest with variation. Cleveland (1977) investigating male voice timbre types reported that a source spectrum does not appear to determine the nature of a given voice category but source spectra do contribute to the individual's phonatory timbre. More to the point, Large (1968), in an acoustical study of seven female singers producing f_0/vowel/intensity combinations in two registers, reported that the fundamental appeared stronger in middle than in "chest" voice, and that more of the total energy was concentrated in the higher partials of "chest" production than in the tones produced in middle register. Finally, Sundberg (1977) also investigated the possibility that formant frequencies were a factor involved in the perceptual discrimination between low and mid registers. He found that he was able to separate the source spectra from the partials that were influenced by vocal tract resonance. He also observed that the lowest partials were stronger in the mid-register samples than they were in the lower register samples.

THE PRESENT STUDY

The first step in studying registers in the female singing voice was to reliably determine that they are indeed perceptual entities. A brief review of this experiment (Schoenhard and Hollien, published 1982) would appear relevant at this juncture.

Basically, the question asked was "Do voice registers exist in the female singing voice?" Perceptual responses to samples thought to illustrate the registers of female singers were obtained. The experimental stimuli were provided by eight accomplished female singers who phonated a single fundamental frequency/vowel combination in three registers (i.e., low, modal or heavy; middle or mid, and high/loft or light) at approximately equal intensity levels. Two tapes were constructed; the first consisted of 24 stimuli representing the three registers and the second, 16 samples of only the heavy and light registers. Twenty-nine listeners of roughly equal groups of singers/singing teachers, phoneticians, and controls were required to sort the samples into (unnamed) categories on the basis of their own definitions of "quality" or timbre. That is, a forced choice paradigm was

used. The judges exhibited a significant ability to perceive quality differences between heavy and light register production, but their ability to differentiate productions of the middle register was marginal.

If the fundamental frequency and amplitude of tones sung in different registers are equal, it must be the quality (or sound spectra) that permits identification and our second experiment was designed to permit study of this issue. Here, an attempt was made to determine if particular register productions were associated with particular spectral envelops, the overtone energy levels and/or the number of overtones produced. These constrasts were made amongst the three registers produced by the eight singers; however, only the main register productions heavy and light will be considered in this abbreviated presentation.

Procedure

The procedures utilized in this research have been presented in detail in Schoenhard and Hollien (1982), and have been reviewed above. The sixteen presentations by eight singers (i.e., heavy or light register productions of the vowel /ɑ/ produced at 392 Hz (G-4) and at constant vocal intensity) were spliced into tape loops and two methods of spectral analysis applied. First, a wave analysis was carried out on a General Radio wave analyzer, Model 1900; bandwidth was 50 Hz and the frequency range was 20Hz-10kHz. The second analysis was conducted by means of a hybrid system consisting of a Princeton Applied Research FFT Real-time Spectrum Analyzer, Model 4512 interfaced with a DEC PDP-11/23 computer. Approximately five second samples were used in order to obtain the spectral distribution.

RESULTS

The results of the two-register contrasts may be seen summarized in Figures 1 and 2. Note that the two sets of curves are roughly similar; that both tend to reflect the characteristics of the vowel being produced (but the formants are somewhat more apparent in Figure 1). Further examination of Figure 1 will reveal that the spectra for the lower register (A) and the upper register -- (that should read read (C)), begin to diverge around harmonic overtone number eleven. No evidence of the existence of any partial above HO-14 (around 5 kHz) occurs for the light register whereas energy in the upper partials continues to be apparent through HO-18 (over 7 kHz) and beyond for the heavy. The problem associated with the use of a wave analyzer (and similar equipment) is that they are not differentially sensitive in the upper frequencies and, hence, it is difficult to separate overtones from ambient noise above 5 kHz. As may be seen, it is impossible to do so for those frequencies produced in register-C. It is our belief that the lack of appropriate discrimination by this device (and others like it) has led to the commonly held notion that a singer produces a greater number of partials in the heavy register than she (or he) does in the light register. Of course, it is conceded that the two curves are different in the higher frequency regions. However, there may or may <u>not</u> be a total loss of partials for phonatory activity in the upper register.

The second (FFT) procedure was carried out in order to: 1) further test the register relationships and 2) generate stable data on the upper

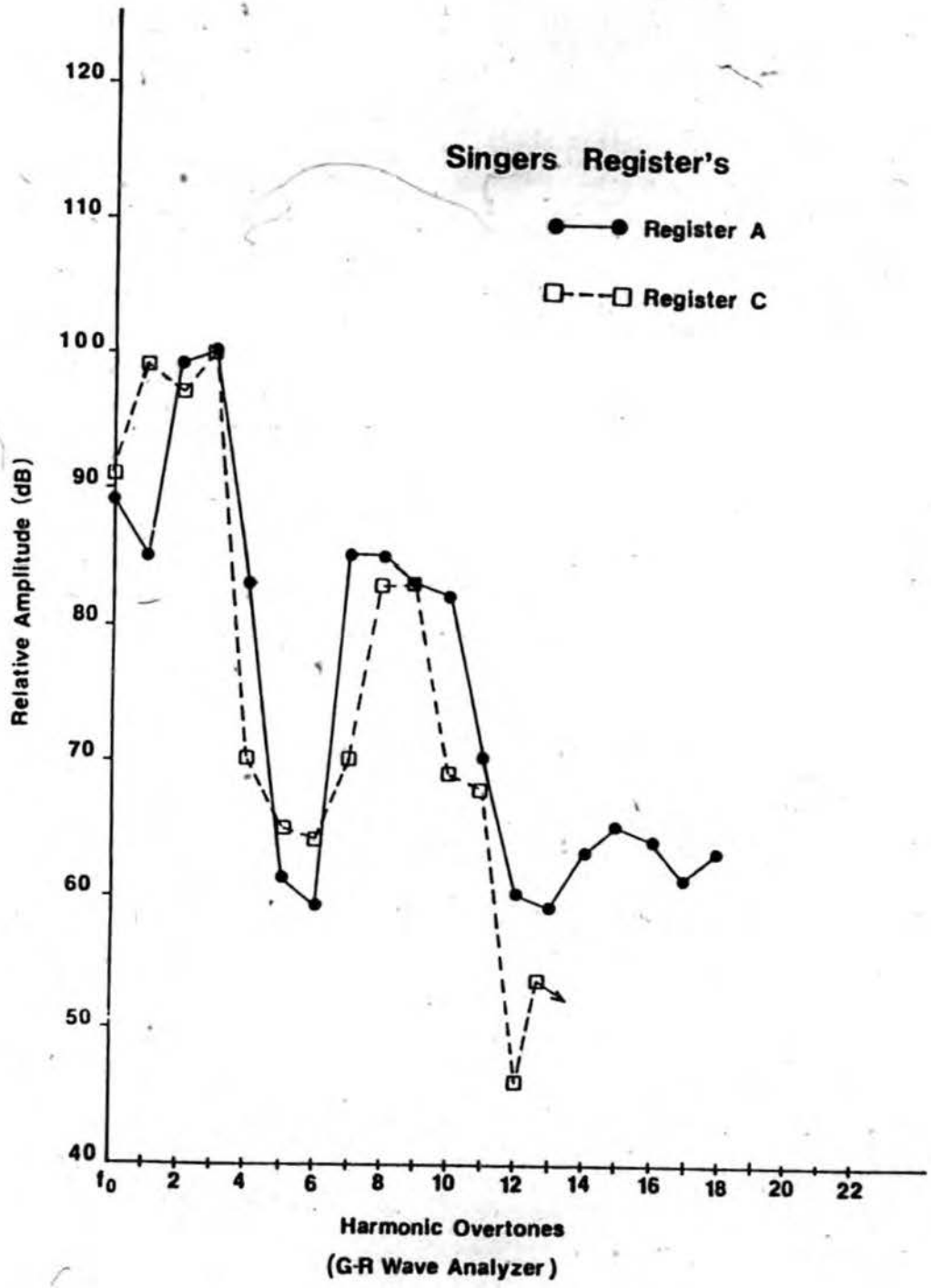
Singers Register's
Register A
Register C
Relative Amplitude (dB)
120
110
100
90
80
70
60
50
40
f0
2
4
6
8
10
12
14
16
18
20
22
Harmonic Overtones
(G-R Wave Analyzer)

Figure 1

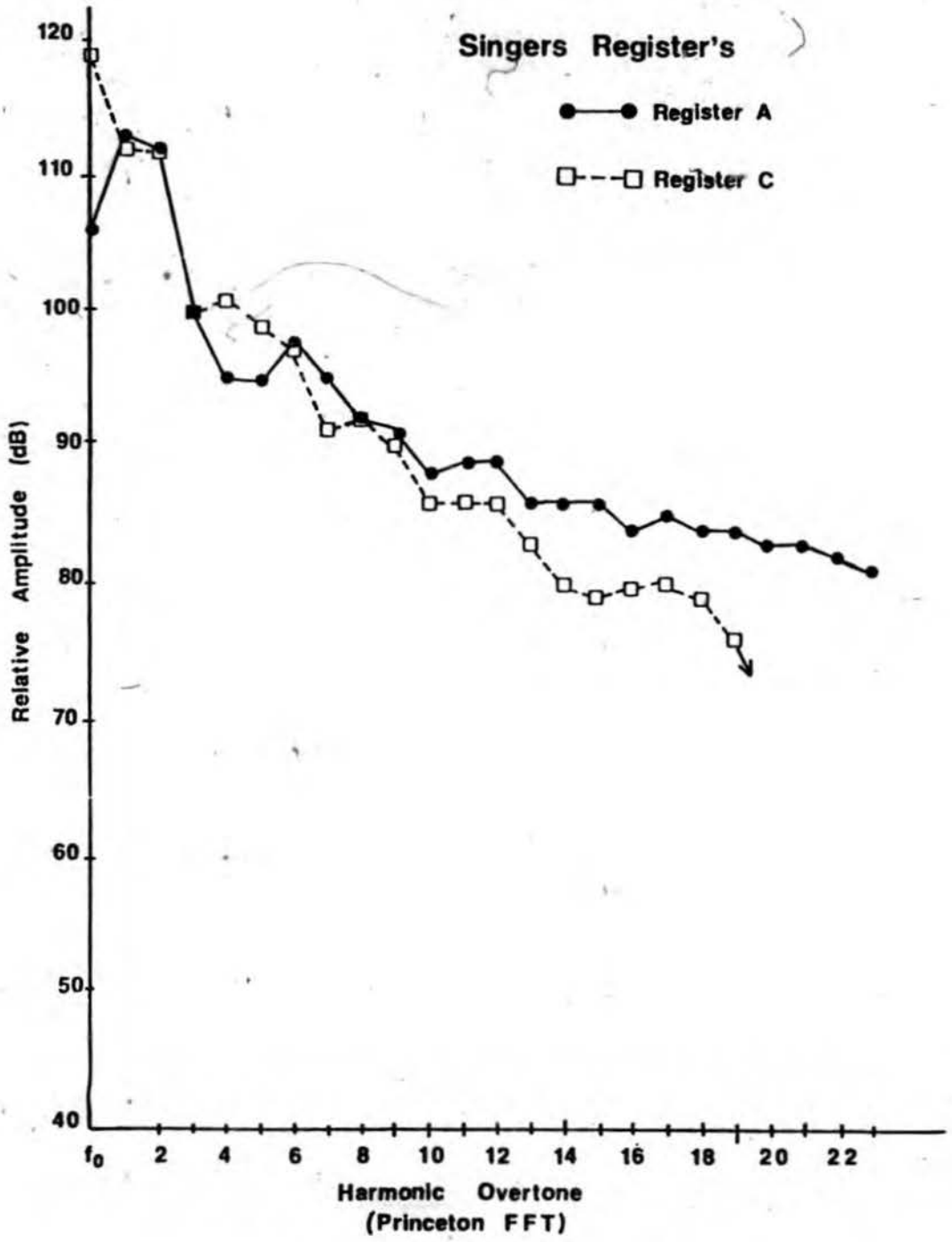
Singers Register's
Register A
Register C
Relative Amplitude (dB)
120
110
100
90
80
70
60
50
40
f_0
2
4
6
8
10
12
14
16
18
20
22
Harmonic Overtone
(Princeton FFT)

Figure 2

partials for both registers. As can be seen from examination of Figure 2, energy in the upper partials (overtones) exists relative to both registers. Indeed, the FFT procedure provides information between HO-18 and HO-23 (7-9 kHz) for the heavy register and between HO-13 and HO-19 (5.0-7.5 kHz) for the light. In this case, the differences between the two types of productions are quite apparent especially since the two curves were equalized (relative to energy level) so that direct comparisons can be made. Basically, these differences are three in number: 1) energy levels for the two registers are systematically different in the higher partials (i.e., above about 4 kHz) with the heavy register exhibiting more energy, 2) the overtones for the light register do not drop out in the higher frequencies; they merely are reduced in energy level to a point that they cannot be detected by certain electroacoustical devices and 3) those authors (such as Colton) who indicated that they found more energy in the fundamental frequency for the light register probably are correct. Finally, these relationships are even more apparent when only those subjects/conditions where very high levels of correct (perceptual) identification occurred are utilized in the analysis.

CONCLUSIONS

The data produced by this research appear to demonstrate that the two singing registers that can be perceptually discriminated also can be contrasted on the basis of acoustic information. In any case, it may be concluded that:

1. The heavy and light registers can be differentiated on the basis of spectral contrasts.

2. The light register exhibits more relative energy in the fundamental and/or first harmonic overtone.

3. The heavy register exhibits more energy in the harmonic overtones above 5 kHz -- and, perhaps, more overtones overall.

4. Registers either occur in the singing voice or, at least, singers are able to produce them at will.

Since registers have been shown to exist, teachers of singing must take cognizance of them and develop methods by which they are eliminated from the voices of individuals that sing in the classic/western, concert/opera mode.

ACKNOWLEDGEMENT

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A REVIEW OF VOCAL REGISTERS

Harry Hollien

This report emanates from one of the programs sponsored by the Collegium Medicorum Theatri; it results from the efforts of a rather substantial number of individuals. I am pleased to be associated with them; indeed, it is a honor to be able to report our joint deliberations and conclusions to you.

By nature of background, it should be pointed out that the Collegium Medicorum Theatri (CoMeT) is a society -- by invitation only -- which consists primarily of physicians who are concerned with, and treat, individuals who use their voices professionally; they are especially interested in singers and actors. Since this group fosters and encourages relevant research, the physicians are joined in their efforts by a few scientists (primarily phoneticians) and engineers plus a small group of voice teachers/pedagogists.

The CoMeT committee on vocal registers was formed two years ago at the Seventh CoMeT Congress, Amsterdam. It consists of fifteen regular members plus three ex officio contributors -- over half of the group are CoMeT members. The speciality breakdown is physicians: 45%, scientists/engineers: 35%, voice pedagogists: 20%. Members are Giuseppe Bellussi (Italy), Friedrich Brodnitz (U.S.A.), W.S. Brown, Jr. (U.S.A.), Beverley Johnson (U.S.A.), Jens-Peter Köster (West Germany), Van Lawrence (U.S.A.), Richard Miller (U.S.A.), Aato Sonninen (Finland), Johan Sundberg (Sweden), Craig Timberlake (U.S.A.), Ingo Titze (U.S.A.), J.B. van Deinse (Netherlands), Jürgen Wendler (East Germany), Fritz Winckel (West Germany). I have the honor to chair the committee. Ex officio members include CoMeT officers Hans von Leden and W.J. Gould (both U.S.A.) plus a consultant, Carol Schoenhard (U.S.A.). Several other individuals have contributed to this report -- especially Suzanna Naidich (Argentina), Minoru Hirano (Japan) and Wolfram Seidner (East Germany). With only one or two exceptions, all committee members have been active in our deliberations -- many have contributed extensively.

The five "positions" to be presented represent a consensus -- often an overwhelming one -- of the committees' collective opinion. Ordinarily, a particular position or issue or argument will not be attributed to an individual by name; that is, except in those cases where they were particularly eloquent or (perhaps) when they organized the minority report. A substantial number of issues -- other than those articulated here -- have been considered. Those postulates/controversies/issues not covered in this report were considered either not relevant, too trivial for major review or incomprehensible. The positions to be reviewed are five in number.

1. Registers Exist

Voice registers have been shown to exist; hence they cannot be ignored. There is substantial pedagological history in this regard, antedating (in time) even Garcia. Moreover, a substantial number of perceptual and acoustic studies have been carried out on singers with a consequence that they have demonstrated the existence of this vocal phenomenon. The minority, in this case, is led by Johnson and Winckel who argue that only untrained singers exhibit registers and that it is only individuals not yet accomplished in singing who distort their phonatory productions in a manner where various register qualities and breaks become apparent. They also argue that many great singers developed their voices without even being aware of the register concept; that "smoothness of scale and tone" more functionally relate to good vocal development and habits than do approaches which train "sections" of the voice (or elements within it) in piecemeal fashion.

When the two positions are contrasted, however, it becomes apparent that this controversy relates to what is desirable rather than to what exists in singers' voices. Consequently it is upon this basis that the two positions are reconciled. In this regard, consider the relevant experiments that have been reported. Many investigators have demonstrated that accomplished singers can produce phonations in specific voice registers -- even when vowel, fundamental frequency and vocal intensity are controlled. The differences in register phonation can be heard even in those cases where the auditors are making blind judgments (i.e., those only on the basis of quality or timbre). Further, acoustic differences can be observed in the spectra of tones sung in different registers. In any case, the contrasts are even more apparent when the controls are removed from the other three vocal paramenters (f_0, vowel, intensity). Thus, the models, data and descriptions provided by investigators such as Titze, Sundberg, Bellussi and Hollien simply cannot be ignored.

But how then can these findings be made to compliment a "one register" position? Very simply. If the singer is trained to modify his or her phonation in an effort to compensate for register effects -- and is successful in doing so -- single "register" (or no register at all) will result. However, the position of this committee is that the voice characteristic defined as register exists in the voice of singers and must be recognized as an entity. Of course, good teaching can remove or conceal its effects -- if such behavioral change is considered desirable.

2. Singing/Speaker Registers

Vocal registers in singing and voice registers in speaking (or in the untrained voice) are different and separate entities and must be treated as such. It is conceded, of course, that these two particular characteristics may overlap in function and probably have common physiological roots in the larynx. None-the-less, it must be recognized that, while vocal registers exist and are sometimes used in speaking, no attempt is made to "train" them out of the productive repertoire of the speaker. Moreover, a physiological register (vocal fry, pulse, creak) exists in speaking -- one that is virtually nonexistent in singing. The most serious problem in this regard relates to confusions resulting from research reported in the literature.

Specifically, vocal register studies carried out on non-singers cannot ordinarily be extrapolated to singers on the basis of some simple relationship (Brodnitz warns of this danger). Such is often the case, however, and to the detriment of our thinking.

As we have conceded, registers also can be observed in the phonatory productions of singers. However, their uncontrolled presence apparently occurs primarily in the voices of the beginning, untrained and/or "not-yet accomplished" singers. The artistic level or professional singer, on the other hand, works to remove or conceal the influence of registers on tone, line or timbre; that is, if the singers have been trained in the western/classic, operatic/concert mode.

As it turned out, very little controversy occurred amongst the committee members relative to this "position." Wendler, however, argued that because speaking registers are not essential even in artistic speaking (and do not result in problems related either to education or performance), they constitute an academic issue of little practical relevance. Perhaps this position is a little extreme but, if Sonninen's suggestion that we provide tape recorded samples of tones sung in various registers (for distribution throughout the world) is to be implemented, we probably should structure different sets to illustrate registers in speaking and in singing.

3. To "Remove" Registers

The third position taken by the committee consists of a paired set of postulates. As it turns out, this issue was, at once, the most controversial of all yet the easiest one to solve. The postulates can be stated as follows: 1) The elimination or concealment of register effects is desirable for the classical/western, concert/opera mode of singing and 2) Register effects can be fundamental to certain types of singing but this class of singer should be trained to produce those effects with a minimum of abuse to their voices.

It should be noted also that Bellussi and Titze are quick to remind us that a teacher does not "remove" registers from a singer's voice; perhaps Wendler says it best, "Registers cannot be removed as they are physiologically given." Thus, it appears that it is important to conceal registers and/or their effects by training the student to equalize or balance the different sound qualities (from the different registers) until they are no longer perceptible -- that is, in those instances where such modificaions are desirable and/or beneficial to the singer. We are reminded by Sundberg and Naidich, however, that there are valid types of singing where register timbre, or breaks, are used for dramatic effect -- or where the particular nature of the singing calls for production of this type of contrast -- folk singing and yodeling for example.

4. The Source of Registers

The committee accepted the notion that there probably are two sources for registers -- the larynx and the vocal tract. Yet this seemingly universally agreed upon position also provoked some of the sharpest differences amongst committee members. For example Sundberg is adamant that a voice register must originate in the larynx. On the other hand, Hollien

appears to have retreated somewhat from this position. Along with Gould, he now is willing to accept the possibility of mechanical register-type operations originating in the vocal tract (i.e., in the supra glottal oral-facial structures) and that these events may be related to "singers" registers. Further, Hollien and Schoenhard concede the possibility that the so-called middle register may illustrate this class of events. In an effort to establish a reasonable dialogue here -- and perhaps provide structure to the issue -- Wendler (and Bellussi) suggest separation of our register model into physiologic and artistic categories. Presumably, the physiological element would be equated with laryngeal registers (and speaking registers?) whereas "artistic" registers would appear related to singing, to events in the vocal tract -- or even, perhaps to the use of registers for effect.

To summarize. The dialogue relative to the source or sources of vocal registers ultimately led to general agreement that there may be multiple sources for these phonatory activities but that the larynx is the primary source. However, it should be stressed that a substantial minority of the committee argued in favor of the source (of a voice register) being only laryngeal and that the other so-called register-like phenomena actually are some sort of quality/timbre events. It is doubtful that this issue can be resolved except by further research.

5. Labels

The labeling of vocal registers is proving to be the thorniest of all problems. As it turns out, a number of committee members support the use of "the old labels." But what are those old ways and old labels? Note the confusion that would result from an attempt to use the materials presented by Figure 1 in resolving this issue. As can be seen, the figure consists of portrayals of the efforts of four authors to name, number and specify only the frequency extent of voice registers. In any case, are Garcia's materials, the "old" ones we should use? Are his ranges accurate for all singers? Where did the labels he uses come from? What about his specification of three registers? Surely Garcia was referring to the untrained singer -- or, perhaps students -- when he structured his system. Are Appelman's and Vennard's suggestions inferior to Garcia's? Surely these gentlemen are distinguished scholars and pedagogists. Why, then, are the labels and ranges they use different from Garcia's? To confuse things yet a little more, Hollien is known to have focused his efforts primarily upon non-singers or speakers -- but, is it possible that his estimates and terms are valid for singers also? There are many other distinguished scholars and scientists who have attempted to develop structures such as those seen in Figure 1. Add the work of Sundberg, Bellussi, Titze, Large, Schoenhard and others to the figure and the picture becomes even more scrambled.

So, what is the answer to this problem of identifying voice registers? Before listing the proposals made by the committee, a rather startling position (perhaps one that should be articulated separately) must be presented. This opinion surfaced when the committee members began consideration of the "label" issue and commenced evaluating the sources of those labels used most commonly.

Although the term "modal" may be overtaking them, the two labels that appear more often than any others (in vocal music anyway) are "chest" and

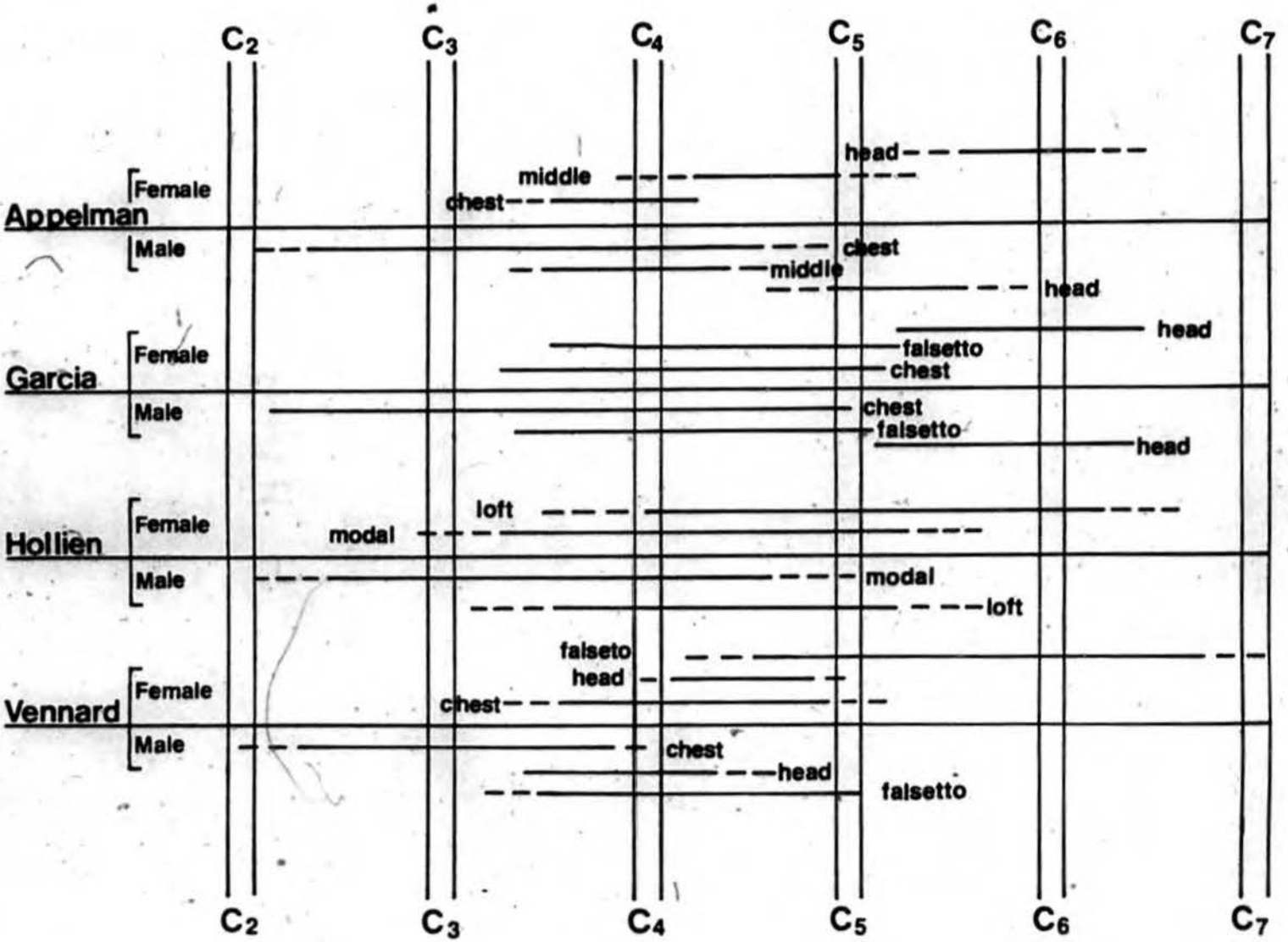

C2
C3
C4
C5
C6
C7
Appelman
Female
middle
chest
head
Male
chest
middle
head
Garcia
Female
head
falsetto
chest
Male
chest
falsetto
head
Hollien
Female
loft
modal
Male
modal
loft
Vennard
Female
falseto
head
chest
Male
chest
head
falsetto
C2
C3
C4
C5
C6
C7

FIGURE 1.

"head" -- with chest referring to the lower register and head for the higher (if, indeed, there is only one higher register). As we all know, these terms are based upon singers sensations -- i.e., on the mechanical response of the bodies of singers to tones sung at certain frequencies or within certain frequency ranges. The generic connotation of these terms is such that they suggest certain relationships -- specifically that the timbre for the lower register resides in the chest; that the quality and/or mechanism of the upper register results from activation of the vibratory properties of the sinuses and/or cavities in the head or "mask." Once these entities are considered physiologically, and/or mechanically, their use as definitions for vocal registers can be shown to be illogical if not absurd. Lower register phonation results from operation of the larynx -- not from sympathetic vibrations of the chest to low frequency sung tones. The source of the upper register again is the larynx -- not sympathetic vibrations (to higher sung frequencies) in the face. In short, while the sensations felt by singers, of course, are valid sensations (indeed, even the non-singer can experience them), they have nothing to do with vocal registers! It is only a chance relationship that brings the two into juxtaposition; that is, voice registers are frequency related and so are the sites of the sympathetically vibrating, sensation producing structures of the torso and head. What a classic case of misdirection this is! For three hundred years, correlary but independent operations have been viewed as related -- even casual -- yet they were not and are not. Worst yet, this seeming relationship has led scholar after scholar astray -- in the past anyway. Not so this committee; please note the following.

As stated, the majority of this committee rejects the so called "old terms." Sundberg suggests that he would be most comfortable if the registers were numbered; Wendler agrees. He further suggests that the values we used in our discussions might be appropriate. They were:

1. the very lowest of registers, probably used only in speaking (old terms: pulse, vocal fry, creak),

2. that (low) register, which is used for most speaking and singing (old terms: modal, chest, normal, heavy),

3. a high register used primarily in singing (old terms: falsetto, light, head),

4. a very high register usually found only in some women and children and not particularly relevant to singing (old terms: flute, whistle).

In addition, we referred to yet another "register" as "2A" and defined it as that "register" which is described by many voice teachers as in the middle of the frequency range; as one constituting an important problem in the training of many singers (old terms: head, mid, middle, upper). As is obvious from the research literature, this register is rather difficult to demonstrate empirically but it receives so much (subjective) support, it cannot be ignored.

An alternate approach to the suggested one would be to use, as labels, a pair of terms that kept creeping into virtually every dialogue we had: i.e., heavy, light (Vennard, Naidich, Schoenhard) or a second set: lower,

upper (relates registers to fundamental frequency). Few, if any of the committee appeared uncomfortable with either of these pairs of terms. Moreover, they do incorporate the advantage of functionally rejecting the middle register (they are laryngeally oriented) -- and they lent themselves to concepts relevant to the concealment of register effects. In any case, the committee (with few exceptions) appeared to favor new terms, generic terms, those that are clear and easy to understand (Koster, Miller).

In Conclusion

A final issue must be considered. Whereas logic, reasoned opinion and the available research tends to support the five positions taken by the committee, it must be remembered that, even if they were to be adopted universally, these positions cn serve only to structure the concept of voice registers and to defuse several long-standing controversies. They patently do not provide the information necessary to identify and operationally describe all potential voice registers, to define the boundaries and characteristics of these phenomena, to explain their origins, sources and functions or to identify procedures useful in their modification or elimination. The materials and concepts provided by this committee simply result in a model that can be tested.

Individuals such as Titze, Sundberg, Bellussi, Hollien and Wendler all have summarized, reviewed and/or interpreted available evidence in attempts to identify and explain vocal registers. The model articulated in this report should assist them, and others, in testing their approaches. Indeed, as nearly everyone on the committee has affirmed, the structural organization established must be testable on the basis of those perceptual, acoustic, physiologic, kinesthetic, aerodynamic and neurological approaches available. We leave many issues to be analyzed and understood. However, we hope that the work of this committee constitutes a reasonable initiative -- one that leads to the solution of the problem. We invite relevant input.

THAT GOLDEN VOICE -- TALENT OR TRAINING?

Harry Hollien

The remarks to follow will be directed almost exclusively to the singing teacher and acting coach. For purposes of this paper, I will combine these several related professional groups into a single entity and refer to them all as "Voice Teachers." Please note also that, since these Symposia are focused on the care of the professional voice, the terminal point of our interest must be the performer. By performer, I refer primarily to the artist: the singer; the actor. Figure 1 provides this relationship. Note that the goals for all the persons portrayed in the figure are depicted in its top third -- i.e., the performers and their performances. Note also the centrality of the voice teacher to this model -- and to the many professionals who interface with them. Incidently, we must remember that many of these other professionals are, in-and-of themselves, "performers." Indeed, the scientists, the physicians, the composers, the conductors each have an area within which they become the "Principal". However, it must be stressed that -- in relationship to the model seen in Figure 1 and the issues under discussion today -- all of these other individuals simply are service personnel . That is, they support the activity of the voice teacher and his or her efforts on behalf of the performer. Hence, they are placed in a position that is at once basic, but supportive, to the teacher. More about these relationships later.

The question is asked: Is that "golden voice" -- that premier singer, that Oscar-winning actor -- the product primarily of the native talents and motivations of the artist or primarily of the modifications to the system (if you can accept the artist as an operating -- if complex -- "system") accomplished by the efforts of the voice teacher? Both positions can be argued. For example, some individuals have been known to contend that top-flight talent only rarely (perhaps very rarely) will be realized without the all-encompassing efforts of that advisor-mentor-tutor-friend: the voice teacher. It also is argued that about the only function that can be assigned to the voice teacher is that of temporary guide; that they only aid the performer and sort of aim them in the correct direction. People who take this position stress that talent will overcome all odds. Which of these positions is correct -- or does the truth lie somewhere in between?

Part of the answer to this question might be revealed by examining the attitudes and opinions about voice teachers held/exhibited by the people with whom these professionals interface. It appears that it might be useful also to examine the attitudes and opinions voice teachers hold about one another -- and about their profession; however, approaches of the second type can become rather personal and will be minimized in the present paper. In any case, the remarks below should be viewed from the following perspectives. First, I must confess that, no matter how much I might want to be one, I am not now and never have been an accomplished singer; however, I have listened to many singers both professionally and critically. Second, I have spent some years now working with, supporting and studying the voice teacher . Third, and perhaps most important, I have been greatly privileged

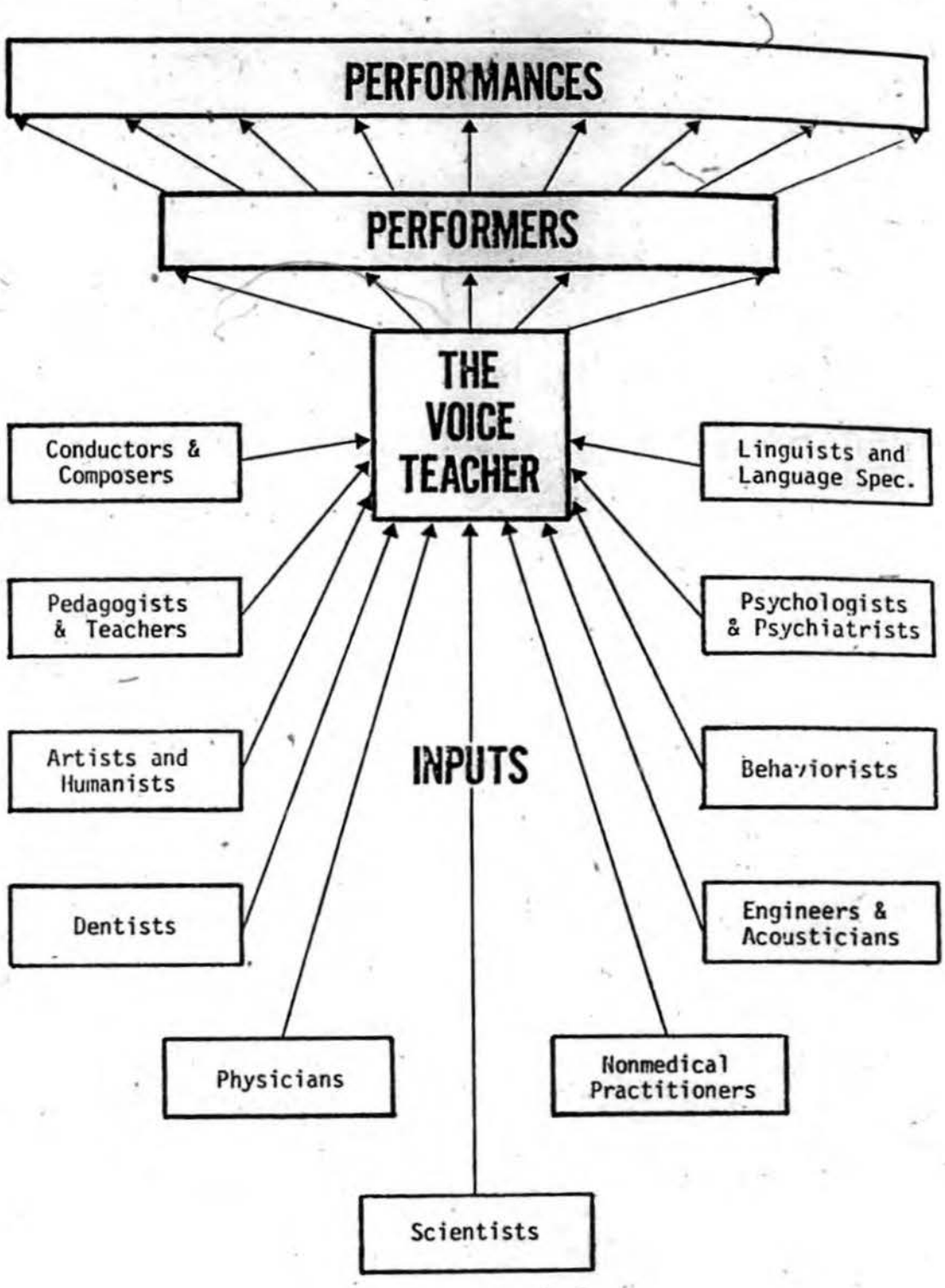

PERFORMANCES
PERFORMERS
THE VOICE TEACHER
Conductors & Composers
Pedagogists & Teachers
Artists and Humanists
Dentists
Linguists and Language Spec.
Psychologists & Psychiatrists
Behaviorists
Engineers & Acousticians
INPUTS
Physicians
Nonmedical Practitioners
Scientists

Figure 1

to carry out research in collaboration with over a half-dozen leading voice teachers -- and, happily, we have been able to jointly publish a number of these studies. Fourth, as with the voice teachers, I have spent a substantial portion of my life developing talent. In many ways, budding scientists are much like student singers or young actors. Finally, I do indeed carry out research on voice (including that on the singing voice) so I am not naive about many of the issues involved in the processes being discussed at this Symposium. Thus, while not a voice teacher or performer, I submit that a view from my side of the room may be useful.

Angel or Devil?

These are some of the attitudes that I have observed. Some successful performers simply idolize their teachers; occasionally to excess. Other performers are quite grateful to their teacher or teachers, and are both vocal and intelligent in their statements about them. They maintain that it is a balance between talent and training that leads to the very best results. Yet another subgroup (among the successful artists) appears to number among its boundaries, those individuals who are not particularly grateful to their teachers but who seem to be quite dependent upon them -- and perhaps unnaturally so. Finally, a few performers are quite negative about their teacher or teachers, denying that these individuals made any relevant contribution to their success. Who among these successful artists are correct in their judgements? Some determination of the accuracy of these statements is required as the opinions voiced materially impact upon the main question being considered in this dialog.

Before proceeding, however, the opinions of still other groups must be considered. A failed performer or "nonartist" can be most critical of voice teachers. It appears that the best these individuals can say about the teachers of interest is that they "sometimes" aid the student performer, at least initially, by useful introductions or occasional advice. At worst, the teacher is thought to frustrate (and even block) talent and is said to have "ruined" great voices (or great actors). Obviously, statements by individuals who have not achieved a reasonable measure of success must be given little credence. However, they cannot be totally ignored. That is, while the opinions of failed performers obviously are expressions of anger/frustration, they also can disguise certain unresolved issues of a totally different nature.

It is not members of other professions who are most critical of voice teachers. Rather, it is the voice teachers themselves who are their greatest censors. Of course, certain members of other disciplines do not understand the nature of this field or not to understand the approaches and/or terminology employed by the voice teacher. From this point of view, however, most of the attitudes exhibited by performers actually result from blocks in communication or from the conflicts they have in relationships or events outside of their work with the voice. In any case, it appears that the severest critic of a voice teacher is another voice teacher. While this problem tends to be [illegible] competition among these professionals, how can [illegible] explanation to the statement made at this very [illegible] voice teacher? She said (in effect) that she was [illegible] apologizing for that myriad of incompetent voice teachers at [illegible] the field. Another example: I remember, sitting in the audience [illegible] co-panelist -- a voice teacher himself -- assured a large audience [illegible] teachers that they were at the workshop he was addressing not because they

all were "failures"! He went on to indicate that he could make this statement because they all had wanted to be star performers but, failing in that ambition, had settled for the role of teacher. Undoubtedly this panelist was correct about some of his audience but certainly not all of it! Ironically, the most penetrating accusation he made was implied in nature rather stated. It was that these teachers were by-and-large ill-prepared for their profession -- primarily because they had prepared for another (that of being a performer). But... how much closer are we to answering our primary question by a review of the good press or bad press directed at the profession? In reality, we are closing in on it as some of the positions and relationships articulated above have a bearing at least upon why an answer does not become readily obvious when the question is asked: that golden voice -- is it talent or training?

The Function of a Voice Teacher

Perhaps it will be possible to struggle toward a reasonable answer to the stated question if we begin by attempting to understand the functions of a voice teacher -- or the skills/talents an individual in this profession must posses. Conceivably, all a voice teacher needs to be is a kindly person who supports the student with words of encouragement. Or, given a different type of personality, mayhaps the voice teacher simply needs to be the student's motivator or disciplinarian! Aids of these types certainly would be appreciated by many budding performers. But, if it is true that the voice teacher is naught but a kind of adjunct to the student or performer, then the talent/training question must be answered on the side of "talent."

On the other hand, possibly there are skills and gifts, beyond those suggested above, that must be exhibited by the voice teacher. What might they be? It is my opinion that many of them are articulated by Figure 2. A brief review of these attributes would appear to be in order.

First, the voice teacher indeed must be a friend to the student or performer. Talent is a fragile entity and must be nurtured into maturity by the ministrations of individuals who are dedicated to this task. It is important that the voice teacher be the student's "friend" even if to do so means applying behaviors that are not always understood -- or even appreciated. However, to function in this role, (and to be a competent instructor), the voice teacher must be a reasonably good practicing psychologist with both technical knowledge about personality and insightful perspectives relative to the elements which underlie specific behaviors -- especially negative ones. Indeed, it is not enough to be well-meaning in his regard as behavior modification is not always a positive and maturing force; it can be dangerous if mishandled. The voice teacher must have specific training in applied psychology -- and must be intuitive and insightful about personality, learning and overt behaviors of all types. Some examples will be employed to illustrate this issue later in the paper.

Second is teaching. The voice teacher must have an interest in, enthusiasm for and specific training in teaching. That is, the voice teacher must be well grounded in sound teaching techniques and a individual who drifts into this profession without obtaining formal training in teaching does his or her students a distinct disservice. Moreover, it perhaps is just as important that he or she possess a high level of patience as we all know that to be associated with talent can be quite taxing. Indeed, the patience shown by some voice teachers of my acquaintance is

nothing short of miraculous -- at least, they demonstrate levels of self discipline not customarily required of like professionals. Voice teachers also must possess specialized teaching techniques (such as imagery) that are not among the usual complement of ordinary teachers; they must possess the talent to travel beyond the traditional; they must posses the facility to draw out those gifts oft hidden in the student. As is well known, all students do not process information in the same manner. The voice teacher, then, needs a repetoire extensive enough to convey the meaning/processes intended. However, these seemingly "special or extraordinary" gifts possessed by some voice teachers have led to what might be identified as cultism. How often does the outsider hear: "Oh, the Cleetfluster method is the only one that can lead to the development of a great singer." "Certainly, Gnarly Fugwump's approach is superior to anyone elses." "You can't expect to be a great singer (actor) unless you practice rolfing." Is not such cultism counter-productive? We all know that there is no single way -- no "perfect' way -- to do anything. While we all should learn from others in any and all ways possible, elevation of any individual to the rank of "guru" does both the teacher and the field a disservice. Worst yet, in some cases it may prevent members of related fields from identifying in a positive manner to yours.

The voice teacher must be an accomplished musician. To be less, subverts the entire profession. Nor is the training and talent necessary to become a practicing musician trivial. The ability to apply the necessary musicology to the task of performer development is twofold. An initial requirement is that the voice teacher know 1) a substantial number of scores and compositions and 2) many different kinds of music from pop-to-western-to-operatic. Indeed, the types-kinds-styles of music about which the voice teacher needs to develop knowledge -- and competency -- is extensive in the extreme. Second, the voice teacher must be able to sing reasonably well and/or play instruments other than the voice. Perhaps more important, it is required that he or she develop a critical music sense, one that permits him to carry out the all-important (but excrutiatingly fine) student evaluations. Tangential talent/training in languages and the theater (and theater lore) also are required of the voice teacher. Certainly, some of these skills are acquired via experience but most demand intensive study -- formal or personal.

To teach, to mold, to motivate the aspiring singer or actor (or the performer who needs some type of rehabilitation) also requires that the voice teacher have a good functioning knowledge of acoustics (including room acoustics, theater acoustics, acoustics of the vocal tract) plus an intimate knowledge of human physiology. Lack of fundamental understanding about physiology and acoustics can lead to abuse of the "system" by the performer. To be specific, no voice teacher wants to "ruin" a voice -- or voices. One of the best ways to avoid this danger is to employ knowledge about human physiology and the internal/external acoustics associated with singing and speaking in ways that help the student avoid stressing their mechanism. Just as important as information about each of these areas is the knowledge about how they interface with each other. Indeed, it is pointless to attempt to elicit some phonatory production of a particular type or level, if the singer simply cannot perform in the manner desired. It is just as important to understand an individual's limitations as it is to be aware of his/her potential.

A parallel issue concerns the health of the student or pupil. Not only must the voice teacher be a fair "country" diagnostician with respect to the

technical problems related to singing, he or she also must possess sensitive antenna relative to each student's potential medical and/or psychological problems. Of course, humans do not come equipped with this type of sensitivity; rather it must be learned. None-the-less, recognition of the early warning signs of voice disorders (for example) or any medical problem is necessary if the voice teacher is to appropriately meet his or her responsibilities.

Finally, the question must be asked: how can a voice teacher possibly be successful if he or she does not possess exceptionally good, and highly trained, hearing? The teacher must be able to hear subtle differences among productions; must be able to store, process and match complex signals. While little formal training is available in basic neurosensory function, this ability, nonetheless, constitutes the capstone relative to the effective functioning of the voice teacher. Moreover, such talent (i.e., the extraordinary processing of heard sounds) would appear to provide a foci for all of the other talents and skills -- both native and acquired -- exhibited by the voice teacher.

A Perspective

To summarize, the talents and developed skills that must be exhibited by even an average voice teacher are remarkable in their extent (see again Figure 2); undoubtedly the list is even longer as a number of items surely have been omitted. Further, I will wager that the majority of the voice teachers at this Symposium are not consciously aware of the magnitude of this list. Yet most, if not all, of you possess this awesome set of skills and talents! As an aside to this position, it also must be pointed out that more attention must be paid to the structuring and/or development of criteria necessary for the enlightened selection of new voice teachers and the organization of training programs designed to provide them with appropriate skills. Perhaps the list seen in Figure 2 could be utilized as a partial basis for educational programs of that type.

It now should be obvious that these remarks bear directly upon the talent/training question cited in the title. That is, if voice teachers play only a minimal role in the development of successful performers, why do they have to exhibit such an extensive array of talents and proficiencies themselves? More to the point, cannot the answer to the talent/training question be found articulated by Figure 2? Of course, those characteristics or talents necessary for the beginner to evolve eventually into an accomplished performer must be present in the student; however, the promise of these gifts can be realized only if they are released, nurtured and developed by the teacher. Just as the premier singer or topflight actor must have talent sufficient for accomplishment, so must the voice teacher effectively apply his or her substantial talents if the performer is to be successful. In short, it is possible that the question of talent or training can be answered by the single word: BOTH?

There are, of course, many other proofs which can serve to support the cited position relevant to voice teachers. The fact that an incredible number of music/acting conservatories, schools, studios, programs, etc. exist throughout the world should be proof enough in-and-of itself. That is, if "talent will out", why the necessity for so many and varied programs -- and for so many voice teachers? Another proof lies in the interface of the voice teacher with the many related professions seen in Figure 2. This centrality suggests both the complexity of talent development and the key

role played in the process by the voice teacher. Even when the performer is attended to (directly) by one of the cited specialists, the teacher probably was the one who first identified the problem and/or made the referral. And... what a vast array of specialists there are with whom the voice teacher must interact. The singer does not -- and probably should not -- have primary interface with these individuals. Rather, the voice teacher must be the person who mediates these processes, buffers the performer from other professionals and interprets what is known to the singers and actors in terms that are useful to them.

The Teacher's Responsibilities

It would appear that some specifics now are in order. As has been stated, it has been demonstrated that the skills and talents of singing teachers must be quite extensive. Further, the teacher must be a stable interface between the performer on the one hand and the support professional on the other -- and the stress here should be on the word stable. Moreover, the voice teacher must be able to attract appropriate professionals, interest them in the problems of performers and then interpret and/or apply the gained information. What an awesome task! Even the more eminent and successful teachers from among your group have struggled long and hard to accumulate the knowledge and skills in those areas that they must possess and apply. Moreover, even those of you who are senior, successful and prominent can benefit from an upgrading of your intellectual repetoire. Three examples should serve to illustrate the type of problems the voice teacher can face and, perhaps, approaches that can be useful in mitigating them. While these problems/challenges can take any of several forms, three among the more prominent are: 1) the problem of oversimplification, 2) the problem of assimilating new data and 3) the missing information problem. I will attempt to use a practical example to illustrate each of them.

The Oversimplification Issue

Voice teachers sometimes are forced to deal with a complex problem in an inappropriately simple manner. The cause of the problem may be rooted in the training they receive, in that appropriate data are not available, as a result of tradition or due to any number of reasons. The end result is that the voice teacher finds himself or herself approaching the issue as though it were a simple entity that had a simple solution -- yet with an uneasiness that does not always reach the concious level. The sensible approach, of course, is to challenge each and every concept one holds. But what a tedious, time consuming and inefficient procedure? Perhaps a better approach would be to continually scan the literature for references to those issues that cause you even mild discomfort.

The following example may serve to illustrate just how the oversimplifications of a complex issue can cause the voice teacher some difficulty. Incedently, I ask your indulgence with respect to some of the terms I use as I am aware that none of my definitions/labels will please all of you. The issue: I am sure that we all will agree that good vocal projection or "focus" is of substantial consequence to a performer. Indeed, to be heard is of first importance to the singer; to the actor. In turn, it would appear that the singer's formant (or "ring") contributes materially to "focus". But... what formant is this to which we refer? Is there actually such an entity as a "singer's formant"? And... if so, where is it; do all

singers exhibit it under all conditions? This concept -- and its consequences -- seems simple, yet the questions that could be asked about it appear endless. Even more to the point is that many of you accept the presence of this, the "singer's formant" and will attempt to train students to produce it. Yet a controversy about ring has been raging for years. Still more important, a corpus of relevant information is slowly being built as a result of observations/research carried out by phoneticians, voice scientists, engineers and physicians. Indeed, it is difficult to read any of Sundberg's analyses (of ring) and continue to maintain that singer's formant is a simple, single event -- of an uncomplicated and uncomplex nature. To understand the extent of this problem, please refer to Figure 3, it provides information about the presence and extent of a singer's formant when several different classes of women produce a variety of phonations. Here it can be seen that accomplished singers exhibit somewhat more ring (i.e., energy in the frequency region around 3000 Hz) than do student singers, and that both of those groups exhibit more evidence of the singer's formant than do nonsinger professional musicians and just ordinary people. But, these data show relationships that are even more important than those cited. The primary one appears obvious. When vocal intensity is increased, so is the acoustic presence of ring (and its percept also). Now consider the data shown in Figure 4. Here the subjects are men and the experimental variable is sung frequency level. Note that a hierarchy again exists among the singers, students, musicians and controls. But, in this case, see how the acoustic presence of the singer's formant covaries with the fundamental frequency being sung.

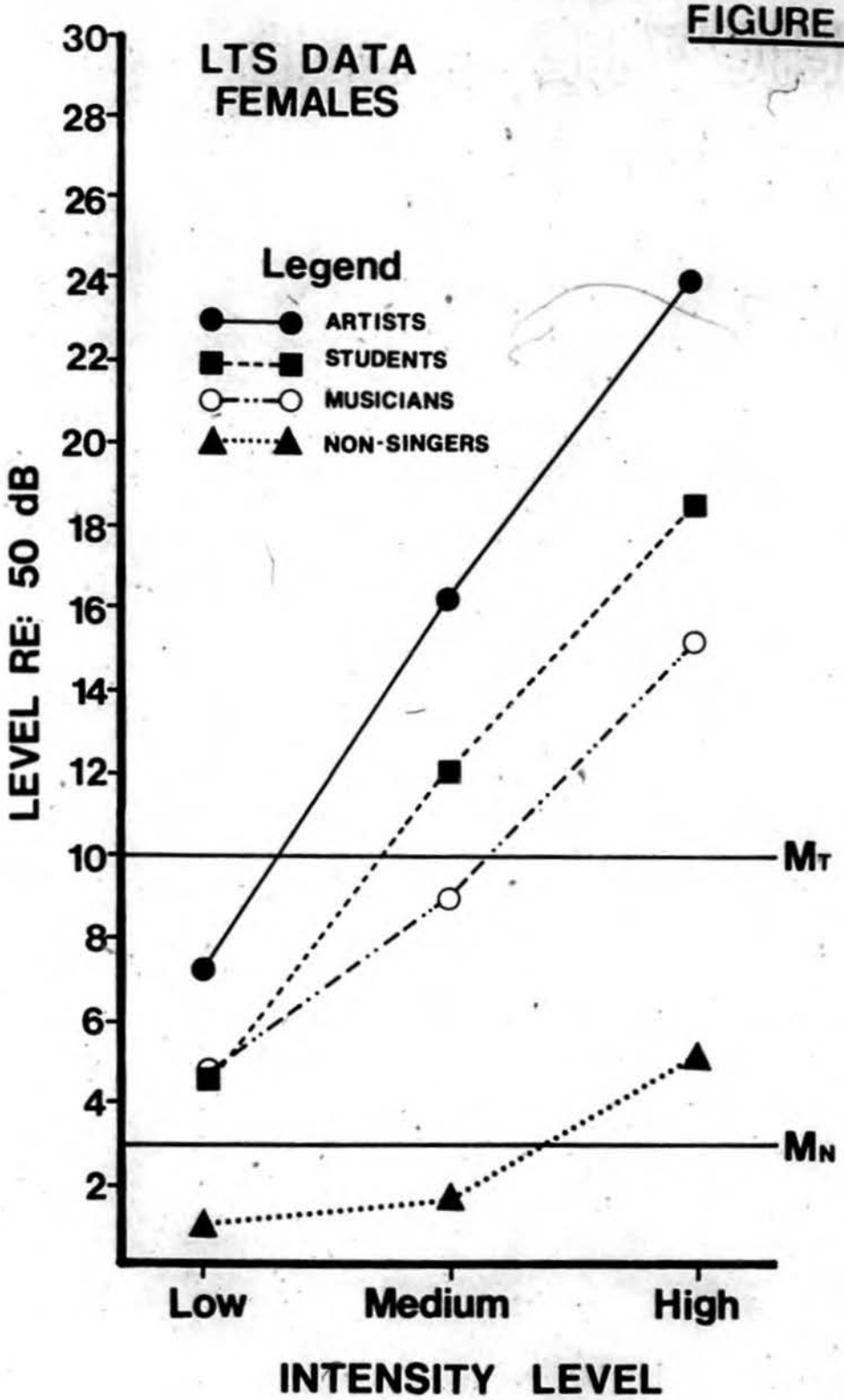
Are these data of any relevance to the teaching of singing and/or acting? Of course they are! How can one teach a behavior without a fundamental understanding of its nature or function? Consider the present case. Here, the understanding of the complexity of ring involves comprehension of a substantial number of relationships (even before the teacher attempts its manipulation). Obviously, a voice teacher has to first bring an awareness of the problem to concious level. Then, he or she must find, interpret and apply data about the issue. In order to do so, a functional appreciation of the relevant scholarly and/or scientific processes is necessary. Indeed, those voice teachers who reject such information out-of-hand probably would not be able to locate the relevant information in the first place -- much less understand and interpret it.

But how can you make a reasonable decision when controversy exists? There are many efficient approaches. For example, if you find that two authors disagree about a subject of interest to you, you can apply a variety of tests. Do both of them provide data to back their respective [illegible] -- or does only one of them do so -- or do neither? Which of them [illegible] in their arguements; which carefully and logically builds [illegible] Are the points presented consistant with constructs you [illegible] In any case, it is possible to make enlightened decisions [illegible] they can be rewarding. However, your success here [illegible] willingness to critically examine those old, simple and [illegible] at least the ones that leave you with a disquieting itch.

The Problem of Accepting New Data

Voice teachers sometimes are faced with changing [illegible] challenge even their strongest and best developed structures. [illegible] or postulates can appear to contradict some of your most [illegible]

FIGURE 3


LTS DATA
FEMALES
Legend
ARTISTS
STUDENTS
MUSICIANS
NON-SINGERS
LEVEL RE: 50 dB
30
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26
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22
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18
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6
4
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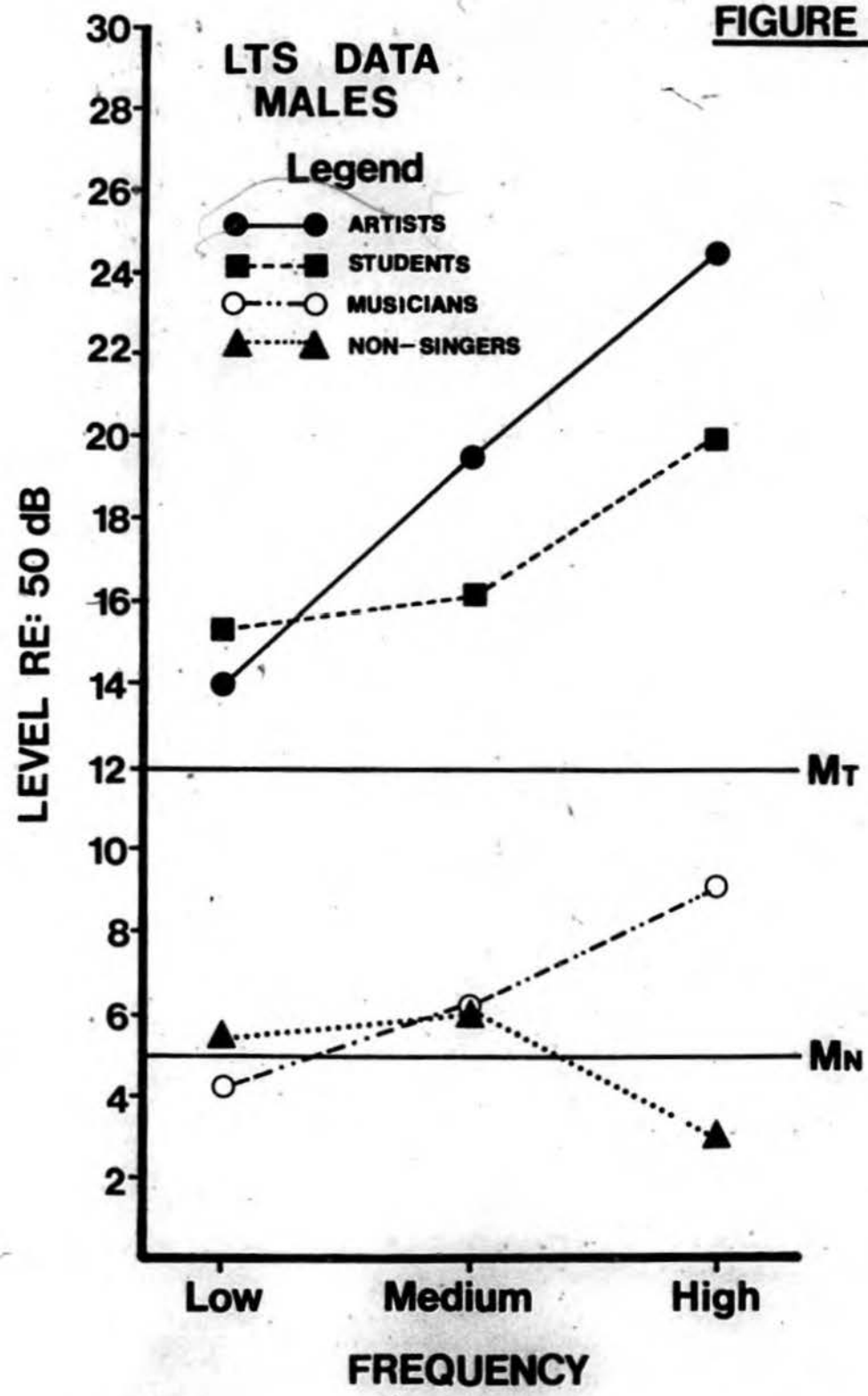
MT
MN
Low
Medium
High
INTENSITY LEVEL

FIGURE 4


LTS DATA
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High
FREQUENCY

institutions; they can be concepts about which you are not uneasy or even concerned. How do you deal with these challenges?

In order to focus on this problem, let us first consider vocal registers. Of course, some authors (even some scientists) will claim that vocal registers simply do not exist; most of us will concede that they do, however. Moreover, it took many years of inquiry, research and debate before even the most basic principles about voice registers began to take shape. Indeed, most of us will now agree that:

1) Voice registers exist and they do so in almost every physiologically normal human being.

2) Voice registers can be identified quite easily in the speaking voice.

3) Voice registers can be extensively modified or manipulated. That is, their effects can be mitigated; perhaps they even can be removed from the phonatory product of the singer.

4) Even accomplished singers can revert to register production if asked to do so.

Further insights are being developed about the actual physiological/acoustical attributes of voice registers -- about what they sound like, how they can be modified and the relative contributions (to a register) made by f0, spectral energy and temporal patterning. One even might think that enough is known about these phenomena that there will be unanimity among voice teachers relative to their nature and extent -- and about effective modification techniques. Such appears not to be the case; rather, there still is extensive controversy about this entity -- and labels used to identify it.

It must be conceded, of course, that there yet is much to learn about voice registers. How many are there? Are speaker's and singer's registers actually different? Do singers have a "middle" register? Are all registers intimately related to phonatory activity -- or, at least, some sort of a laryngeal event? Does the excessive use of register breaks damage the voice? And what about those labels; do they aid, distract or even mislead? The terms "chest" and "head" are good examples of this final case. These terms have a long history; it is well known that they are based upon singer's sensations. But is this the best way to classify them? Of course not. Vocal registers occur in the larynx, not in the chest or head. It is just an accident that the lower frequencies of the modal register vibrate the large cavity of the chest -- and the higher tones of the upper register, the smaller cavities of the head or mask. Of course, the singer's sensations are valid ones. It is just that they have nothing to do with vocal registers -- and, hence, by their nature, the terms "chest" and "head" are not just inappropriate, they actually are misleading. Ironically, they have served to complicate the controversy about registers that has been going on now for nearly 300 years.

In any case, the knowledge needed by the voice teacher to permit him or her to study the phenomena directly (research) or indirectly (discussion; reading) in relationship to their field is substantial. Manipulation of these phenomena (i.e., teaching) requires extensive knowledge also. In this regard, I submit that casual studio or conservatory discussions about a

given issue -- or pronouncements by a individual not conversent with appropriate information -- are inadequate to the task. Nor are musicology classes much more useful unless they are backstopped by fundamental courses which include acoustics, physiology, neurology, etc.. Herein lies the challenge: the centrality of voice teachers requires that they interface with, and synthesize, all the performing arts. To do so requires extensive formal training in, or the selfstudy of, the physical, biological, behavioral and medical sciences. Such is the case, anyway, if the changing concepts about vocal registers are to be understood and useful processes developed.

The Missing Concepts Problem

The voice teacher has to deal with yet another species of problems -- ones that can take a variety of forms. Moreover, they can be particularly devestating to the teacher as he or she may not be aware of their nature at all. Such are the missing information classes of problems; an illustration follows.

There is little question but that the voice teacher has a more intimate relationship with his or her students than does the coach with his athletes, the sergeant with his recruits, the professor with his graduate assistants. The relationship in this case probably more closely parallels that of a psychiatrist and his patients. In any case, the students of voice teachers have been known (and often) to exhibit very positive behaviours toward them -- included are expressions of love (even physical love), gratitude (sometimes intensely so), admiration, support, friendship, tenderness and so on. These responses can take other forms also; for example, the student can be quite demanding and exhibit behaviors such as: dependency, idolization, jealousness, suspiciousness and so on. The intensity of the relationship (whatever it is) may wax and wane from a healthy one to one that can be rather suffocating to the teacher. Suffice to say that the voice teacher and the student performer do not just have an instructor-pupil relationship; they are friends, colleagues, compatriots.

The change in this relationship, if and when it comes (and it often does) may be gradual or abrupt. It may be signaled by a great or small success or failure on the part of the student. Further, the change in the relationship may take a number of forms. The student may increase his dependency to unsustainable levels; the demands on the teacher may increase to a point where they are intolerable: "You must fly to Vienna to be with me on opening night; I cannot go on without you." "I know you have Margarette there for a lesson but I must talk to you right now." "I have failed and you must do something about it." In some instances, the teacher is flattered by these demands. Do they not demonstrate the intensity of the relationship? Do they not prove that, without such training, this student could not have succeeded?

In yet other instances, the tone of the demands is much more negative. "I am failing because you have failed me." "You no longer understand my problems." "You prefer your other students to me." Statements such as these usually are accompanied by demands -- often unacceptable, undeliverable ones. In still other instances the student simply drifts away, or he or she may become openly hostile. In any event, the voice teacher ultimately feels hurt, abused, confused and (even) self-recriminatory. They may vow: "I'll never go through this again." Alas, they often soon enter into similar relationships. Why do they do so?

Simply because there are mechanisms at work that are not understood by the voice teacher (missing concepts). They simply feel inadequate -- or attribute the situation to the "well known" artistic temperment.

Yet the cited mecnanisms can be easily explained. Ask any psychiatrist about them. Specifically, they are called positive transference (in the first case) and negative transference (in the second). Just knowing about transference, how and why it operates as it does, should be comforting in-and-of-itself. No longer must the voice teacher live with the pain and guilt resulting from relationships of the types described above. But, the appeasement of discomfort is not enough. A more formal understanding of those mechanisms that underlie the transference process will permit voice teachers to stabilize their own relationships/behaviors and assist their students in avoiding manic/depressive-like swings in their emotions -- especially ones that could result from the cited process. In any case, the transferece process is reasonably well understood and can be dealt with effectively by the knowledgable teacher.

And what is the "moral" imbedded in, or implied by, this third illustration? First, it is suggested that, the better prepared (in all areas) the voice teacher is, the less likely it is that unrecognized problems will degrade their effectiveness. Specifically, formal training in those areas that underlie (or are relevant to) the teaching activities of the voice teacher are a must. That is, aspiring voice teachers should train in those areas of medicine, engineering, psychology and phonetics which can be used to support, expand and supplement those they complete in vocal music, theory, composition, theater and so on.

Conclusions

The question was asked "That Golden Voice -- Is It Talent or Training?" The answer is clear. If the potential for greatness is to be realized, the performer must be both singularly gifted and exposed to high quality -- and sustained -- education. The purveyor of such training is the voice teacher. In turn, the voice teacher also must be talented, but more importantly he or she must be fully trained and qualified in a number of important and relevant areas -- i.e., areas in addition to the traditional. In order to enhance the process, I would recommend that voice teachers take the following actions:

1) Exert pressure on individuals who lead their training programs to expand and upgrade them.
2) Become more aware of their centrality to the entire performer-performance process.
3) Organize their resources and consultants in such a manner that gaps in their background (if any) will be reduced or removed.
4) Aid the less fortunate teacher rather than just criticise.
5) Continue to develop that talent.

In closing, let me reiterate the fundamental points of this paper, viz. that the voice teacher is central to the entire performer-performance structure and that he or she must be able to interface with divergent specialist groups in order to motivate them to aid the performer. However, the centrality of the voice teacher is, at once, a reward and a curse. Their ability to develop and control performers and ultimately the performance is dependent upon their:

1. Talent
2. Stability and patience
3. Motivation and willingness to prepare others for prominence
4. Understanding of the arts and fellow artists
5. Formal training in a substantial number of fundamental disciplines.

Hence, they also must exhibit the ability to: 1) extract and apply the information gained from other disciplines, 2) foster (and then maintain) the interest of specialists from other disciplines, challenging them to carry out research relevant to the performing arts, 3) maintain an active review of new data and 4) interpret and apply such information in the teaching milieu.

The responsibilities placed on this segment of the teaching field are substantial. It is only by high levels of training and sustained motivation that the voice teacher can continually foster and enhance the capabilities of their many students. Thus, while the frustrations may be substantial, so are the rewards.

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ESTROGEN RECEPTORS IN THE HUMAN LARYNX: CLINICAL STUDY OF THE SINGING VOICE

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INTRODUCTION

There are conflicting reports in the literature regarding the effects of the menstrual cycle on vocal quality. Whitehead et al. (1974) reported measurable changes in vocal quality as measured by changes in spectral analysis in the period just before menses. Brown (1982) saw a lowering of the fundamental frequency in 3 out of 8 subjects. Case reports also suggest that both trained and untrained voices can become hoarse during the premenstrual portion of the cycle (Smith, 1962; Brodnitz, 1971). Conversely, Silverman and Zimmer (1978) reported that there was no significant measurable premenstrual hoarseness in young women with no vocal training. It is possible that the changes which occur are usually small, and might well be undetected in the majority of women who do not make great demands of their voices.

One possible physiologic cause for altered quality during the premenstrual period is the reduction in estrogen levels just before menses. Abramson et al. (1983) reported significant numbers of high affinity binding sites for 17B3 estradiol in human laryngeal biopsy samples. Narbaitz et al. (1980) and Aufdemorte et al. (1983) localized estrogen accumulation in fetal mice and adult baboons, respectively. They found significant distribution of labeled hormone in the nuclei of cells in vocal cord mesenchyme, laryngeal aditus and vocalis muscle, but little or no accumulation in epithelial cells. As early as 1961 it had been shown by Schiff and Burns that estrogen could affect the quality of the mesynchymal extracellular matrix which they called "ground substance." They suggested that lowered levels of estrogen cause a breakdown in mucopolysaccharides to smaller subunits, resulting in a shift of the sol-gel equilibrum to the sol-state. Altered metabolic activity by estrogen-sensitive laryngeal cells and changes in the quality of the extracellular matrix could have an effect on the quality of the voice.

We have investigated the possible changes in vocal quality of professional singers during the premenstrual period. In this study we report on the responses of over 120 trained singers to a detailed questionnaire dealing with their perceived vocal quality just before and during menses.

METHODS

Statistical information was obtained by a survey. Five hundred questionnaires were distributed to professional singers via doctors of singers, opera companies, music schools, and voice teachers in the United States and France. Data is based on the 126 questionnaires initially returned. An additional 26 responses from France, received after the statistical evaluations were completed, were evaluated separately and supported the data.

Singers were asked to indicate their age group, normal singing range, history of medication including birth control pill and hormones, age of onset of menstruation, experience with menstruation (whether no discomfort, slight or marked discomfort), current menstrual status (whether regular, irregular, in menopause, menopause completed, or pregnant) and, finally whether they associated a change in the quality and function of their singing voice with menstruation. At this point the questionnaire broke into three separate units: (1) for those with regular menstrual periods, (2) for those who were no longer menstruating, and (3) those who had been pregnant at any time.

In the section for women whose menstrual periods were regular, respondents were asked to identify descriptors that most clearly described their vocal function and quality during (1) vocal attack and (2) during sustained singing in the days just prior to and during menstruation. Twelve descriptors were given for vocal attack and 21 for sustained singing. Respondents were then given a chart of vocal ranges and were asked to indicate in what part or parts of their range the descriptors applied. They were also asked if there were specific notes where the changes in their voice appeared, and if there were any notes in their range which became unusable during the menstrual days. They were asked to indicate the number of days prior to menstruation when difficulty began and the days after the onset of the menses when the difficulty ceased and the voice returned to normal. They were asked to characterize the timing of the onset of these vocal difficulties (abrupt or gradual) and the timing of the return of the voice to normal. They were asked if they have to stop singing altogether at any time during the monthly cycle and if so when and why. The closing questions dealt with whether they had ever sung under a contract that released them from performing responsibilities during their period and, if so, where and the reasons for the release. Finally, they were asked for the degree to which menstruation had increased or decreased its effect on their singing as they had grown older.

The same set of questions was given to singers whose menstrual periods were not regular, with the additional question of whether the quality and function of their voice had improved or declined since menstrual periods had become irregular or ceased.

In the closing section which was to be answered by respondents who had been pregnant, the number of pregnancies was determined and whether the voice had changed (improved or declined) during the pregnancy and the quality of the voice during the trimesters of pregnancy. They were asked if more than one pregnancy had an additional effect on their singing and finally if they had ever suffered from postnatal depession and, if so, the effect on their singing voice.

Results were evaluated with a Large Sample Statistical test for comparing two binomial proportions, with α 0.05 level of significance.

RESULTS

The sample population provided an age distribution from 18 to 55+, with the 30-34 year old group the largest, and the 25-29 year old group the second largest. Singers were encouraged to comment in space provided. By the comments received, and the way in which the questionnaire was distributed we felt that the results represent trained singers, the majority of whom use their voices professionally or plan to do so.

The majority of respondents (78%) reported that they had noticed a change in the function of their singing voice, but only 33% of these felt that their voice had been affected to a marked degree. Voice alteration generally was first noticed 3 to 4 days before the onset of menses, and the voice returned to normal by day 5 of the new menstrual cycle. This corresponds to the same time period when estrogen levels abruptly drop to their monthly low and then, subsequent to menses, increase.

The effects of menses on voice range during vocal attack, as reported by the respondents, was quite clear. Problems of vocal attack occurred most frequently in the upper middle (52%) and high voice (40%) for regularly menstruating women, although no part of the range was unaffected. Women in menopause, conversely, reported that cessation of menstruation primarily affected the low (23%) and middle (38%) range. Less than 10% of the women in menopause reported a change in the upper middle or high range. The difference in these two populations in the upper middle and high range was statistically significant.

A similar result was found with sustained singing. The greatest effect of menses is felt in the upper middle and high range, and again there was a statistically significant difference between menstruating women and those in menopause. It is apparent that the menstrual cycle does affect specific portions of the trained singers range.

When we turn to women in menopause or past menopause the picture changes dramatically. Nearly one-third said that "everything about their singing was better," one-third said that their voice had stablized, and only one-third reported some difficulty on attack and sustained singing in the lower and middle registers. There are significant differences between menstruating women and those in menopause.

The majority of singers who had been pregnant said their singing improved during pregnancy. Sixty-two percent of the singers said their vocal quality was unchanged during the first trimester of pregnancy, 16% said it improved, and 22% said their quality declined, with morning sickness given as the chief reason for the decline. During the second trimester, 45% said their singing improved, 40% said it remained stable, and 15% said it declined. In the third trimester, 47% said their singing had improved, 26% said it remained stable, and 26% said the quality declined. It seemed clear from the responses we received that, if anything, the hormonal state of women during pregnancy is beneficial to their singing.

DISCUSSION

Detailed evaluation of the responses of a large number of trained singers strongly suggests that physiologic changes which occur during the menstrual cycle adversely affect the singing voice. Although the data we present is based on subjective reporting by our respondents, the population sample was large enough to be statistically valid, and the respondents were professionals who were highly attuned to even subtle changes in their voices. Moreover, our data is in agreement with the findings of Brown (1982) that 3 of the 8 women in his study showed a lowering of their fundamental frequency.

Our findings cannot simply be explained on the basis of estrogen levels. It is true that most women noticed a change in vocal quality just before menses, when estrogen levels are dropping. Several added the comment that they observed a similar transient decrease in vocal quality in the middle of their cycle, around the time of ovulation, and estrogen levels dip then as well. In addition, estrogen levels stay high during pregnancy and many respondents reported an improvement in their voices during pregnancy. However, a large fraction of the women in menopause also reported an improvement in their voices and estrogen levels are low during menopause. It well might be that the critical factor causing voice changes during menstruation is not the actual level of estrogen, but the constant changing of estrogen levels. Physiologic changes in the status of the larynx and pharynx in response to changing levels of estrogen might well be more difficult for a singer to adjust to than a more permanent change induced by either high levels of estrogen during pregnancy or low levels after menopause. The roller-coaster fluctuations of hormones may have more to do with women's vocal health than the levels of specific hormones at different points in the cycle.

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THE ELDERLY VOICE

PANEL DISCUSSION

Chairman: Carol N. Wilder, Ph.D.

Panelists: Albert Andrews, Jr., M.D. - Theodore D. Hanley, Ph.D. - Harry Hollien, Ph.D. - Beverley Johnson - Edward Mysak, Ph.D. - Robert McGlone, Ph.D. - Charles Vaughan, M.D.

Wilder: I would like to ask those members of the panel who did not present papers to speak first and to give us their insights.

Vaughan: A long time ago I knew enough not to volunteer, but unfortunately when this subject arose, I said as a physician I will get together what we know about the physical changes which go on in the larynx. I went to the library and I went through a MEDLAR search and this didn't turn up anything at all. I went to my friends in the school who know a lot about anatomy and they weren't able to tell me a very great amount, and in fact, each of them said to me "that's a very interesting concept, we ought to study it." As a consequence, I don't have an awful lot to tell you. I do have a couple of slides with which I can demonstrate a few things which we do know, but precisely what they mean necessarily, so far as what happens to the voice, is pure conjecture. It's probably all conjecture.

If we consider, for example, a coronal or cross section of the larynx, one sees the true and false vocal folds held within the cricoid cartilage and thyroid cartilage. If we look at a coronal section of an infant larynx and then compare it with that of an adult, we can see that there are indeed several changes which are present. One of the most striking things is here in the cartilages. Someone had mentioned ossification. The cartilage indeed does become ossified starting at about age twenty. Now that doesn't just happen overnight. It's a gradual ossification. Eventually the cartilage becomes far less elastic.

I can indeed conjecture what this might imply. For instance, this morning we were looking through one of those fiberoptic laryngoscopes and we were watching one young lady as she went up to her very uppermost pitch. What we saw was a very marked constriction of the inferior pharyngeal constrictors, and no one has mentioned those as influencing the larynx one way or the other. But, they do attach to this cricoid cartilage, and to the thyroid.

If you constrict those cartilages, you could or would pull the laryngeal cartilages together. And if you pull those cartilages together you are going to lengthen the vocal folds. We've already

mentioned the fact that lengthening the vocal fold increases the tension on it and that in turn increases pitch. As a consequence, when you're young and your cartilages are elastic, you may be able to do things like this, but as you get older and as your cartilages become ossified, perhaps you might not be able to use this particular method to reach your uppermost note. You then may say that your voice is deteriorating. But now remember, this is not fact, this is conjecture. This is, however, something we can think about.

There are other structures to be seen in a coronal section of a larynx. There is muscle. We know that there is a change in muscle with age. The muscle mass of a teenager is not anything like the muscle mass of a full grown adult. My own shoulders, for example, are bigger now than they were when I was in my best physical condition in high school and in college, largely through an increase in muscle mass. But then, as I get older, all of my muscle mass will begin to get smaller.

Dr. Hirano has made many comments about the covering of the endolarynx. This covering will change with many factors, including hormonal influences. There are mucous glands through the entire endolarynx and we know that we need mucous in order to lubricate the larynx. These glands are severely affected by aging and by hormone influence as well. There are then indeed a multitude of things which we know generally about and these all occur in the larynx with aging. But we do not know a great deal about the specific effects which they have on laryngeal physiology and on the singing voice.

In addition to the cartilage, the covering, the mucous glands, the muscle mass, there are also the vascular structures, the arteries and veins and there are nerves. We know that nerve conductivity remains basically the same throughout life. However, the central connections change considerably. A child learns, for example, very soon how to be specific about accomplishing a given motor act. We develop fine skills and our motor coordination improves throughout youth. This appears to reach its maximum at about young adulthood.

This relates to the fact that most athletes in areas which require fine motor coordination, hitting a baseball for instance, are best when they are young adults. Their muscle strength continues to increase up until middle age. You get stronger as you go on, but your coordination begins to deteriorate. This of course is why athletes do deteriorate. The laryngeal internal musculature requires very fine coordination and I would assume again, that this would continue to improve until early adulthood. There will also be some mental deterioration, which in turn gets me back to my original comment about my mental lapse in agreeing to comment on this subject in the first place.

Johnson: To me, in order to be a premiere singer, you must be a very highly skilled athlete. I do not believe that it is "normal" to sing the way opera singers and concert singers do. It is a very highly skilled act and you must work at it, not just occasionally, but all the time. Every muscle involved must be developed to the finest point possible. This means, in turn, constant supervision. I don't feel you can learn to sing by yourself and then go off and just sing.

You will see singers who get to about age forty or forty-five or some place in there and then the voices deteriorate. I don't think that is necessarily related exclusively to age. I think rather that it has to do with the way in which they've used those muscles. If they have used them improperly, they will deteriorate or get all out of shape and they then simply couldn't keep it up.

I am thinking about Giuseppe de Luca who sang very well into his seventies, and Rosa Ponselle is still singing every day even though she's reached eighty-five. Rosa Ponsells has a pianist come in and she sings every day. I'm told that her voice is really still quite beautiful. Lily Pons came back after having sung quite badly. She went off to the desert and supposedly quit singing. She got help, and she got a pianist and she worked every day and she came back, I think about five years ago, and she sang one of the most beautiful recitals. She was well into her seventies.

Then we have Birgit Nilsson, who started out singing very beautifully and after about a year or two the voice began to deteriorate. Her throat and neck hurt and everything was wrong and she said, "this is not for me." She went back to the farm just by herself. She vocalized and worked very carefully until it all "felt good." Those are her very words. It felt good. We all know that she's into her sixties and she's singing Isolde. She's doing all the great soprano roles again.

Mysak: In relation to changes in the spoken voice with increasing age, research I did in Indiana some years ago indicated that number of words per minute seemed to follow a general pattern. As I got into the increasingly older group, the words per minute slowed down. We had a nice peak in the middle years at about 150, then we went down to about 124 and even a 110 words per minute and less.

Phonation time ratio also seemed to follow the same general sort of curve. That is, in any unit of speech, if you measure the total time elapsed from beginning of phonation until completion, if you measure just the voiced time, not the paused time, that's a phonation time ratio. And it did seem, as one became older, there was more and more pause time.

Also, total speaking time was measured. The amount of voice which one makes at three or four years old (and we don't have any really solid data on this), that is the total amount of voicing time which one provides, would also show a slow reduction over the passage of decades. There would be less total voicing.

I am still impressed with that possible overall pattern. There may well be an evolution of involution mode or formula which might hold up when it comes to voicing.

I was also impressed with Mrs. Johnson's comment that if you stayed in good vocal shape that perhaps you might continue to be able to voice right down to your last breath, as it were. I like that thought. I'd like to feel that the larynx could hold up unlike the other tissues, the hair, the skin, the teeth, to mention a few. Theoretically, I think we use the laryngeal joints more than we use any other body joints.

This brings me to another point: We apparently are stuck with our group means, and I think that we're going to have to start a bank for longitudinal study from the birth cry until the death rattle. I think we should follow people every year or possibly every six months or so. I think we may very well learn more when we begin to take individuals through these changes. Right now our vocal aging data is horizontal and we can only learn a limited amount from horizontal data. I think that someday someone will have to start a data bank and follow up a thousand pre-adolescents.

Another factor is the control and monitoring of the voice. I've been very interested in what I call the sensor system. We've been talking about changes in muscle and nerve and changes in the covering membranes. But I would think that some of the earliest changes were probably related to changes in control of the larynx, through the ear or through touch and movement feedback. Tactile or proprioceptive. I think the mechanism by itself probably could and probably ought to continue to function longer than it seems to.

I believe our problem is in the control of the mechanism, whether that be auditory or proprioceptive. It's one thing for example, for us to study how othersperceive vocal aging but it's also going to be interesting to see how people themselves perceive their own voices. Do we find younger people paying more attention to their voices? It's as if we had some sort of self-analysis of the voice going on.

I think the control mechanisms are still going to give us the earliest evidences of change in the voice in age. When the individual gets older and older he pays less and less attention to his vocal output. He pays less and less attention to how it comes out, how it sounds and this may very well be a reflection of certain of our neurophysiologic changes.

McGlone: I think it's been made abundantly clear that we know very little about what happens in the singing voice with advancing age.

We hear a good bit about the premiere singers who stopped singing, at least for the concert stage with the exception of those few whom Mrs. Johnson has mentioned. And she may be right. If she is, she has destroyed one of my earlier thoughts about the matter. It may very well be that if they continue to work, they can continue to stay in condition and they can continue to perform. The examples she has given are certainly good evidence that this may have some validity. But, nevertheless, we do have to agree that the laryngeal structures, indeed the body, changes as we get older. I'm referring specifically to the changes that begin in middle age and continue until you get to the elderly.

Dr. Vaughan and Dr. Hanley have both commented to ossification in the larynx. There has been a good bit of x-ray study in this area. I would imagine it occurs in singers, as well as in the general population. Muscle mass may also diminish from middle age on. If we go with what Mrs. Johnson has said, muscle skills will not change. Coordination may. With continuing practicing, with continuing training, maybe it will stand up.

There is one thing that those of us who do scientific research have not taken into consideration though, and the symposium has pointed this up very clearly. For, as Mrs. Johnson has said, singers are not normal people. So, much of our research and much of our data which pertain to normal people may very well not apply to singers.

With life expectancy increasing and with youth diminishing, we really need to study more about these phenomena. I don't know exactly how to go about studying it, except by going to the professional and finding out from them. In this area I think we need to take into consideration a couple of points. One, going from the slides which Dr. Hollien presented, we have to have a base of reference and I think the base of reference even for the women, the females, cannot be the college age, the early adult or the early vocal students. I think it's got to go back to the middle age - the population group, Dr. Hanley mentioned.

It's in early middle age that the changes begin to start occurring. Other work which has been mentioned, my own studies, those of Dr. Mysak, have all indicated that early middle age is when changes begin to appear. The changes would indicate a going upward in pitch. Whether this is true in singing or not, I don't know. Instead of taking as a base line the twenty year olds or such, we need instead to go to the middle age group to secure our base line, where the singer, perhaps from lack of interest, physical degeneration or otherwise begins first to go downhill. That's a good place to begin with a base line for looking at the changes in the elderly voice.

There's another point I'd like to bring out, and this is totally speculative, and this relates to a couple of things Dr. Wilder said in her introduction. Some of the things which have been described in the elderly voice include wobbling or vocal tremor. There have been a series of studies done over the past several years indicating that everybody has a natural body tremor. This is particualrly existent in the periphery. If I hold my hand out horizontally, you can see my tremor evident. This is present in all persons. And we even have the stereotype manifestation of this in the actor who depicts old age with a tremorous gait. It does indeed appear as if these tremors exaggerate as people become older. Although it starts in the periphery, it has to move centrally, more and more, as we get older. Dr. Shipp and I did a study a couple of years ago in which we tried to look at the larynx to see if we could find the same tremor associated with laryngeal behavior and we found no indication that it was happening centrally. But it is my supposition that as an individual becomes older and older and as the tremor becomes more and more manifest, that it will move more centrally. Ultimately it will arrive at the respiratory system and at the larynx. I think it will come to the tongue, to the pharyngeal cavity and what have you. But as I say, this is speculative on my part. I have been thinking about it for a while, though, but not in relation to singing.

There's another point which relates to a comment made by Dr. Hollien. "What is normal for old age?" He then showed a couple of slides where he divided his population by decades. I'm not sure what decades, because they are easier to handle mathematically, give us a clear idea of human behavior. I didn't like the book, Passages, but it did divide life up into stages. Possibly we have voice stages as well. These would not necessarily fit into ten or fifteen year time spans for each individual. Maybe it takes longer for a very well-trained singer to make a passage from one vocal stage to another. This may be another way of saying what Mrs. Johnson had said, that if they continue their training they may simply maintain themselves in a certain passage or rather keep themselves from making a passage.

Hanley: As a first timer in these discussions, I cannot help saying that I've been terribly impressed with the quality of the audience, with the wide distribution of disciplines here and the wise comments which have been made. I've been particularly impressed by what I've heard about the discipline of the singer. I want to do my own study again now. With more subjects. I want to use my normal at forty-five or fifty or whatever age group I'm able to isolate and I want to use them as the control group and I want to use singers as my experimental group.

My hypothesis is a very simple one and I know it's going to be verified. I am going to fina a more normal voice among the singers. The points within the analysis which do show up as reflecting some

departure from normality are those blasted perturbation quotients. The singer with the singer's control is going to have fewer of those perturbation quotients. There is going to be more control of the individual pitch periods both with respect to time and with respect to amplitude and I think it's an exciting study. I hope that I am invited back to deliver it.

Johnson: Dr. David Brewer spoke to me during the afternoon while I was observing and participating with his fiberoptic examination of the larynx and commented that there seemed to be little common language between the voice scientist, the otolaryngologist, and the singer. He said further, perhaps if we observe what goes on, perhaps we will then be able to find some voice words which we can use in common. For instance, if I am looking at that television laryngeal image and I see something happen, I can say, "that feels to me like x, y, z." We suddenly have some words in common which will mean the same thing to both of us because we have seen it on the television screen at the same time.

This also brings to mind a comment I would like to make to Dr. Vaughan. As I observed what was going on in my own throat and in my own larynx, my larynx was absolutely quiet. There was no tremor whatsoever when I was making the different vowels. One image which I saw of another subject was that when vowels changed and they got to the "ah" the entire structure demonstrated movement. I know this individual is half my own age. I don't know what that means, but I mention it for whatever it's worth. I think I'm a little better trained vocally than the subject who showed movement.

Wilder: I think that it's interesting. If you go back to another, earlier, study voice tremor was the highest of the predicted variables, so far as the judgment characteristics. They found listeners said they were responding to something they perceived as voice tremor very much. I'd also like to respond to something both Hollien and McGlone said: The lack of normative data if you will, for older subjects. We've established indeed that these physiological changes occur.

What concerns me as someone who works with disordered voice, particularly in older people, is the temptation right now to compare them to a different population. We compare them to the normative data that we have at hand which is, as we have said, based on a much younger population. Now if we did this for children in whom we also know the physical structure is different, we would consider ourselves quite unethical. We would never dare to make that kind of an equation. But we're inadvertently doing it when we work with the older voice client. This may give us some unfortunate diagnostic ideas and some unfortunate treatment ideas too. Our goals thereby may be a little bit off.

Question: I've heard some older singers of both sexes and a lot of older musicians and conductors and instrumentalists, I'm reminded again of what Mrs. Johnson called the saucer-shaped curve. We start off without self-consciousness and then, as we go through the midportion, we become much more aware of ourselves and we begin to work toward a much higher level of consciousness, but on the other end of the scale. Thereby, with an older performer who may not have the vitality and the athleticism, performances can still be beautiful, largely because of the heightened degree of the quality of essence.

There comes to mind the example of Casals playing the cello at the very end of his life. He could barely scratch out the melody but yet the essence of the playing, the importance of the essence of the playing was undeniable, and it must relate somehow to that curve. It must relate somehow to being so highly trained as to be able to make beautiful sounds even within considerable physiological limitations.

Vaughan: I'd like to make a comment here. I hope that not all of you here who are singers think that you are going to be able to last as well and as long as some of these people Mrs. Johnson has spoken about. It's not fair to yourselves if you do. There are vicissitudes of age that occur simply because you're exposed to viruses and you're exposed to things like chemical imbalances, like diabetes and all kinds of other things which will influence you, no matter how well trained. If you get a viral infection which involves the recurrent laryngeal nerve, you're going to have a cord paralysis, no matter what.

Wilder: This particular point also is applicable to systemic arthritic problems. If you have a familial tendency to acquire them, there probably isn't a great deal that your vocal training is going to do to keep you out of getting them. If it's affecting the pharyngeal joints, your training probably isn't going to matter a great deal.

Comment: (from the audience) May I suggest to Dr. Hanley that he use in addition to trained singers, trained actors, because they are trained to speak, whereas singers are trained to sing. Sometimes the singer's training carries over into his or her speaking voice, but not always.

Hanley: I appreciate that suggestion, for the actor is the closest to my heart of all of the performing arts.

Question: Have any studies been done with a control group to show the difference in the change of the voice between professional singer or actor as opposed to a non-professional voice user?

Those of us who have had singing training will probably go through our life with better control of our laryngeal musculature than those persons who have not had vocal training.

Wilder: I think that's what Dr. Hanley is proposing and his, incidentally, is the first that I have ever heard.

Comment: (from the audience) I have heard ninety year old men and women with very firm, very controlled voices and at the same time I have heard people in their seventies and their eighties with a very pronounced tremor and shake.

McGlone: I'd like to make a small comment about that, based on material that I presented here last year and the year before. The material did not deal with voice but it did deal with articulation. We found that supralaryngerally, a singer, singing and then speaking, the same way, functioned differently. A non-trained singer, singing and speaking, functioned the same way. So at least performing the act of singing, there is a distinct difference at least above the level of the larynx, based on not too many subjects. I think we had twenty subjects in the two studies.

Again, I think that knowing a little bit about acting, too, it depends upon which school of acting they come from. I think that some actors get worse by going to conventional drama schools.

Hollien: I think it's clear from what's been said that there are many studies which need to be done and I don't think this study has been mentioned: A study on the recognition of dialect, and the recognition of different dialects.

We used in this study trained actors, and one of the things that we found, and this had nothing to do with the main thrust of the study, was what Dr. McGlone has just mentioned. There was a tremendous variability in the product of the actors who were brought in and had or were required to do the same task. Some of them did it very well but some of them did it very badly. This is one of the things that I believe we are facing with groups of singers. Groups have to be very large to wash out some of this variability.

Question: I believe it was mentioned earlier that from middle age on, the fundamental frequency of the male voice got higher in pitch. But this is in speaking. Does the same thing happen with the singing voice? Would you expect the male singing voice to get higher with increasing age?

Johnson: I wouldn't think so. I have never seen it to be the case. Generally speaking, the high tones go first.

Question: How do you explain the discrepancy?

Johnson: In singing, we stretch and pull and work the vocal folds to their utmost capacity while we're learning to sing. Those

high notes are almost not part of the natural system. Of course, as the musculature gets older and as it begins to tighten up, you're not going to be able to stretch out, they're not going to have the same elasticity.

In singing, I've never known a singer who was able to keep his or her very high notes into older age and past middle age, except Zinka Milanoff. But then there again, that's another exception.

Wilder: I think that one of the confusing points here may be that in some of these studies, in which this rise is reported, what they're talking about is the mean fundamental frequency in speech, but there's not very much range around that for a single individual. The singer is stretching out to the physiological ends and extremes of the range.

Hanley: This is true. This is the habitual pitch level and the mature adult males and the octogenarians differ from each other in this context in the nature of about three semitones or certainly not much more than that. It's not that much difference in habitual pitch level. It is a significant difference but it's not that large.

Question: When you're talking about middle age, are you talking about middle forties, middle fifties, middle sixties?

Mysak: In my groups, the middle age is about forty-nine, or the mean age was about forty-nine on or forty-eight perhaps.

Vaughan: Physiologic differences are also enormous. You can have a ninety year old man who looks seventy and acts sixty.

Mysak: Another point that we ought to make here. When you're talking about singing you're talking about a different kind of neurological drive of the speech mechanism. Neurologically when you drive your larynx for singing, this is a different act than when you drive it for speaking. So it's hard to compare singing data with speaking data.

Another thing we need to keep in mind when we are discussing these points: There are two kinds of monitoring, or control. There is a conscious and a subconscious. For example, many of us who are not professional speakers, speak without really hearing our voices. We just talk ideas. We don't think about our voice. So we monitor on a subconscious level.

When we hear people talk about the trained singer or the trained actor, I think that person is monitoring on a conscious level. That individual speaks and hears his voice and feels his articulators moving. Most individuals who are not trained are more concerned with the content of what they say as opposed to the quality of the voice with which they say it. There are then all of these differences. So

if you are going to compare data, you're going to get differences if you compare professionals with non-professional voice users, or if you compare speaking voice with singing voice.

Hollien: Are you sure about what you are saying? Do you mean physiology or do you mean neurophysiology here?

Mysak: I think that I probably am not able to differentiate between the two and I think that there may very well be different central mechanisms working different central controls for differing between running speech and singing. I think there may also be differences between the control mechanism I use when I am repeating something which someone else has said or when I am making a spontaneously considered utterance.

Andrews: Perhaps I am being mechanistic or simplistic, but it seems to me that the baseball batter requires just as fine and just as delicate a coordination, at least as far as his eyes and hands are concerned, as the singer has to have between his ears and his larynx. I wonder if we looked at athletes in the aging process, if they also could not give us some clues as well.

The second point: I recently saw a member of the d'Oyly Carte Company who came in and said that his speaking voice was off. I said, "Why are you worried?" He said, "I know if this goes on with my speaking voice, soon my singing voice will also be affected." His first manifestations of difficulty were in his speaking voice.

The third point I'd like to make is relative to the older individuals who have a higher pitched voice than you would expect them to have at an earlier age. It seems to me that there is a visual change in the appearance of the larynx. The vocal folds appear to be thinner in the older individual and have less bulk, and I think this could well cause a change in impedance with a rise in pitch.

Question: I wanted to ask Dr. Hollien about this study he is going to do in Florida. There are so many different people regionally represented in the elderly groups in Florida. Will this be one of your control factors? I mean, how will you differentiate?

People coming out of the mid-west sound different when they get old. Those from the south are different still. How will you control that sort of thing in your study?

Hollien: Most people in the United States speak "general American" now or something very close to it. So the only control we'll have there is to avoid any significant regional dialect. Anyone with a significant regional dialect will be eliminated from the

study. When we did some recent studies with the southern dialects, and there is a whole series of them, we had a great deal of trouble finding Southerners who still used a dialect in Florida. In Mississippi and Alabama, you might not see this, but there is a movement in our speech dialects towards the "general American" in the United States. I don't think this will be a problem. Wherever it does appear, though, we will eliminate that particular subject from the study.

Vaughan: I'd like to open up another bag of questions. Mrs. Johnson has made comment from time to time about "a voice is ruined". She puts it in quotes, I think because she's not too sure what that means and I'm sure that I don't know what it means either. On occasions patients will come to me and tell me: "My voice is ruined." I always wonder what's going on, because I look and I can't tell that anything is different. And I wonder if any of my fellow laryngologists here can. Is there some irreparable damage which cannot be undone?

Johnson: Well, I've known of one singer with bowed vocal cords and you could certainly see that.

Vaughan: Was that permanent? For, if I go out and work with my right arm, I can get it so tired, so fatigued, that it's almost useless for a while.

Johnson: This particular singer felt that it was permanent, because she could not eliminate its effects from her voice. But, with careful work and by almost sending her back to her childhood speech, she was young enough, the cords did respond and they're perfectly healthy and non-bowed now. But at the time they were seen by the laryngologist, there was some thought that she would never sing again because she could not bring her cords together at all. So, she in her mind felt that her voice was ruined, and that's again why I'm putting the term in quotes.

Pushing young voices is something else again. I think of one singer, and the time we first heard her was at the age of forty-two, which is how old she was when she first came to the Met. Then you hear a syoung singer start out and sometimes it's a little tiny sound, but it's beautiful. If you happen to have a bad teacher, or if people around happen to exploit this voice, maybe at the age of thirty or thirty-five, the voices are absolutely destroyed. I don't know what they do to the muscles, but when you listen you would certainly say it's a very old doddering voice. Maybe it can come back, maybe it can't.

I've seen many voices that have come back. I was thinking of Madam de Los Angeles who this last year came and sang one of the most

beautiful recitals I have ever heard. Two years preceding that she sang badly. She couldn't even get up to an F, it just simply wouldn't happen. Now, all of a sudden here she is singing very beautifully again, because she's gone back to retraining the muscles the way they should be.

I have a long list of people and I'm thinking as I say that of one individual, a singer with whom my husband used to perform and he said that on his seventy-fifth birthday, he sang the Love-Death from Tristan just as beautifully as anyone could sing it. The voice was young, vibrant and beautiful.

I've pondered this question and I think that if singers have good training, and learn to perceive sensation, beautiful singing, if they learn to hear beautiful singing they will never experience any tension or hurt in the larynx. They can go on and on and sing just as long as they can speak.

Comment: (from the audience) I am a singer and a teacher and I'm still performing publicly and I'm still working professionally and I consider myself an older singer and I'm fifty-six years old.

My voice has in the past done some of the very things that Dr. Vaughan is talking about. Usually it has happened because I've been too busy to keep up that regime that you must follow. If you do not practice every day, you do indeed get out of condition. I would think that it is a matter of being out of condition muscularly. Your entire body needs to be toned. All of your muscles should be in good tone. And when I have not done my daily practice, if I try to sing after that, maybe I let the voice practice go for a week or perhaps ten days, I have to get back into condition again by practicing very, very attentively. Then my voice comes back.

Comment: (from the audience) In response again to Dr. Vaughan and also to Mrs. Johnson, I personally think it is possible to ruin the voice.

Alluding to your analogy of the arm muscle: if you look at someone on the beach who is ninety years old and who has not done any exercise for the preceding forty years, he still has a contour to his bicep. But I have believed that if one practices and sings incorrectly, particularly early with an improper muscle balance for any extended period of time, one does indeed contour muscles incorrectly, particularly these fine little laryngeal muscles.

One establishes a contour of those muscles and hypertrophy which lasts. I believe that it is possible to do it with improper muscle use and improper muscle balance. Then it is difficult, if not impossible, to reverse the contouring or to reverse the tendency, at

least with respect to the initial potential of the voice. Thus, I think it would in fact be possible to permanently ruin a voice, in just that way.

Hollien: Of these voices that are ruined, what proportion of them are ruined by teachers and what proportion of them were not good enough in the first place?

Johnson: I don't really need a microphone to answer that one. There are just as many different opinions about how you train a voice as there are voice teachers. Since I work on the idea that you cannot teach anybody to sing and that you can only guide and work with them, I would say fifty-fifty with respect to your question, Dr. Hollien.

Vaughan: Why are ruined voices always in their early twenties?

Johnson: Because they want to sing louder and bigger and higher and faster. They may have a good sound. People exploit them. They get to doing roles which they shouldn't do, much too soon. It's rather like someone who's potentially a champion weight lifter. Someone who has the potential for being an Olympic champion and they give that person a weight which is much too heavy for him to work with and he pulls and works his muscles all out of shape.

I have seen this phenomenon over and over again with someone who comes in with a beautifully placed natural voice. It sounds beautiful and you hand them an opera score and they say, "Sure I can sing that", and indeed they can. That's the horrible part of it. But then as you're at it, after several months you say to yourself, hmmm, that was a glorious voice when I first heard it. Then you begin to hear a wobble at the age of twenty-two or twenty-three.

Wilder: Mrs. Johnson, it seems to me as if there is an unfortunate youth cult in the concert artist field. Many seem to feel that if you have not made your name by the time you are twenty or twenty-five, that you may as well forget about it and go into something else.

This seems to me to be particularly unfortunate with respect to the voice where the instrument has to mature for a period of time. There is indeed one of those theories that we have to think about. Who is it who said that you add muscle on into your thirties and this may be why we feel that certain voices have not matured sufficiently until that age is reached: The voice simply isn't ready to attack some of these things we consider to be weightier roles.

Johnson: I would like to mention two more people. Kirsten Flagstad was never heard of until she was thirty-nine, when she first came to the Met. Birgit Nilsson was forty-two. Their voices were just really at the right age so that they could carry the load of doing many, many operas.

I know any number of young singers who are taken into companies and the first year they do very, very well. They're adaptable and they can do simply anything which is handed to them. And then all of a sudden you say, what happened to singer X. Well, when we gave her a role in this new opera this season, she just couldn't sing it. So again, I believe it's just as I said earlier, it's like the weight lifter or somebody learning to dance.

I am also always interested in a singer's neck. I have never seen a really great singer who did not have a neck and throat larger in size than someone else did. I've seen this happen under my own eyes that the extrinsic muscles of the larynx in the front of the neck begin to hypertrophy and grow as I watch. They seem to protect the larynx somehow.

Question: Mrs. Johnson, could you give us what you would consider to be an optimum age range, say for example, for the soprano, the mezzo, the alto, tenor and bass when they would be ready to handle the kind of role that you are talking about?

Johnson: I don't think I could make a definite statement on that score. Sometimes a student will come in at the age of sixteen and the voice will sound quite ready to develop, and in two or three years they are quite ready to carry very heavy roles. Other people come in at the age of twenty-eight and you say on listening to them, ah, the voice is so young and in two or three years more this may be fair. I think ultimately it depends upon each individual voice. I don't think there are such things as absolutes in this context.

Comment: (from the audience) That's very interesting to hear you say. Because each sixteen year old soprano seems to feel that she herself is ready to tackle the big parts at that particular time. I wish that we could get guidance from voice teachers of your stature. I wish you could help discourage the sixteen-year-old who's convinced that she is ready. Because if I don't tell her that she's ready, she'll go to another voice teacher who will.

Johnson: I agree with you completely on that count. I think that a teacher should be trained by these scientists who are with us here today so that he can also know when we hear, what we hear.

We discourage a sixteen-year-old from coming into the Juilliard until they are at least eighteen. That's just a general rule, and you can't come and audition before you're at least eighteen. We believe that the voice cannot be mature enough to carry all the load that is going to be put upon it here. But I do indeed think that some eighteen-year-olds think that they might carry Lucia and I think it may be up to us voice teachers to tell them, "Yes, you could sing through Lucia tonight, but you could not carry it for an entire season without ruining your voice."

Wilder: I would like to add a comment here. I saw just this year for the first time the list of songs which were put out for high school students to audition with here in New York State and it seems to me that someone in music education ought to do something about that situation and very quickly. There was a list of the most incredible series of arias.

Question: Is voice more susceptible at an early age to ruination by poor teaching or by overuse and is this worse before puberty or after? Do we have to be more careful with the prepubertal voice or with the postpubertal voice?

Wilder: I don't really think we know enough to tell you whether a voice is more susceptible to ruination in the prepubertal or post-pubertal period.

Question: I wonder if you panelists would put an upper age limit on when the voice can be ruined?

Johnson: I encourage the rule about the lower age. I'm sure we at the Juilliard must have an upper age limit, but I don't know what it is.

Wilder: I think that some of the larger contests contribute to this age factor, because the feeling seems to be that you've got to sing at a certain level by a certain age in order to compete.

Question: I would like to direct a question to Mrs. Johnson regarding stamina.

I hear a lot about training young singers to develop stamina and I wonder if you could tell us what some of the older established singers like Ponselle and Flagstad, what kind of things they did to develop stamina. What does stamina even mean in terms of the larynx?

Johnson: When you ask me what Flagstad and Ponselle and people like that did, I don't know, that was their secret. But stamina in any art whatsoever has reference to the discipline of doing first at the beginning just a small amount and then adding and adding and adding and adding to it, and adding your entire body.

When you sing you're using your entire body. So you have to learn things about body posture and your use of every bit of your body. This must be done every day, over and over again. And you have to add more and more. You have to have a certain set of rules which you follow, and physiologically do something every day before you sing so that your body becomes ready to do it when it is called upon to do it.

Vaughan: The different athletic events seem to have different ages at which athletes mature the best. Swimmers, for instance, are always teenagers and you can't really become a long distance runner until you're twenty-nine. I wonder how old you have to be to be a singer and I wonder if there might not be an optimum age for that, too?

Question: I would just like to ask Mr. Hanley and any of you others, can you derive anything of value from listening to some of the older recordings of a prominent singer?

I think in terms of some large record collections which have recordings of Giusieppi DeLuca from the time he was eighteen years old and on up until the time he was seventy. I know of others: Marian Anderson's voice changed drastically from the time she was a young girl until the time when she retired.

Given the variables in recording techniques, is there so much lost in the process that you could not determine anything from listening to and analyzing those voices recorded over a long time span?

Hanley: I've often thought about your question because it's a very good one and it has come up before, but I don't have any ready answer to it. I'm not sure until I try. I do intend to go back through record libraries to see if I can find similar vowel sounds from people at known ages and see what I can derive from them.

Comment: (from the audience) There is an enormous problem in doing this kind of analysis and the only way you could do it is very subjectively and on a perceptual basis because it's so easy to be biased by the quality or by something in the music.

Hollien: What specific questions do you want answered from those old recordings?

Comment: (from the audience) I can only say that the listening ear perceives a great difference and a great change from the early youthful recordings up to the present day ones and I just wonder if some of those recordings would produce any data of value which would be usable?

Question: What opinions do the panelists have to the practice which was followed during the golden age of bel canto singing, in which a singer was not allowed or permitted to sing any aria or song for three years, during which time he practiced voice like an athlete.

Vaughan: I would even amplify that to say that no one should be allowed to sing until he is able to talk correctly. I think this is the first thing which should be learned by all of us.

Question: What do you mean when you say that voice teachers must be very careful? For instance one teacher may say to us, "Don't let your students sing too loud." The other comes in with a voice which is unsupported and we have hyperfunction and we have problems which are created by that. How loud is too loud? How soft is too soft? How much choir singing is too much? How much is too little? What is too young in age and what is too old in age? What do we mean by "be careful?"

Andrews: The reason that we have voice teachers is to answer precisely those questions which you ask. You need experts to listen and the expertise of the singing teacher may very well be in knowing just when to tell his student to quit.

Johnson: I think another answer to those questions is a fairly simple one. Now we have all sorts of recording devices and people around who are telling us what's what and so on. In those early days to which you allude, the maestro insisted upon the students living in the house with him and having all the students together so that they heard each other and they only had one criterion and that one was that they would listen. Did they like it? Did it feel good? Nobody was ever allowed to vocalize by himself or herself. There was always a critical ear around. There was always a teacher around so they never had a chance to get into trouble.

Nowadays, for instance, at the Juilliard, we have the students thirty weeks out of the fifty-two and they get one hour per week. They then go home and they practice and they come back and they have not been able to do what you want them to do, so you try to give them a little bit each time they come in.

In those days, teaching was a twenty-four hour a day affair and by the time the voice was about ready to go, they added the consonant sounds and then they added the song. But they had their base, just like the base of a pyramid and they had their foundation, strong and solid and they were also able to get rid of the people who were not vocally what they wanted them to be. I hope that answers your question.

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Some Physical Characteristics of the Male Falsetto Voice

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Summary: Previous research indicated that, as groups, male (bass/baritone) and female (soprano) professional singers tend to exhibit differing vocal tract and voice source behaviours. The use of an objective measure of voice [xeroradiographic-electrolaryngographic analysis (XEL)] revealed differences between the two voice types, especially at the highest sample pitches (e, 330 Hz for bass/baritones, and e'', 1,320 Hz for sopranos). XEL analysis combines two known techniques, i.e., soft-tissue radiographic imaging (xeroradiography), and an analysis of voice-source vibratory patterning (electrolaryngography). Subsequent to this investigation, interest centered on the male professional falsetto voice over a two-octave range (E 165 Hz to e'' 660 Hz) using a sample (n = 9) of professional countertenors. Results suggest that there are characteristic trends in the patterning of the male professional falsetto register, but there is also evidence of within-group variability. The subjects significantly increased the size of the pharyngeal tube area during phonation. ANOVA and Trend Analysis revealed ventricular space as the only measure to expand systematically and consistently as sung pitch increases. **Key Words:** Falsetto—Countertenor—Voice.

The literature concerning the male falsetto voice is characterised by uncertainty as to its musical character and delineation, and disagreement as to its physiological basis.

The male sung vocal pitch range is generally held to contain three principal registers (defined here as patterns of interaction between the vocal folds and resonators) that are customarily used in vocal music of Western civilisation (1). These are the so-called chest and head registers [sometimes embraced under the heading "modal" register(s)], and a third, higher register, usually termed falsetto. These registers are generally held to be present and potentially available to every male voice, but the title given to falsetto would appear to imply that this pitch range is in some way uncharacteristic of the adult male voice, and that it is induced by some unnatural artifice of vocal technique. In the past, gender stereotyping or musical convention has perhaps decreed the falsetto voice to be unmasculine, and therefore inappropriate for most male vocal activities.*

Arguments have been presented (2–4) suggesting that it is possible to identify two types of male falsetto—countertenor and and male alto. Evidence of radiographic studies, however, indicates that a single underlying laryngeal procedure is common to all falsetto singers (5). Differences of title may be attributable to nothing more than differences of

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* The falsetto voice has been described as being "unnatural" and "artificial" (6–9), "illegitimate" (10), "miserable" (11), "shocking and distasteful" (12), an "abomination" (13), a "trick voice" (14), that can only be produced "pianissimo" (15), and, in general, to be avoided (16). Other comments concerning its use suggested that practitioners "risked injury" (17). More recent publications have also used the value-laden term "effeminate" (18,19), and have echoed the warning about falsetto singing endangering vocal health (20,21).

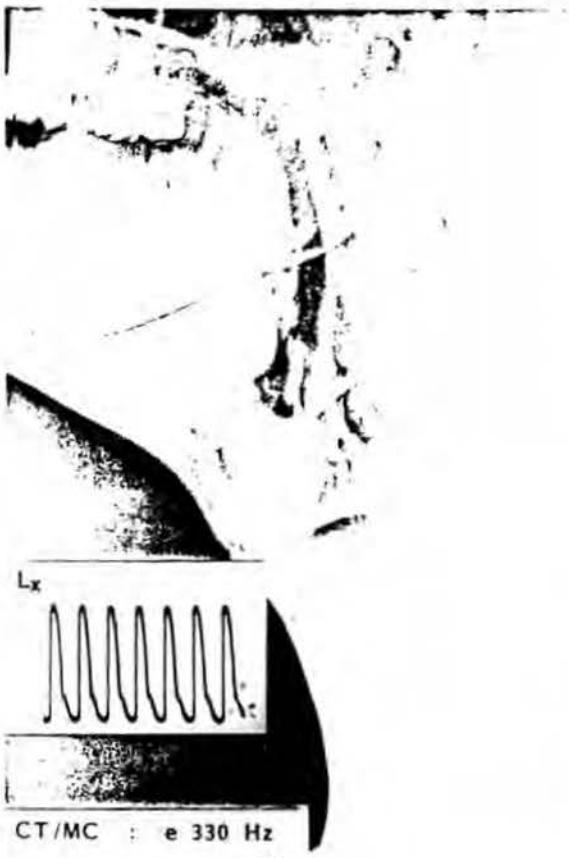

FIG. 1.

genre of use, e.g., solo voice versus cathedral choir context. For the purposes of this article, therefore, the terms "falsettist," "male alto," "countertenor," and "male soprano" are considered synonymous in so far as each refers to a male singer who customarily sings in the uppermost register, rather than the lower (modal) registers, and whose use of this register is a matter of habit and/or training, and is quite distinct from the surgically induced "castrato" voice.

Vocal music of the late 17th and early 18th centuries required the solo countertenor to be a highly skilled and accomplished performer. The tessitura of the music written for this voice rarely exceeded a two-octave compass, ranging from approximately E = 165 Hz (middle of the bass stave) to e' = 660 Hz (top of the treble stave).

Opinions regarding the physiological basis of falsetto have ranged widely. These include the belief that this voice arose from a contraction of the muscles of the throat and pharynx in combination with a rigid epiglottis (22), or that it originated as a function of air being directed down from the frontal sinuses (23). Later writings have offered more plausible accounts, with a general agreement that in falsetto (as compared with the modal registers), only a part of the inner edges of the vocal folds vibrate (24–28). Recent technical advances in observation and measurement of the action of the laryngeal assembly during falsetto singing have enabled the collection of data to support this view (29). These suggest that a definite "chink" is observable in the pattern of vocal-fold vibration throughout the falsetto vibratory cycle (30). One authority (31) suggests that this is due to the muscles being firmly tensed, with the cartilaginous portions sufficiently held together so that only the membranous portion is set in vibration. A more elaborate explanation (32) claims that: (a) on transition from the chest to the falsetto register there is a total relaxation of all muscles, including the cricoid and cricothyroid (which only contracts for the highest tones); (b) the

FIG. 2.

FIG. 3.

vocal folds vibrate along their whole length, except when singing the highest tones (between c'' = 520 Hz and g'' = 750 Hz), but the arytenoid region moves considerably less than in the chest register; (c) the vocal folds do not meet in the middle during adduction; and (d) a crescendo or mezza di voce cannot be achieved in the lowest falsetto tones. However, this last finding appears to be at variance with phonetographic evidence of a trainee countertenor (33). Another authority (34) suggests that the vocal folds are longer, stiffer, and thinner in falsetto than in the chest register, and that although the glottis is not usually completely closed, there is evidence that complete glottal closure may occur (35). There is also the suggestion (36) that falsetto tones consume more air than comparable tones sung in the modal registers, and that this has the effect of reducing the amplitude of the higher overtones.

The drawing of general conclusions from the literature reviewed above is problematic not merely because of the divergence of views expressed and evidence presented, but also because authors have rarely provided any indication of the numbers of singers studied on which their conclusions are based, nor of the singers' level of vocal ability (i.e., whether they were professional vocalists, or untrained persons who rarely used the falsetto register). Indeed, one suspects that in some cases the views may be based only on the introspection of the writers.

One exception to this is a recent Swedish investigation (37) of changes in vocal tract configuration in four "semiprofessional" countertenors. This videofiberscopic study indicates that (a) in the falsetto registers, the vocal-fold vibratory pattern bears a stronger resemblance to that of the modal (chest) register than the "untrained" falsetto of a control subject; (b) at higher intensity the countertenors had complete glottal closure, and this was also observed for two of the four singers at lower intensity; (c) there was an increase in vocal-fold length and pharyngeal constriction when moving

FIG. 4.

FIG. 5.

from low to high pitches; and (d) two of the four singers narrowed the laryngeal tube with increased pitch, whereas the other two showed no change across pitch. These findings offer some insight into the nature of the physiological basis of the male falsetto register, and suggest that training allows it to acquire a number of qualities that are characteristic of the modal (chest/head) registers.

The purpose of the present study was to obtain robust data from a sample of male falsetto singers, all of whom were of acknowledged professional standing as vocalists, to extend our understanding of the nature of the falsetto voice.

SUBJECTS AND METHODS

In an earlier investigation (38), two of the present authors reported the development of a technique for the study of the vocal tracts of singers using xeroradiographic-electrolaryngographic analysis (XEL). In that study, differences and similarities in vocal-tract orientation in male and female singers vocalising at "low" and "high" points of their registers were examined.

XEL combines two well-known techniques more usually employed in the fields of oncology and experimental phonetics. Xeroradiography (39) is a radiographic imaging technique that yields good resolution of bone and soft tissue on a single image, thus allowing the airway to be seen clearly, with contrast boundaries being edge enhanced. Examples of xeroradiographic images (considerably reduced for publication purposes) are shown in Figs. 1–8. Electrolaryngography (40) uses constant-voltage monitoring of translaryngeal electrical conductance. A microvoltage is passed between two gold-plated electrodes, placed on either side of the pharyngeal cartilage, to generate a waveform (Lx) that relates to the pattern of vocal fold-tissue contact. Thus XEL provides evidence of soft-tissue changes throughout the vocal tract during phonation.

FIG. 6.

FIG. 7.

SUBJECTS

Nine male falsettists acted as subjects, each self-identified as a countertenor. The principal criterion for inclusion in the study was the a priori establishment by the subject of a national or international reputation as a soloist using exclusively this voice register. (The subjects also self-identified as being within the category of bass-baritone or light-baritone according to the pitch range of their chest (modal) register, but rarely, if ever, used this register when singing.) All the singers were resident in the southeastern area of England, but it is estimated that they represent a substantial proportion of the countertenors of international standing who are currently working in Europe.

METHOD

The XEL technique was used to obtain data from each countertenor in the following conditions: (a) vocal tract at rest; (b) vocalising at three pitches, E = 165 Hz; e = 330 Hz; e' = 660 Hz. It would have been desirable to sample a greater number of points across the vocal ranges of the singers; however, the number of samples of the vocal range that could be obtained was constrained by the necessity of ensuring that subjects remained within safety limits of exposure to radiation. The three pitches chosen were regarded as being representative of the lower, middle, and higher regions of the countertenor vocal pitch range. Subjects were seated in a comfortable position for singing and positioned to allow lateral imaging of the vocal tract. To minimise movement during vocalisation and to limit differences of angle (Fig. 9) between exposures subjects were requested to keep themselves as still as possible and to maintain eye contact with a fixed point on the wall. (A head restraint was considered for this purpose but pilot trials indicated that subjects felt this to be an "unnatural" intrusion, which may have affected the tone quality of vocalisation.)

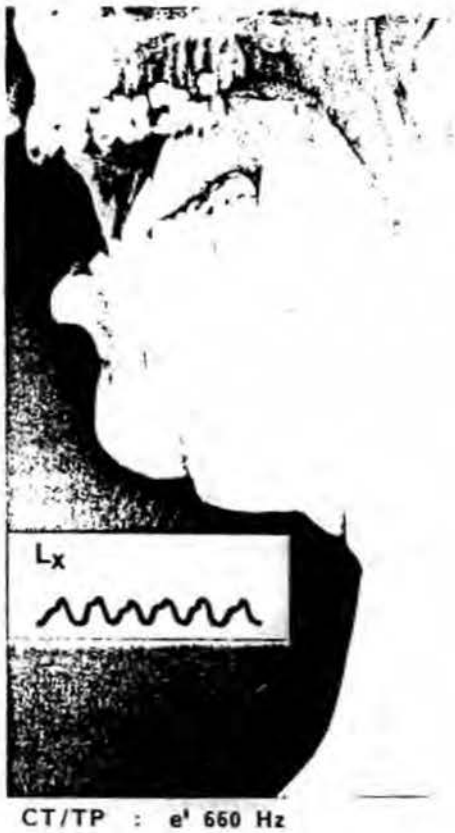

FIG. 8.

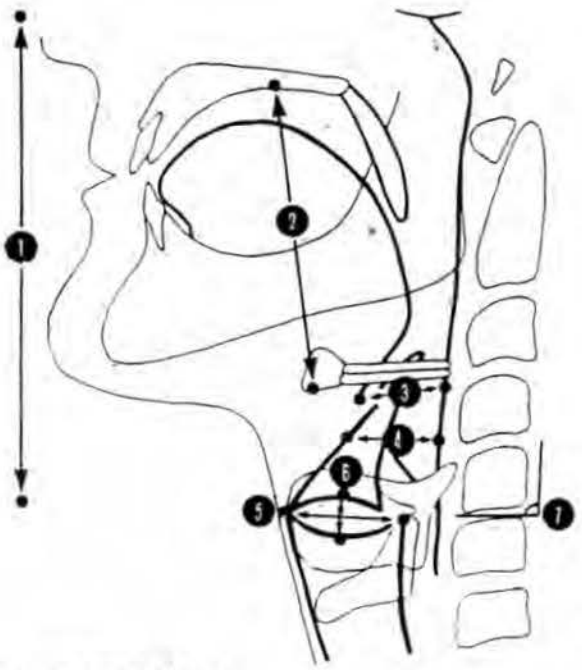

FIG. 9. Schematic of vocal tract points at which measurements were taken.

Subjects were allowed to practice the vocalisation of each of the pitches, and the radiographic image was taken when each subject indicated that he was satisfied with the quality of the sound being produced, usually 3 or 4 s after the initial onset of the sung pitch. Subjects were asked to vocalise each pitch at a mezzo-forte level of loudness, to the vowel /i/.

Electrolaryngographic data of the same vocalised pitches were collected immediately prior to each xeroradiographic imaging session. Subjects were allowed similar practice freedom, and were given instructions similar to those for the xeroradiographic images. It was not possible for the two forms of data to be collected simultaneously because the positioning of the electrodes required for the electrolaryngographic procedure would have obscured critical areas of the xeroradiographic image.

Subsequent to collection, each xeroradiographic image was measured at six points to obtain vocal-tract dimensions in millimetres. For technical reasons, the obtained images were slightly larger than life-size. Accordingly, the obtained data were reduced to 0.833 of full size to allow measurements to have real-life equivalence. The points of measurement were selected from those possible because they have been found in a previous study (41) to be the most significant indicators of vocal-tract soft-tissue change during phonation. These points of measurement are shown in Fig. 9 and are as follows.

1. Vertical length of tract (variable 1): spheno-occipital bone to the superior border of the vocal folds.

2. Hyoid height (variable 2): vertical height measured from the superoposterior border of the hard palate to the lower inferior border of the hyoid body.

3. Lower oropharynx (variable 3): anterior of vallecula to pharyngeal line.

4. Laryngopharynx (variable 4): epiglottic rib to pharyngeal line at the level of the mucous covering of the arytenoids.

5. Laryngeal airway (variable 5): anterior commissure to posterior of arytenoid lumen—posterior cricoid tip.

6. Ventricular space (variable 6): superoinferior dimension at the widest point.

In addition, because the position of the spinal column in the position adopted by the subject might have changed slightly between vocalisations, and because the relation of the spinal position to the orientation of the vocal tract could only be surmised, the angle of arc between the upper borders of the vocal folds and the posterior line of the spine was measured for each image (Figure 9, point 7).

Electrolaryngographic evidence for each sung pitch was provided by displaying the resultant data on an oscilloscope, polarised with increased vocal-fold contact as positive-going. This data was made permanent by means of a Polaroid oscilloscope camera.

RESULTS

Xeroradiographic data

The means and standard deviations of obtained measures are shown in Table 1.

TABLE 1. *Countertenors (n = 9); mean XEL measurements (± SD)*

	Hz	Ventricular space (mm) Variable 6	Laryngeal airway Variable 5	Laryngopharynx Variable 4	Lower oropharynx Variable 3	Hyoid height Variable 2	Full vertical length Variable 1	Angle° Variable 7
At rest	0	1.3 (±1.1)	28.0 (±2.1)	17.3 (±3.5)	18.7 (±3.0)	76.1 (±5.7)	128.1 (±12.4)	109.9 (±5.75)
E	165	4.8 (±2.3)	30.0 (±3.1)	18.9 (±6.1)	28.9 (±6.9)	86.1 (±7.5)	136.1 (±14.2)	96.1 (±6.83)
e	330	4.2 (±1.7)	32.5 (±3.3)	20.2 (±3.4)	30.4 (±3.4)	86.5 (±8.2)	132.6 (±13.6)	98.2 (±11.94)
e'	660	3.1 (±1.5)	32.2 (±4.7)	21.3 (±2.9)	30.6 (±5.0)	88.7 (±7.1)	131.9 (±11.8)	104.0 (±9.83)

Influence of angle between spinal position and vocal folds. The first concern in examining the data was to establish the significance of the angle between the spinal position adopted by the subject during the data collecting trials and the position of the upper border of the vocal folds. If this angle showed a consistent relationship with the other measures it would be difficult to resist the conclusion that any differences in obtained measurements reflect nothing more than concomitants of changing spinal position. The data for each variable was therefore subjected to a regression analysis upon the data for angles.

With the exception of variable 6 (ventricular space), these analyses yielded nonsignificant values of F ratio. The exceptional variable yielded a value of $F = 5.672$, $p > 0.025$. No obvious reason for an association between spinal position and this single variable, but not others, presented itself, so a scatterplot was run to examine the situation further. This showed two clear outliers from the general grouping of the data. In particular, it was found that one of these had adopted spinal positions such that they showed a range of 23° compared with a group mean of 9.75°. The regression of variable 6 was therefore run again, excluding this subject. With this exclusion, the value of F reduced sharply to a nonsignificant value of $F = 2.089$, $p > 0.150$. It was concluded, therefore, that no consistent relationship between spinal position and the data for the other six variables existed, and that this factor could be ignored for the purposes of data analysis (Table 2).

Movement from rest to vocalisation. The relative positions of the measured points of the vocal tract at the position of the rest were compared with those when the voice was "primed" for vocalisation by means of t tests for related measures. Introspection suggested that the orientation of the vocal tract was probably nearest the position at rest when vocalising in the midpoint of the pitch range. Therefore, the data for this point (e = 330 Hz) was used for the purposes of this comparison.

Allowing for individual differences between subjects (see further analyses below), the following changes were observed in meaned data between the images obtained for the resting position and those for the vocalisations of the middle pitch sampled (e = 330 Hz) (Table 3).

These results indicate that, as a group, subjects opened up the vocal tract when moving from a resting position to the vocalisation of the middle pitch (e = 330 Hz). Although the increase in the vertical length was not significant, the hyoid height did increase significantly, indicating a lowering of the jaw and allowing the tongue root to displace, thus facilitating a concomitant increase in the lower oropharynx. At the voice source, the significant increase in the laryngeal airway measure indicates a tensing of the vocal folds, and the opening up of the ventricular space may, according to one authority (42), be indicative of subjects "covering" or "darkening" the voice timbre whilst at the same time maintaining the "ring" in the voice, i.e., that peak in the spectral envelope in the region of 3 kHz, the so-called "singer's formant." The above data also

TABLE 2. *Regressing variables on angle*

Variable 1	Variable 2	Variable 3	Variable 4	Variable 5	Variable 6*
$F = 0.089$	$F = 0.032$	$F = 0.649$	$F = 1.843$	$F = 0.132$	$F = 5.672$
$p = 0.768$	$p = 0.860$	$p = 0.428$	$p = 0.719$	$p = 0.719$	$p = 0.025$

* When rerun ignoring subject no. 5, $F = 2.089$, $p = 0.150$.

TABLE 3. t *Test comparisons of measures for 'rest' and e = 330 Hz*

	Mean at rest (mm)	Mean e = 330 Hz (mm)	t	p
Vertical length—slight, nonsignificant increase	151.889	157.889	1.806	>0.05
Hyoid height—an increase	89.778	102.11	4.203	<0.01
Lower oropharynx—a marked increase	22.111	35.889	8.676	<0.001
Laryngopharynx—slight, nonsignificant increase	20.000	23.778	1.95	>0.10
Laryngeal airway—an increase	33.111	38.444	4.667	<0.01
Ventricular space—an increase	1.196	5.000	3.750	<0.01

support the most favoured explanation for the acoustic generation of this singer's formant, namely, the opening up of the pharynx " . . . so that it is considerably wider than the area of the entrance to the larynx tube" (43).

Changes in the orientation of the tract between vocalisations of low, middle, and high points of the vocal range. Relationships among measures: The next question that needed to be addressed in the analysis of the data concerned possible relationships among the measures, i.e., whether any of the measures correlated in a systematic and regular way; for example, if an increase in hyoid height is observable, would this bring an accompanying increase in ventricular space, or perhaps a reduction in some other variable? Evidence of any such relationship could provide information about reorientation of the vocal tract as the singer moves to another of the sampled pitches.

TABLE 4. *Matrix of correlations across sampling points (N = 27)*

Positive correlations (vx = large, vy = small) were observed between the following pairs of variables:

	r	p
v1–v2: vertical length–hyoid height	0.7921	<0.000
v3–v4: lower oropharynx–laryngopharynx	0.5934	0.001

Correlation between vertical length and laryngeal airway of r = 0.2844 approached significance (p = 0.075).

Negative correlations (vx = large, vy = small) were found between:

	r	p
v1–v4: vertical length–laryngopharynx	−0.4203	0.015

v, variable.

TABLE 5. *Relationships amongst variables at sampling point E = 165 Hz (N = 9)*

Positive correlations were observed between the following pairs of variables:

	r	p
v1–v2: vertical length–hyoid height	0.8791	0.000
v3–v4: lower oropharynx–laryngopharynx	0.6502	0.029

No negative correlations reached significance at 0.05 level.

Correlations (Pearson *r*) for all pairs of variables were therefore calculated so as to produce: (a) a matrix for relationships among variables across the three pitches (Table 4); and (b) matrices (×3) for relationships among the variables as sampled at each of the three pitches (i.e., at E = 165 Hz, e = 330 Hz, e' = 660 Hz) (Tables 5–7).

The statistically significant correlations are shown in Table 4. The data suggest that, in general, if the vertical length of the tract is increased there are concomitant increases in the hyoid height measure (indicating increased jaw opening) and in the length of the vocal folds (laryngeal airway measure). The width of the pharyngeal tube also changes systematically (namely, the relationship between the lower oropharynx and laryngopharynx measures), with evidence that an increase in vertical length will reduce the opening to the pharyngeal tube immediately above the larynx. This may be interpreted as further support for the most widely accepted acoustic explanation of the "singer's formant" (mentioned above).

Matrices (×3) for possible relationships amongst the variables were then computed for each sample pitch. Taking the interpretation of these three matrices (Tables 5–7) together, there are relatively few significant correlations, positive or negative, for each sample pitch. This suggests that there was considerable variation between subjects, with few points of conformity across the group as a whole. As might be expected, there was a strong positive correlation at each sampled pitch between the two vertical measures, i.e., vertical length and hyoid height; the lower larynx position was accompanied by an opening of the jaw and lowered hyoid. The

TABLE 6. *Relationships amongst variables at sampling point e = 330 Hz (N = 9)*

	r	p
Positive correlations		
v1–v2: vertical length–hyoid height	0.8900	0.001
Negative correlations		
v1–v4: vertical length–laryngopharynx	−0.6991	0.018

TABLE 7. *Matrix of relationships amongst variables at sampling point e' = 660 Hz (N = 9)*

	r	p
Positive correlations		
v1–v2: vertical length–hyoid height	0.7185	0.015
v3–v4: lower oropharynx–laryngopharynx	0.8030	0.005
Negative correlations		
v3–v5: lower oropharynx–laryngeal airway	−0.6060	0.042
v4–v5: laryngopharynx–laryngeal airway	−0.5941	0.046

positive correlation between the pharyngeal tube measurements (lower oropharynx and laryngopharynx), indicates that when one was widening the other was likely to be moving similarly. However, this was shown for the lowest and highest sampled pitches but not for the midpoint (e = 330 Hz). Moreover, at the highest sung pitch (e' = 660 Hz), this opening of the pharyngeal tube was matched by a corresponding decrease in the size of the laryngeal airway measure, suggesting that some subjects were achieving the higher pitch through altering the contact mass of the vocal folds rather than increasing the tension (compared with the middle pitch).

Analysis of variance. To determine the apportionment of the variance among the variables, an analysis of variance [treatments (sampling points) × treatments (measures) × subjects] was applied to the data. The results are shown in Table 8.

It is clear from Table 8 that almost all of the variance in the data is attributable to differences between measures with some modest element of variance between the subjects. Only a very small portion is attributable to differences between the three sampled points of the vocal pitch range. This would appear to imply that these singers have developed their own particular technique for shaping their vocal systems at various points of their pitch range, and that there is very little consistency between subjects in the way that the resonators and voice source, as measured, reshape in moving to higher or lower parts of this register.

TABLE 8. *Analysis of variance*

Source	ss	df	ms	F	p
Total	471364.27	161	—	—	—
Subjects	2585.83	8	—	—	—
Sampling points	13.24	2	6.173	0.128	>0.20
Measures	457657.27	5	91531.40	421.48	<0.000
Sampling points × measures	350.32	10	35.032	2.351	>0.20
Sampling points error	879.21	16	54.951	—	—
Measures error	8686.62	40	217.165	—	—
Sampling points × measures error	1191.9	80	14.899	—	—

Trend analysis. Given that only a small portion of the total variance was attributable to differences between the three sampled pitch points, the third question to which an answer was sought in the obtained data was whether such variance as was present followed a linear trend in respect to any of the measured variables. Because any one variable might follow an independent trend pattern that was unique to it, data for each variable was subjected in turn to a treatments (pitch-sampling points) × subjects ANOVA. Using the method of assigning orthogonal components derived from hypothetical trend lines to sums of squares, F ratios for possible trends in the data for each of the six variables were obtained. The number of hypothetical paths that may be tested by such a procedure is constrained by the number of sampling points available. In this case, two paths, linear and quadratic, could be tested. The data was therefore subjected to analysis to discover whether any of the variables, as measured at the three pitch-sampling points, might lie along these paths (Table 9).

The most striking feature of the Trend Analysis is that for each variable there is a large amount of the total variance attributable to "subjects." This would appear to qualify the information gained from the main ANOVA above (Table 8), indicating that subjects do differ markedly from each other emphasising the personal nature of the countertenor technique.

The second noticeable feature is that "subjects" and "error" consume large amounts of variance compared with "treatments (pitch-sampling points)." (Error here simply means the variance not attributable to identified variables.)

The only variable to show any significant adherence to linearity is ventricular space ($p < 0.05$ 0.01). Here the measurements indicate that after initial expansion from rest to the lowest pitch the space expands in a consistent manner as frequency of the sung pitch increases. Data for the other variables do not indicate any adherence to linearity.

Given the exception above, the conclusion must be that there is very little of the variance attributable to reorientation of the vocal tract in a consistent way across the group. This further supports the conclusion drawn from the main ANOVA (Table 7) that there is wide individual variation between these countertenor subjects.

TABLE 9. *Analysis for trends amongst variables*

	ss	df	ms	F	p
Variable 1: vertical length					
Total	8625.63	26	—	—	—
Subjects	8068.96	8	—	—	—
Pitch sampling points	128.07	2	64.037	1.496	0.20
Linear	112.50	1	112.50	2.629	0.10
Quadratic	15.574	1	15.574	0.364	0.20
Error	684.741	16	42.796		
Variable 2: hyoid height					
Total	2392.000	26	—	—	—
Subjects	1857.33	8	—	—	—
Pitch sampling points	74.889	2	37.445	0.983	0.20
Linear	64.222	1	64.222	1.686	0.20
Quadratic	10.667	1	10.667	0.280	0.20
Error	684.741	16	42.296	—	—
Variable 3: lower oropharynx					
Total	1094.30	26	—	—	—
Subjects	240.963	8	—	—	—
Pitch sampling points	21.630	2	10.815	0.198	0.20
Linear	18.000	1	18.000	0.329	0.20
Quadratic	3.630	1	3.630	0.067	0.20
Error	874.963	16	54.685	—	—
Variable 4: laryngopharynx					
Total	754.667	26	—	—	—
Subjects	488.667	8	—	—	—
Pitch sampling points	37.556	2	18.778	0.989	>0.20
Linear	37.556	1	37.556	1.979	0.10
Quadratic	0.000	1	0.000	0.000	0.50
Error	303.556	16	16.972	—	—
Variable 5: laryngeal airway					
Total	627.185	26	—	—	—
Subjects	481.185	8	—	—	—
Pitch sampling points	45.852	2	22.926	1.912	0.10
Linear	26.889	1	26.889	2.242	0.10
Quadratic	18.963	1	18.963	1.581	0.20
Error	191.852	16	11.991	—	—
Variable 6: ventricular space					
Total	120.667	26	—	—	—
Subjects	77.333	8	—	—	—
Pitch sampling points	18.667	2	9.333	2.409	>0.10
Linear	18.00	1	18.00	4.64	<0.05>0.01
Quadratic	0.667	1	0.172	0.172	>0.20
Error	62.00	16	3.875	—	—

ELECTROLARYNGOGRAPHIC DATA

The electrolaryngographic waveforms (Lx) for each sung response reflect the patterns of contact between the vibrating vocal folds (44). The Lx waveforms (recorded by Polaroid photography of the oscilloscope screen) for each countertenor sung pitch were subjected to analysis by visual inspection. Attention was paid to specific features of the waveform; in particular, interest centred on the size and shape, the steepness of the closing and opening gradient, and the distance between peaks. The location of the electrodes on either side of the thyroid cartilage is crucial to the formation of the waveform, and slight displacement, either up or down, will alter Lx size and shape. This makes optimum placing critical, especially as singing subjects are likely to move their larynxes considerably on a vertical axis from rest and tend to dislike wearing the neckband that is customarily employed to assist in the set positioning of electrodes. In drawing the following conclusions we have been careful to take into account the operating constraints of using the electrolaryngograph with singers. We therefore confine ourselves to general conclusions.

Our visual analyses indicate that, for identical pitches, subjects did not employ similar sound source soft-tissue contact. Variations in waveform patterns fell into two broad categories:

1. The *size* of the waveform, indicating that subjects varied in the amount of vocal-fold contact for identical pitches.

The *configuration* of the waveform, indicating individual variations in the amount of time per cycle that the vocal folds were in contact with respect to the periodic time (commonly referred to as the "closed quotient").

Examples of the Lx waveforms from the sample are given in Figs. 10 and 11 for four different subjects (and are identical to the Lx waveforms captioned in Figs. 1–8). These examples are indicative of the variations in waveforms across the group.

Subject:	No.	1	2	3	4
Figure:	10	A	B	C	D = e 330 Hz
	11	A	B	C	D = e' 660 Hz

Figures 10A–D show example individual variations in Lx waveforms at e = 330 Hz, the midpoint sung pitch. The configuration of the waveform for subject 4 (Fig. 10D) strongly resembles the characteristic waveforms of bass/baritones in their modal register reported in an earlier study (45). This finding complements and supports the videofiberscopic evidence (46) reported in the introduction earlier (see above). There are also examples of a countertenor vocal-fold contact waveform that has a characteristically short closed quotient and this

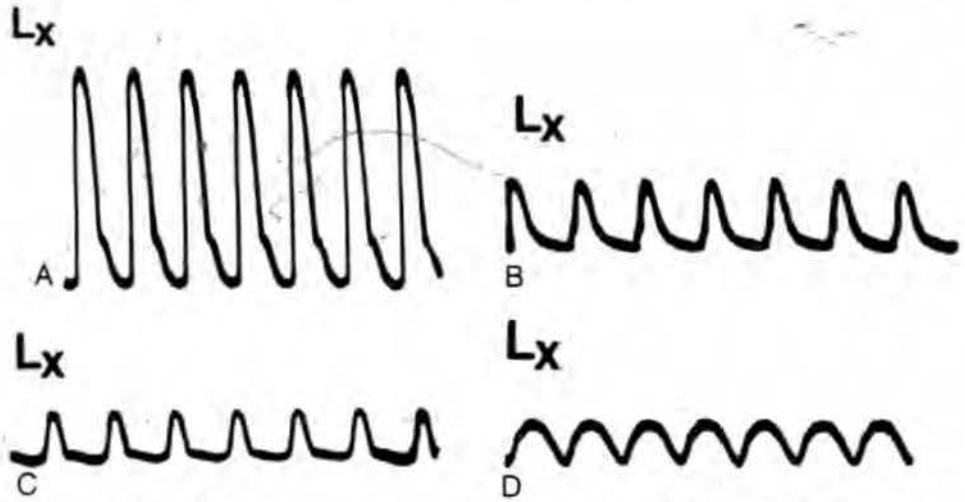

FIG. 10. (A–D) Lx waveforms of subjects 1–4, respectively (while singing e, 330 Hz).

may be observed in examples from subjects 2 and 3 (Fig. 10B and C). This short closed quotient is indicated visually by the distance between one wave and the next being relatively long. The wave represents (from left to right) the onset of adduction (closing of the folds) to the end of abduction (when no part of the folds is in contact). The point of maximum closure is indicated by the peak of each wave. Subject 1 has a waveform that has a longer closed quotient and a slight "knee" on each downward slope, indicating an extension of closure prior to a relatively short open period. The vertical size of this waveform pattern compared with the other three subjects could be due to more vocal-fold contact, but it could also be due to better optimum electrode placement on the neck, or to the subject interpreting the dynamic "mezzo forte" at a higher intensity than the other subjects. (The Lx data is therefore not sympathetically treated by statistical comparison/analysis; hence, for the purposes of this article, our reliance on visual interpretation. It is recommended that in any future research intensity of signal should be monitored to control for one of these variables.)

The lower set of figures (Fig. 11A–D) show individual variations in Lx waveform for the same four subjects at the highest sung pitch e' = 660 Hz. As with the midpitch (e = 330 Hz) subject 4 (Fig. 11D) has a waveform pattern that is unlike the other three and that has a very short open period between vibrations. There are some similarities between subjects 1, 2 and 3 (Fig. 11A–C). All three waveform patterns are larger than for the lower pitch, which we interpret as being an indication of increased contact between the folds (perhaps due to singing this pitch, which lies at the top of the range at a higher intensity). Subjects 2 and 3 both had "knees" in their downward slopes, although this was more marked for subject 2. Subject 1 had also increased the amount of time that the folds were in contact and reduced the open period compared with the lower pitch.

The discrepancy between the number of peaks shown for subject 4 (Fig. 11D) and the other three subjects is due to the time display calibration on the oscilloscope being altered to show more clearly this very unusual Lx waveform pattern. At present, we have no clear interpretation of the physiological basis for this pattern (and we have ensured that it is the correct way up!).

In summary, these four examples indicate slight differences in patterns of voice source soft-tissue contact between subjects. Such differences were observed at all three sampled pitches. Moreover, these differences appeared to be confirmed auditorily as each subject has a distinctive countertenor voice. At a purely subjective level, in the examples given here subjects 3 and 4 appeared to sing with a more "covered" or "darker" timbre to their voices, whilst subjects 1 and 2 had a much "brighter" sound.

The comparison of the patterns of vocal-fold contact between these countertenor subjects and the falsetto register singing of a sample of bass/

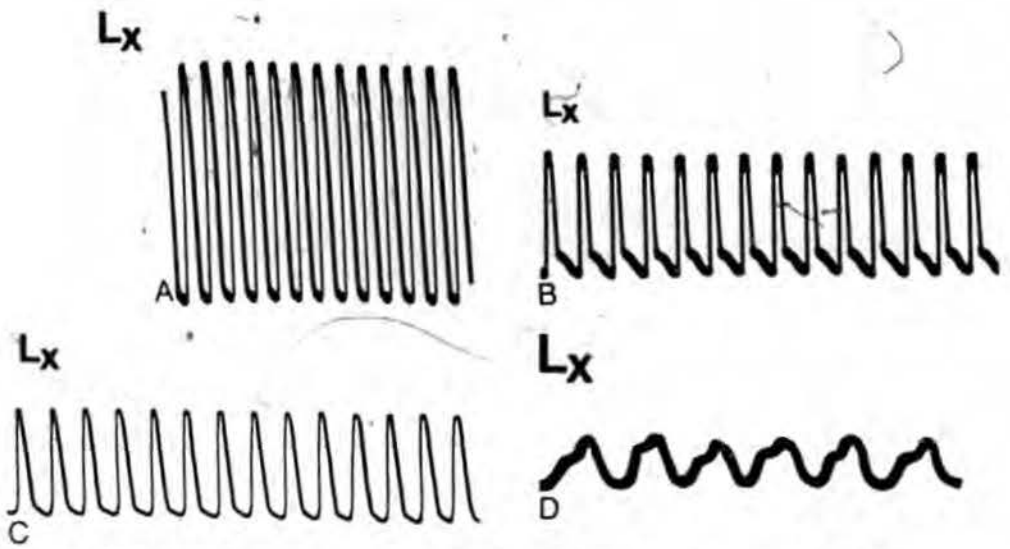

FIG. 11. (A–D) Lx waveforms of subjects 1–4, respectively (while singing e', 660 Hz).

baritones will be the subject of a future article. Nevertheless, interpretation of the above visual analysis indicates that the countertenor Lx waveforms appear to have features that are characteristic of both falsetto and modal singing in that, whilst they may frequently be "spikey" in appearance (similar to "untrained" falsetto waveforms), they can also exhibit "knees" in the abduction part of the wave, and have a relatively large closed quotient (as in modal "chest/head" singing).

CONCLUSIONS

The XEL analysis has been useful in examining the vocal tract configurations of a sample of professional countertenors. The principal features of this analysis are as follows.

1. No consistent relationship was apparent between the spinal position and the data for the other measurements.

2. *t* Test comparisons between the measures for rest and the middle sung pitch e = 330 Hz revealed that subjects increased the size of the resonators in phonation, with a particularly significant increase in the pharyngeal tube area.

3. The Pearson *r* correlations for changes in dimensions across pitches provide evidence of group factors operating in the changes to the configuration of the vocal tract. There was also evidence of wide individual variation amongst subjects.

4. The individual nature of the way that this sample of countertenors manipulate their respective voice mechanisms was further illustrated by the results of the main ANOVA and the trend analysis. Ventricular space was the only measure to reduce systematically and consistently as sung pitch increased.

5. The electrolaryngographic analyses revealed that, amongst these subjects and at all three sample pitches, there was evidence of "modal" register-type Lx waveform patterns. We suggest that this may be construed as support for the notion that training and use can modify the soft-tissue contact within the falsetto register, and that such modifications may incorporate complete glottal closure.

In summary, there appear to be levels of commonality as well as dissimilarity amongst subjects. Despite the large amount of individual variation, there is evidence of group factors operating in the priming of the vocal tract from rest, and in the way that certain physical dimensions move consistently with each other (either positively or negatively). Furthermore, it may be conjectured that, through training and consistent use, these countertenors have transformed their "falsetto" register into their "modal" register.

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APPENDIX II: Surveys

Pamela Lynn Kordan
265 Park Street
Upper Montclair, New Jersey 07043

February 1, 1990

Dear

I am presently in my senior year at HUC/JIR in New York and am working madly on my senior project. My topic is as follows: Alternatives for women to the vocal requirements and expression of traditional chazzanut. The purpose of this project is to explore the problems encountered by women Cantors when singing traditonal chazzanut, a specific style of religious musical expression, which evolved exclusively for the male voice. I am in the process of arranging pieces by Alter, Katchko, Rappaport and Ganchoff to hopefully create a singing line that is more appropriate to the female vocal instrument and vocal expression.

I am trying to collect as much feedback from women Cantors in the field as possible to help me with my evaluation. If you would please answer the questions below and return these answers to me in the enclosed envelope, I would be very grateful to you. Any additional insights you may have would be more than welcome and appreciated!

Thank you very much. I look forward to your response.

Sincerely,

Pamela Lynn Kordan

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?

2) Did you sing any religious music as a child?

3) What lead you into a career in the Cantorate?

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? I've been singing since I was a child but started formal training at age 15.

2) Did you sing any religious music as a child? Not particularly.

3) What lead you into a career in the Cantorate? My affiliation with a Reform synagogue as soprano quartet member eventually led me to consider the Cantorate - prior to the job, I was pursuing opera and concert careers.

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. I don't think the problem is in the writing - rather, it is in the performance. (turn the page and I'll explain)

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? Why not? There has to be some flexibility as to what women can accomplish with their different sound and lighter texture, but traditional chazzanut, though written for men by men, does not have to be a closed medium for women. I think the important thing to emphasize is the feeling that goes into the chant -- all the rest follows (as long as vocal technique is secure)

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? I think nusach is important to preserve, therefore, if the composer/cantor is fully versed in the art and is well acquainted with the text and has special feeling for it, it is a wonderful idea. Hopefully, he/she can also write music well!

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? Since I was 13.

2) Did you sing any religious music as a child? In Temple I was a member of the choir straight through High School.

3) What lead you into a career in the Cantorate? The main thing was a feeling inside that this is what I should do. My grandfather was a cantor and this was a big influence. I also felt a need to live a life that could include a family, home and stability.

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. yes, most certainly. The tessatura is different for a soprano then for a tenor. although both are high voices there is a difference in the area of the voice that is most comfotable to sing in. I often have to transpose music and change certain notes to have it fit my voice.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? Music, that is, traditional chazzanut must be written for the female voice according to research. Until the traditional branch of our religion and their professional Organization accept women as cantors this task will be difficult to overcome.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? (see below)

6) most certainly, but only after they have studied the correct way to approach the texts. In my years at HUC I felt this "improvisation" skill was really lacking. By your last year in school you should be encouraged to improvise.

→ In closing I must say as much as I dislike the automatic transposer on the organ in my Temple, I don't know how I would have survived without it!

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? I began singing seriously at about 13 yrs. old. I did sing as a child.

2) Did you sing any religious music as a child?
I sang in a choir and sang duets w/ the Cantor (a man, of course)

3) What lead you into a career in the Cantorate? I started w/classical music. After graduating from Manhattan School of Music I got a job as soprano soloist at the Concord and became interested in cantorial music.

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.
I don't think the difference is in the sex of the composer as much as the culture that the music evolved from. (over)

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?
I'm just not sure that the training is the issue. I think a style will slowly evolve that will suit women's voices better. With efforts like yours being made, I guess there are infinite possibilities.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

It's always wonderful when cantors express themselves through their own compositions. Not everyone is gifted in that area, but it certainly should be encouraged not only for vocal reasons but because creativity should always be valued in art of itself.

Good Luck,

Audrey Halpern

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?

2) Did you sing any religious music as a child?

3) What lead you into a career in the Cantorate?

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

A difficult question - I really don't know ... because we don't have any role models. To keep the style authentic we must rely on past greats but somehow adapt it to our voices and needs. As far as I am concerned, the whole area is tricky because

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Yes - to discover the best expression vocally and stylistically suited to our own instrument. The pure expression that comes poetic, sincerely expressed, can be very ... But I'm not always in favor of composing when ... and real ... I think the intent ... can be a dilution and cheapening of our heritage of ... I think it's important to be honest ... as composers - we're not all ... to do it!

assume that women composers can write better ... women simply because they are female; most ... almost no traditional chazzanut at all because ...

P.S. What about this "Rachem" by ... on the Rosa Ponselle vol III record?!! Have you ...

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? Professional Training since ages!? Specific major learning in Junior High at the National Music Camp (Interlochen, Mich.)

2) Did you sing any religious music as a child? Started at Conservation through High School

3) What lead you into a career in the Cantorate? My Cantor from home (Harold Orlansky)

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. The tessitura & passaggio are obviously different, (but nothing that a little "creativity can't overcome)

5) A What is your vision for the evolution of training women in the style of traditional chazzanut? B Will women begin teaching this prayer medium?

A) More "supportive" instruction from faculty

B) I see no reason why not

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? Depends upon the Judaic background & liturgical grounding of the student - composing from ignorance will not produce quality phrasing nor positive development of the text

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?
all my life - yes

2) Did you sing any religious music as a child?
Christmas carols in public elementary school!

3) What lead you into a career in the Cantorate?
I was in a professional choir in Syracuse & read about Barbara Ostfeld; I had always taught Rel. School at temple.

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. No difference in composers. Trad. chazzanut is written for tenors - the resistance is different for sopranos & is not comfortable to sing.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?
You have to sing things in your voice; women can teach trad. chazzanut even if they can't sing it due to range & tessitura

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?
I don't think that Cantors necessarily make good composers. But it would be nice if more composers wrote for sopranos & if transcriptions published music for other than "medium" voice.

Reform composed music originally written for tenors presents the same problem.

Good luck Pam. See you on Feb 28th.
Susan

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? I've been singing since 1977, seriously. As a child, I sang in choirs and in musicals.

2) Did you sing any religious music as a child?

NO

3) What lead you into a career in the Cantorate?

I sang in Temple choirs and directed a synagogue choir. It was a natural progression to become the Cantor

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

Music written by women generally takes into consideratio →

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

on other side

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Cantor Rita Glassman
San Rafael, Ca.

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? Since childhood – have had 10 years of voice training.

2) Did you sing any religious music as a child?
I was reared in an Orthodox home - so, yes - I sang religious music at school, synagogue, and in summer camps as a child.

3) What lead you into a career in the Cantorate?
A strong interest in + connection with Judaism, singing, creative/joyous approaches to teaching others about Judaism, working with people and connecting with all ages spiritually - love of Jewish music - wanting to contribute something positive to others - through singing as a vehicle

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. Yes - music by women generally more melodic, the line is more fluid, more

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? Women can and should be trained to sing in the style of traditional chazzanut and have as much exposure as possible to recordings of old time Chazzanim to know the sound of the older styles of Chazzanut

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? If they are moved or inclined to do so – it is not only a matter of sing one's instrument well enough - the best expression of prayer texts comes from a person's head and heart being in the right place — Kavanah helps a lot

4) direct, generally easier to sing - sometimes the music is more romantic, more lush in harmonies, more folksy.

5) Having heard Moshe Kussevitsky as a child and other European Chazzanim growing up. I did not as a soprano have difficulty singing in the traditional style as I had the original sound in my ear – however, the Krechts is not always appropriate - I shall enclose an article which appeared in the W. Street Journal on

The Soul Music of the Synagogue

By Nat Hentoff

New York

In the Orthodox synagogue in the Boston ghetto where I grew up, the cantor was the main reason I went to services at all. Back then, as for centuries, while the rabbi appealed to the intellect of the congregation, the cantor, or chazzan, made the sacred texts compellingly clear to the heart. Never more so than during the service marking Yom Kippur, the holiest day of the Jewish year, whose annual observance begins this evening.

In those days, I was mesmerized by the passionate improvising of the cantors and would collect recordings by such world-class figures as Yossele Rosenblatt and Pierre Pinchik, along with 78s by Bessie Smith and Joe Turner who also sang deep blues. In the synagogue on Yom Kippur, I waited for the chazzan's first chorus with the keen anticipation of being surprised yet once more. In his black robes and high black skullcap, the cantor was a magical juggler, a master of melisma—for each sacred symbol, he sang three, four, six notes that climbed and throbbingly intertwined. The voice was bold and bright—what in opera would have been called a dramatic tenor.

Indeed, some of the grander chazzans had more than enough virtuosity and panache to moonlight in opera. But the peerless Yossele Rosenblatt, whom Enrico Caruso once slipped into a synagogue to hear, refused all such offers. What if he were required to sing on a Saturday? What if he had to take the role of some person he would not have in his house?

In a recent lecture on American cantors at Yivo (The Institute for Jewish Research) here in Manhattan, Mark Slobin, professor of music at Wesleyan University, retold a dark fable about a renowned 19th-century cantor in Vilna who was not only seduced by the operatic stage but also by a Polish countess. Abandoning his faith and his calling, the cantor eventually was himself abandoned by the countess and became a vagabond. In the pouring rain, on the eve of Yom Kippur, the apostate came to a synagogue and found there was no one there to sing "Kol Nidre," the most solemn of Jewish prayers. The wanderer chanted the melody, which is more than a thousand years old. And then, of course, he died.

In 1934, Moishe Oysher, a bravura cantor, starred in a film about this chazzan who forgot what he was here for. It's called "Der Vilner Balabesl" ("Overture to Glory").

Since there are now cantors in Reform synagogues who cheerily adapt some of the sacred texts to rock melodies and rhythms, even unto including an electric bass, it does seem as if the Vilna cantor may have been punished too severely for his faithlessness.

Yossele Rosenblatt

The advent of rock is not, however, the most significant change in American cantorial music. Women, in rapidly increasing numbers, are becoming cantors in Reform temples, and gradually in Conservative synagogues as well. In the Orthodox places of worship, however, women are not likely to lead the congregation in prayer, musical or otherwise, until the Messiah comes. And it's doubtful if permission would be granted even then. But the professional male chazzan is found less and less in Orthodox synagogues too because of the strong rebirth of the belief that because all worshippers are equal, members of the congregation can share the role of cantor.

So where are the traditional chazzans of yesteryear? Some can still be found in Conservative and Orthodox synagogues around the country but, Prof. Slobin notes, the largest pride of chazzans is in the Miami area. On the major holidays, meeting rooms in condominiums are packed with swaying, praying worshippers murmuring an obbligato to the daring improvisations of the cantors as they implore, argue with, and show off a little before the Almighty.

But where can the legendary chazzans be heard? The record companies have practically no cantorial albums left in the catalogs. However, there is a store—Louis Stavisky Co., 147 Essex St., New York, N.Y. 10002—that has a remarkably extensive supply of albums by singers whose like will never be heard again because the ways of life that created them are, as with black classic blues singers, disappearing.

Louis Stavisky lists sets by Yossele Rosenblatt, Zawel Kwartin, Pierre Pinchik, Moishe Oysher, and a good many more. Each LP sells for $4.85, but the handling charges depend on the distance from the store. Anyone interested in this cache of rare cantorial music can write or call (212-674-1289) for a catalog and other information.

Women cantors should thrive in Reform synagogues because most of the people in the congregations never had a chance to hear the traditional chazzans now stored in Louis Stavisky's place. But I empathize, deeply, with a white-haired woman who, at the end of Prof. Slobin's Yivo lecture, said:

"I still remember the wonderful feeling the cantors used to give me as a girl when they cried and sang. But recently, I went to a synagogue, and I heard this woman cantor. I was so disappointed!"

For years, on the High Holidays, my father and I would walk all over Boston to check out the cantors at all the synagogues. No Jew could ride on those days, but we didn't mind. As we walked, we compared notes about the quality of the voices, the taste with which the chazzans embroidered their melodies, and the power of their *krechts* (a catch in the voice, a sob, a cry that summoned up inconsolable ghosts of Jews past).

I wish there had been tape recorders then. They would have been forbidden, but for such music, I would have stopped.

154

Old and New Songs to the Lord

Jewish tradition teaches that when all other avenues are closed, the gates of song are always open to God's ear. That is one reason cantorial music has won so warm a place in the hearts of the Jewish people, and why Nat Hentoff's piece (Arts page, Sept. 24) on the great chazzanim of the early 20th century touched so sentimental a chord. Those were indeed thrilling voices and glorious advocates of their congregations before the Almighty.

But one comes away with the feeling that great cantors have had their day, never to return, "because the ways of life that created them are, as with black classic blues singers, disappearing." I cannot speak for the blues, but chazzanut—the art of the cantor—is alive and well. There are 400 of us in the Cantors Assembly serving Conservative synagogues in the U.S. and Canada. Many more are being trained in the Cantors Institute (Conservative) and School of Sacred Music (Reform). Graduates of the Cantorial Institute (Orthodox) are serving scores of congregations.

The style of today's cantors varies widely, but as long as young people continue to choose to devote their lives to serving as cantors, chazzanut will continue to comfort and to inspire.

CANTOR SAMUEL ROSENBAUM
Executive Vice President
Cantors Assembly
Jewish Theological Seminary
New York

* * *

When jazz-critic Hentoff feels attracted to Hazzanim and their lore he has good reason. Hazzanut and jazz are forms of stylized folklore. I just wish to rectify a few errors made by the enthusiastic critic.

On Yom Kippur no hazzan wears a black robe or skullcap; he is in white from head to foot; in fact, he wears his own shroud.

There is no "first chorus" in the Kol Nidre, and it is not a prayer, but a legalistic formula hotly debated by rabbis.

Yossele Rosenblatt was certainly a worthy hazzan, but Mr. Hentoff is mistaken that he did not seek secular laurels. He gave a "Schubert-Lieder-Abend" in Hamburg which turned out a complete flop.

As for Reform cantors, this writer is to a certain extent responsible for their existence, for it was he who, together with Prof. W.A. Binder and Cantor G. Ephros, founded the Hebrew Union School of Sacred Music in 1948. It was and is the aim of the school to set a straight course against the chaotic bastardization of our genuine musical tradition, for which some of the hazzanim adored by Mr. Hentoff were certainly co-responsible.

I can well understand that many ladies yearn for the voices of good hazzanim, as girls adored good tenors, and even Mr. Frank Sinatra. The answer to this was given by Freud in "Totem and Tabu."

As for Reform hazzanut, I was once its helmsman (never its captain!), but the good ship has long since changed its course, whether I like it or not. But it should not be forgotten that all hazzanut was ever a stylistic mixture of Jewish folklore, popular songs of the ghetto's environment, and, after the 17th century, many elements of the Italian opera.

PROF. ERIC WERNER
Hebrew Union College
New York

* * *

I can still recall the long walks I took as a child with my father to Temple Beth El in Borough Park, Brooklyn, to hear the great Moshe Kussevitsky. My father, an Orthodox Jew whose piety seemed only intensified by the tragedies of the Holocaust, would have walked half a day to hear the impassioned strains, so familiar to him from the synagogues of his native Vilna.

That early exposure to the sounds of Kussevitsky and other cantors like him was to influence me greatly as I grew, and I, like Mr. Hentoff, am often "mesmerized" by the recordings of the great cantors of yesteryear.

Having been raised in a society relatively free of religious oppression, however, I am convinced that the cantorial techniques of Eastern Europe are not the only ways to inspire a congregation to pray. The sobbing sound may have its place in some of the liturgy today, but it mirrored hundreds of years of weeping over harsh realities. I and many others are part of a new generation of Jews who approach Judaism with joy and optimism. While we can appreciate and even incorporate older traditions and styles into our spiritual expression, we are excited at the prospect of creating new ways of showing our love and devotion to our people and to God. Furthermore, while there are clearly differences between the male and female voice, it is the intention of the individual leading a congregation which may or may not allow for the opening of the soul to prayer. The cantor's role is not to enhance him or herself while pleading with God on behalf of a congregation, but rather to glorify the sacred prayers. Although the woman quoted by Mr. Hentoff was "disappointed" after hearing a female cantor, generalizations ought not be made on one experience.

The familiar is difficult to give up, but the psalmist wrote, "Sing a new song to the Lord." I urge Mr. Hentoff to share in the worship of cantors, both men and women, who are singing a new song to the Lord, and I believe that the heavens do rejoice, and the earth is glad because of it.

CANTOR RITA GLASSMAN
Temple Sinai
Roslyn Heights, N.Y.

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? 27 years. yes playing guitar & singing at age 3 -- in Temple Choir at age 8.

2) Did you sing any religious music as a child?
Yes, in Temple choir on Fri. eve & Holidays

3) What lead you into a career in the Cantorate?
Love for Jewish music and our people

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. Some chazzanut was simply written for a certain voice (i.e. Rosenblatt wrote for himself & others wrote similarly) we can't be expected to sing all music written. Since I'm a lyric coloratura -- that keeps me

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? I think its important to keep learning & teaching chazzanut -- but the roots of the style were from men and if we want to learn authentically, we must listen & learn from as much of the original so we can then we can teach.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? As a person in the first class of Reform chazzanut was traditionally emphasized. I think that if we learn the principal modes, we should be able to improvise on them. But only if we are STEEPED in the tradition. Since we are REFORM cantors, we must give our attention to ALL styles + expressions. Keeping our heritage intact requires that we preserve the modes & traditional melodies, so yes, if students use those parameters for composing chazzanut. But combining one's own creativity & modern style w/ chazzanut is a fine line. I think we had just enough emphasis on chazzanut -- but I wish we could USE IT MORE ON THE JOB. Lets be realistic,

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? 18 years.

2) Did you sing any religious music as a child? yes - with my dad, rarely in temple (it was very traditional)

3) What lead you into a career in the Cantorate? I spent a summer at Camp (camp) and met several cantorial students & observed students

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. Since there are so few female composers besides Miriam Sideon, Bobbie Friedman or Beryl Schulder I don't see a vast difference. The music & these 3 is really the same for each sex. The better composers just write better for the voice in general

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? Since my graduation I have been in large reform (classical) congs where they are looking for English - its hard to find chazzanut & therefore, I would like to see women educated & ultimately teach a variation or chazzanut

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? I think the school's time is best spent having students learn the traditional that already exists. If one, as a seasoned pro, wants to write & compose that's fine. However, although I think the school should encourage & support creative talents I hardly see it as a priority.

and create a distinctive female sound.

Good luck!

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?
I began singing [seriously] in High School, but was in a [junior] choir at my synagogue from 4th - 6th grade

2) Did you sing any religious music as a child?
see above but it was NFTY stuff

3) What lead you into a career in the Cantorate?
[illegible]

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.
[illegible]
[illegible] However, I think it's important to note that [illegible]

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?
When we have women in prestigious traditional pulpits, then women will be [illegible] of the [illegible] and [illegible]

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Absolutely, but even more important, students must acquaint themselves with a variety of styles. Finding what doesn't work for you is an important step towards finding what does.

Traditionally, nusach provides the outline while the cantor has the freedom to improvise. I think cantors need to be taught better how to do this, as well as encouraged in more structured composition.

[illegible] There is no one right way for either males or females to sing anything - what works in your voice might not work in mine. For example, some men do not take well to [illegible] but are fine with Katchko. We need many men & women →

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? I've been singing since I was born.

2) Did you sing any religious music as a child? Yes - I sang in jr. Choir

3) What lead you into a career in the Cantorate? jr. Choir/NFTY/UAHC Camps/Love of music + singing/Love of Judaism and Synagogue

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. over

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? Until more women are in traditional pulpits, the expertise in this medium will still be a mans domain. Women in school would certainly benefit from having a woman's voice to emulate.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? (over)

Less time should be spent on the exact notes of any one cantors music and more time on developing the skill of modal improvisation. Composition would be the next step in encouraging individual expression, and should be an important part of the cantorial curriculum.

Pamela Lynn Kordan
Senior Project: -Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?

2) Did you sing any religious music as a child?

3) What lead you into a career in the Cantorate?

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

2/2/90

Dear Pam —

I really have very little to say on this topic as I never do trad. Chazanut and never sing a capella - being raised in a Reform setting it just isn't in me! There are only 2 women in my opinion, who ever successfully chanted Chazanut - one was my class-mate Faith Steinsnyder Gurney who lives in Manhattan and the other was a woman from the 50's — they called her "Sheindele the Chazante". I →

OVER

Dear Pamela,

Sorry this took so long. I hope it's still helpful. I had mis-placed it. Good luck. My HUC friends tell me how wonderful and talented you are. Renée

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? I sang as a child, then went to more "intellectual" pursuits and then back to singing. Began studying "seriously" in my twenties.

2) Did you sing any religious music as a child? Yes, but in the community it happened to be Catholic + Methodist music.

3) What lead you into a career in the Cantorate? I became a Zionist, immigrated to Israel [illegible] in Jerusalem), came back to States and then became involved in all Jewish activities (particularly educational fields) *

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. Yes - despite knowing one woman who can make all the noises (like old time Chazzanim) I don't think it's easy or possible or necessary to do "old-time Chazzanut". Most women

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? I don't think congregations are crazy about men singing this "old" chazzanut style. In a concert it can be appreciated but in reform congregations as a prayer medium, it's doubtful.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

If we have time as students, of course we should compose for our needs.

*3) After finding out that women could become cantors (after obtaining an MS in psychology and education and involvement in Jewish areas including cantorial soloist), I decided this combined all the areas I wanted.

*4) sound ridiculous trying to kvetch etc. I prefer to sing more neutral music. Having been trained at JTS, we are far behind the times with music we study. I don't think you have to be a woman to write "unisex" cantorial music.

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? yes

2) Did you sing any religious music as a child?
yes - Junior choir

3) What lead you into a career in the Cantorate?
Combined interest in music, liturgy + working with people

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.
yes - Music written for soprano voice is much more complicated

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?
It's possible

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?
Of course.

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? from small child - yes!

2) Did you sing any religious music as a child?
I always was singing in synagogue and at summer camp. (Jewish)

3) What lead you into a career in the Cantorate?
My experience as a cantorial soloist after master's degree in Opera + summer camp + experience

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. ~~[illegible]~~
NO, I haven't (particularly as a mezzo)

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? My vision is that the congregation at large will only hear a "cantor" and not notice whether they are male or female & hope women will teach it — to better communicate it vocally to other women.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? Absolutely, if they have the creative ability and resources to accomplish it successfully.

Pam —
Hope this is helpful — good luck as you finish up & welcome to the field
Yours

J. Sufrin R. Eichorn
60 Homestead Street
Malden, MA 02168

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? 16 yrs. seriously yes

2) Did you sing any religious music as a child?
from age 12 I sang by services at Holy Blossom Temple and performed cantorial solos with my father

3) What lead you into a career in the Cantorate?
a tremendous amount of support from the Cantor & rabbi at the temple I grew up in

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. very little music written by women was available when I was at H.U.C. At present, there is still very little in my repertoire by women.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? yes
women need to build their own approach to chazzanut taking the aspects of cantorial style that do not sound foolish in a woman's voice and imposing upon chazzanut the more pleading tone of the female voice

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?
absolutely yes. Keeping in mind the modes of traditional chazzanut as a foundation for composition.

Janice Rogers

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? I've been singing for about 30 years since I was 8 years old.

2) Did you sing any religious music as a child?
I sang in the children's choir at Temple Beth Israel in Chicago which is how my interest in Jewish music began.

3) What lead you into a career in the Cantorate?
My commitment to the future of Judaism as well as a love of music.

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.
I have not had a lot of experience singing music written by women for women so I don't feel qualified to answer that question.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?
To be perfectly honest, I find it difficult to look at music as being "sexist." I believe that women are equally capable of singing traditional Chazzanut as men and except for traditional prejudice coming into play, see no reason why women should not teach this prayer medium equally as well as men.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?
There is no doubt in my mind that student Cantors who express interest in musical composition should be encouraged to compose for themselves. However, I'm not sure that those who are not so inclined should be pressed to do so. I appreciate, however, the understanding that individual texts require their own unique expression.

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?

2) Did you sing any religious music as a child?

3) What lead you into a career in the Cantorate?

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? 40 years Did you sing as a child? yes

2) Did you sing any religious music as a child? yes

3) What lead you into a career in the Cantorate? good experience - Debbie encouraged

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. No - except that Debbie & Shoman just wrote a service with me in mind & I love singing it There isn't much women to women - music for me to compare

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? I don't know enough to answer Yes some day, but not soon

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? Only if they have composing talent. I hate composing.

Debbie Katchko sings hazzanut beautifully. I think it's because she was raised with it - it's in her ear. She's also had no major vocal problems. I've wondered if they're related to her singing style. It would be good to know. I'm not yet convinced that women can't sing traditional hazzanut (1 step lower) & would be very interested in seeing (purchasing) some of your arrangements.

Pamela Lynn

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?

2) Did you sing any religious music as a child?

3) What lead you into a career in the Cantorate?

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Kokin)

4) I find no discernable difference between male & female composers. I do find that certain pieces are more effective for me than others, the reason for which is sometimes that I can "translate" it for my voice & sometimes I can't. For example, most of Irma Ritter's Chazzanut feels as though he wrote for me. However, his "Eloheinu & Fitze" just doesn't work for me at all.

On the other hand, I do not have access to the volume of Chazzanut by female composers that is by male composers.

5) I feel quite strongly that women cantors need to be trained by both men & women, as should the men. We all deserve to have the widest range of possibility & sound & style from which to chose our own unique sound. Two of the finest coaches I had during my study at HUC were Cantors Bob Abelson and Faith Steinmyder Gurney. They were most helpful because

they explored with me the possibilities in the music in myself. Their depth of knowledge of the style, their security in that knowledge and their genuine curiosity in what I could bring (vocally & emotionally) to a piece allowed me to grow. A coach of this philosophy of either gender, would be the most help in breaking down the barriers between one kind of voice and another.

The optimum would be both men & women teachers of Chazzanut, but no one should be hired simply on the basis of gender.

5) I am not convinced that requiring someone to compose will always encourage vocal creativity. But, I agree that many avenues need to be explored to allow a beginning cantor the opportunity to know her/his soul & voice as much as possible.

I hope my answers have been helpful. Please call if you want further clarification.

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? Formal studies from age 11

2) Did you sing any religious music as a child?
Yes, Christian - Catholic Masses etc

3) What lead you into a career in the Cantorate?
Personal Choice

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. I don't know any traditional Chazzanut written by women - I perform the style written by men from the 19th century - I have no opinion.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? I really don't have a vision. I have no opinion understanding of the style - I don't see it open to me - but I can see there Orthodox women can their style. Women are more G. Focus on the text.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Yes - women should write to express themselves - personally we don't because the Prayer Text - if we are sincere - then I guess we must express the Text.

Pamela - I am sorry I'm not helpful - I think the Project is great - + I wish you luck.

Pamela

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? since I was small is seriously

2) Did you sing any religious music as a child?
yes. I led the U.J. congregation, and sang at services at my parents temple

3) What lead you into a career in the Cantorate?
a combination of a voice and the need to work with people in a Jewish environment

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. Frankly no. being a mezzo. I believe gives me a small disadvantage in this regard. I find that a mezzo is totally dynamic and down in my voice. I also live with my husband who has taught me the nuances, and I have observed them by osmosis

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? I learn it to the women I am presently coaching. They are prepared to study and work with me because I am a woman who can do it. I think a women's perspective is very helpful and reassuring for them.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? Absolutely. I think if the students at HUC were taught the art of improvisation more completely, it would enable us and encourage us to do this.

Pam,
I hope I have answered in a helpful way.
Good luck!
Martha Novak

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?
24 years
yes — in a children's choir to begin with.

2) Did you sing any religious music as a child?
yes, a lot of Hebrew & Yiddish folk songs.

3) What lead you into a career in the Cantorate?
I was disappointed with the secular music world, and for part-time [illegible] got [illegible] became my most meaningful work.

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.
Sometimes yes, sometimes no. There have been great male cantors with very lyrical voices, and sometimes their repertoire is suitable. Composers like Helfman who blend traditional and modern in a very lyrical manner are wonderful for my voice.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?
I dearly hope so. I think the problems with women singing this repertoire are much more psychological than technical. As women do more of this, we'll be used to hearing them, and they'll feel more free to relax and express themselves in this medium.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? yes. Although not everyone has talents in that area, so you can't require great composing for everyone. I could have used more experience in cantorial improvisation — it might have helped to loosen me up!

Good luck with your project.

Aviva Katzman
Chicago, Il

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?

2) Did you sing any religious music as a child?

3) What lead you into a career in the Cantorate?

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Barbara Thorn

Good luck Pam!

2

Rabbi:
David E. Fass

Assistant Rabbi:
Andrew Straus

Temple Beth Sholom

228 New Hempstead Road, New City, N.Y. 10956
(914) 638-0770

Cantor:
Regina Heit

President:
Marty Cohen

February 8, 1990

Ms. Pamela Kordan
265 Park Street
Upper Montclair, New Jersey 07043

Dear Pamela,

I will be glad to help you with your survey. Just so you are aware, I received my Investiture in 1981. Since then I have served two pulpits, from 1981-1987 I served in Evansville, Indiana (Conservative/Reform) and from 1987, here in New City (Reform). One more thing, I would like to recieve the results of your survey when it is completed. Now, on to your questions.....

1. I have been singing ever since I can remember. Both my parents were musicians (although amatuer). I also play piano, violin and guitar.
2. Yes, I did sing religious music as a child, my father has been a Ba'al T'filah since he was young.
3. I was raised in a very traditional home, so the Cantorate was not an option for me growing up. A Rabbi approached me while I was in my sophomore year of college and made the suggestion.
4. I find no difference in the music, sometimes I must transpose a piece up a step, though. I tend to approach the music through text, rather than composer.
5. I believe in the perpetuation of Hazzanut, without question. There are already women such as Cantor Faith Gurney who teach/coach this medium. It is important for anyone, male or female to internalize and absorb this particular sound in order for it to work. As I said before, one's loyalty should be with the text first.
6. Yes, how ilse does new music evolve. But we must be mindful of the various tools we have to work with, such as Hazzanut, Folk Melodies, Modern Sounds etc.

I hope this rather lengthy response is of help. I have never had difficulty singing any of the composers you mentioned. As I said before, every once in a while I must transpose a piece up a step, but that's it. I also grew up hearing this medium, so replicating it is almost second nature to me. If there is anything else I can help you with, please feel free to call. Good luck, and if you get a chance, I'd love a copy of your completed project.

B'shalom, Cantor Regina Heit

Wendy 4.

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? Since I was 12 yrs old.

2) Did you sing any religious music as a child? (yes) I was director of a youth group singing troup called the Troubadors while in high school.

3) What lead you into a career in the Cantorate? My strong connections to Judaism, music and lots of encouragement from my husband David and my Cantor/Mentor Ted Hellman.

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. yes - traditional chazzanut is not a favorite of mine - some of the differences are in the style more than key, I think.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? As HUC it will come to pass much sooner than anywhere else. It is also, in comparison, much nicer for the female voice than the male voice.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Of course, it is wonderful to compose for yourself and all of us do it even just a little bit. However- I, for example, am simply not a composer and I would not be inclined to compose something that suits me first. First I would continue looking and asking others until I found what suited me. I do not necessarily think that cantor's have to compose for themselves in order to discover their own individual expression.

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? since I was 11 - yes

2) Did you sing any religious music as a child?
no

3) What lead you into a career in the Cantorate?
[illegible] interest in judaism and love of music

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.. traditional chazzanut - difficult to sing keeping the [illegible] [illegible] [illegible] [illegible] I have not really sung music by women composers

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? traditional chazzanut recitatives are difficult to [illegible] especially [illegible] female voices as they must be transposed thereby losing some of the brilliance of traditional chazzanut

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts? I feel that people have gift writing music is a gift given to few - I feel one could and should arrange traditional chazzanut to suit one's own [illegible] as it [illegible] was an improvisatory medium

* is also difficult to master because it is not really Western music We no longer hear that kind of music around us. We are the keepers of this flame and I think we should adapt it to our own ears and voices

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?

2) Did you sing any religious music as a child?

3) What lead you into a career in the Cantorate?

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child?

20 years - yes

2) Did you sing any religious music as a child?

3) What lead you into a career in the Cantorate?

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain.

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium?

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

Pamela Lynn Kordan
Senior Project: Survey
February 1, 1990

QUESTIONAIRE

1) How long have you been singing? Did you sing as a child? Professionally, 10 yrs - for pleasure - forever

2) Did you sing any religious music as a child? no

3) What lead you into a career in the Cantorate? I became music director of Temple Emanu-El Westfield NJ

4) In your studies and now in your career, did you/do you find a difference when singing music written by men for men (i.e. traditional chazzanut) and/or music written by women for women? If yes, please explain. Not really in tr ad. chazzanut

5) What is your vision for the evolution of training women in the style of traditional chazzanut? Will women begin teaching this prayer medium? Absolutely. There are many whose style is as authentic as the male chazzan. The most important thing is to listen as much as one can to recordings & in live services.

6) Do you think that student cantors (both men and women) should be encouraged to compose for themselves, in order to discover their own individual expression and/or how to use their individual instrument to best express the prayer texts?

If a student cantor has the inclination for composing, by all means - Kol ha kavod! We should be open to a variety of styles & instrumentation in the synagogue.

Good luck

Jan Kordan

Main Line Reform Temple, Beth Elohim
410 Montgomery Avenue
Wynnewood, Pa. 19096
649-7800

Cantor Nancy R. Ginsberg

1. I have been studying privately since I am 13 years old, approximately 16 years. I sang in shows in school as a child.

2. I did not sing religious music as a child.

3. I was very young when I graduated from Indiana University and an operatic career did not seem like a reality at the time. I had been acting as the "cantor" at the Hillel on campus and really enjoyed it. When Gary Zola, the recruitment director at the Cincinnati campus, came the Indiana University campus I met with him. I was impressed by him and what he had to say so I applied to the H.U.C. As far as I'm concerned it was a very smart career move.

4. Traditional chazzanut has never been my forte. I don't know of any "traditional" written or arranged by women for women. I know that I had difficulty negotiating many of the passages with the proper flavor. I had great (male) coaches at H.U.C. and it was very difficult if not impossible for them to explain or show me what I was supposed to do. The best female voices I heard sing chazzanut at H.U.C. were Roz Barak and Mihal Schiff. They had the feel and flavor that none of the other women could quite capture.

   The non-traditional music written by women (an there isn't much out there - besides camp music) is really no different than the music written by men. I can sing Freed, Steinberg, Janowski as well as Higgins and Nelson.

5. I don't see women teaching chazzonut at H.U.C. because they haven't learned to master it. Unfortunately, my worst coaching experiences at H.U.C. were with women. They couldn't convey the medium. You and I both know that it is a medium that goes much farther than just notes.

   I also don't believe that too many Reform congregations want to hear chazzaznut either by a man or a woman. The times I have done it here, it was

not well received.

6. I believe men and women should compose for themselves to reinforce their learning and understanding of the proper modes for their proper times. When they can do this they will easily be able to discern a piece of music's appropriateness for Shabbat eve vs morning or musof, the shlosh r'galim vs high holy days, etc.

Again, I don't feel it's the male vs female instrument. There are high and low voices in both. each will find the right piece in the right mode for the proper time for their individual voice.

Beyond the voice is the cantor as a personality and how they choose to interpret the text. Some are Schalet singers, some are Steinberg singers, and others prefer the music from the camps (NFTY). I am not making a value judgment but as artists searching for our own expression in the task before us, we must choose the composer or composers that reach us and touch us. If not, how can we hope to convey the meaning and significance of the text to our congregations week after week, year after year.

Students as well as those of us in the field should compose when the need arises or because we are moved to do so, not to discover our individual expression in terms of vocal fact but because of the bigger picture. We are cantors transmitting the words of prayer, the words of Torah, the words of our ancestors, and it is our job and responsibility to be true to the text. I do not see it as a male/female issue.

I have tried to answer your questions to the best of my ability and understanding. I hope it will be satisfactory to you. Good luck on your senior project. If I can be of assistance in the future, please do not hesitate to ask.

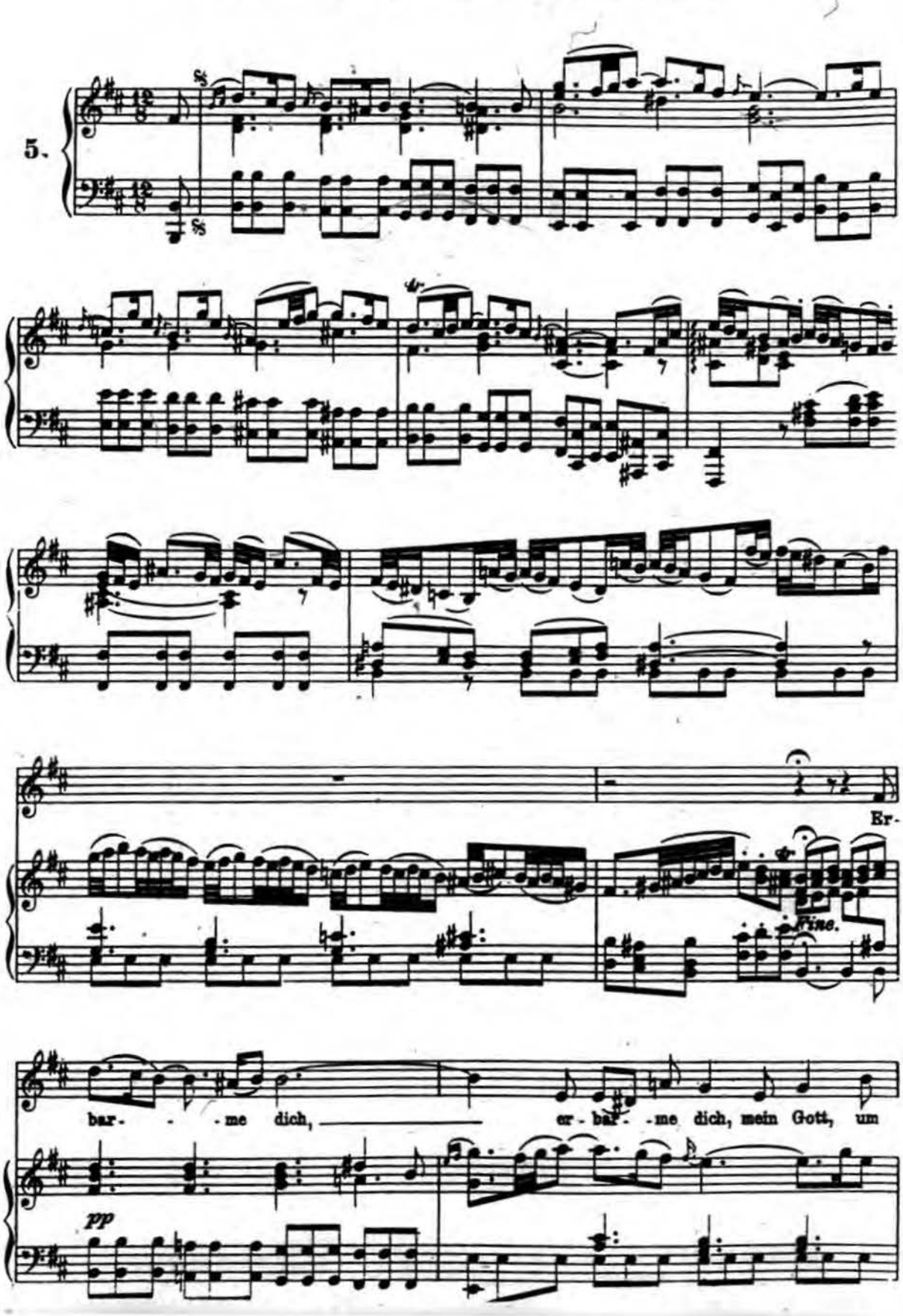
Very truly yours,

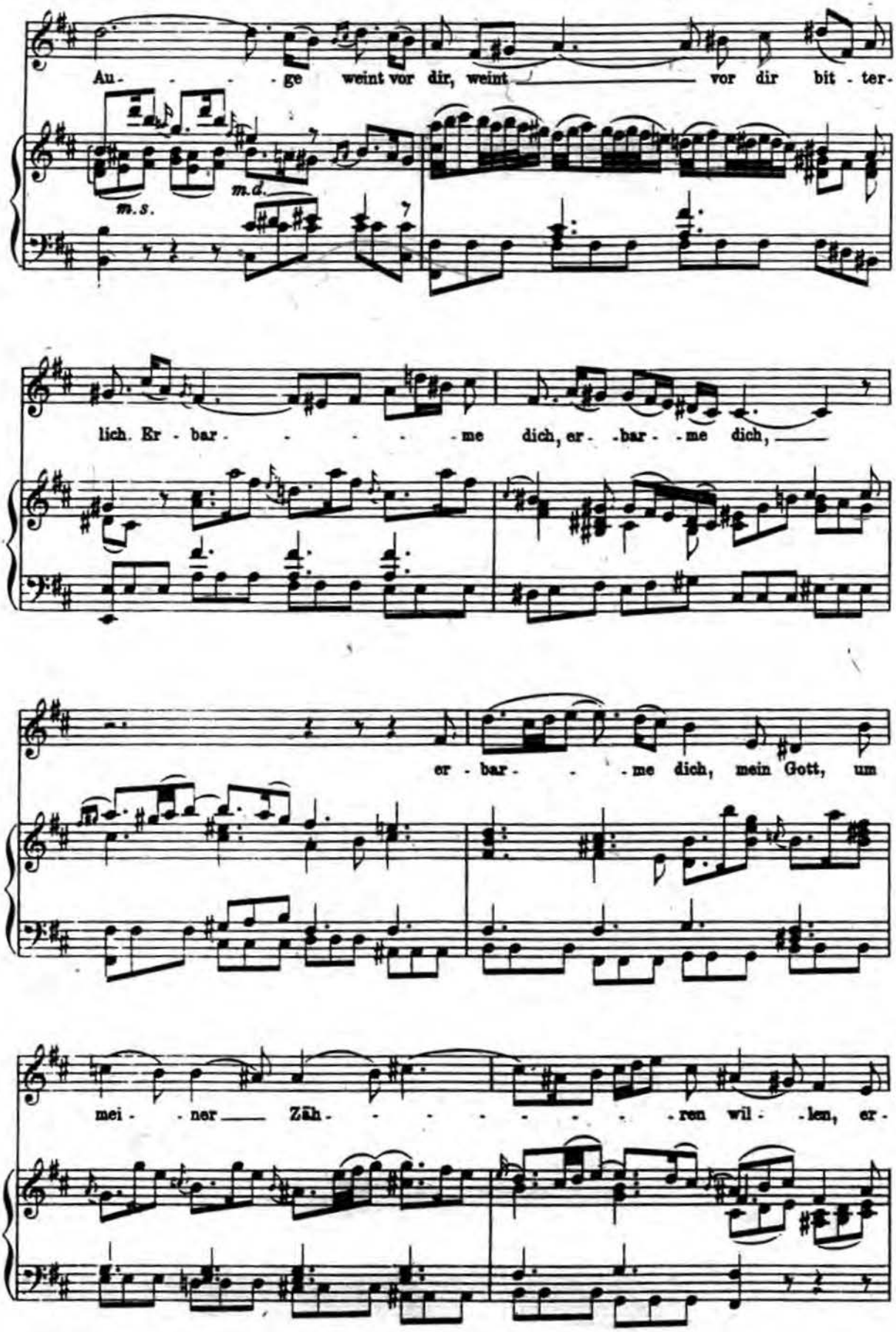
Nancy

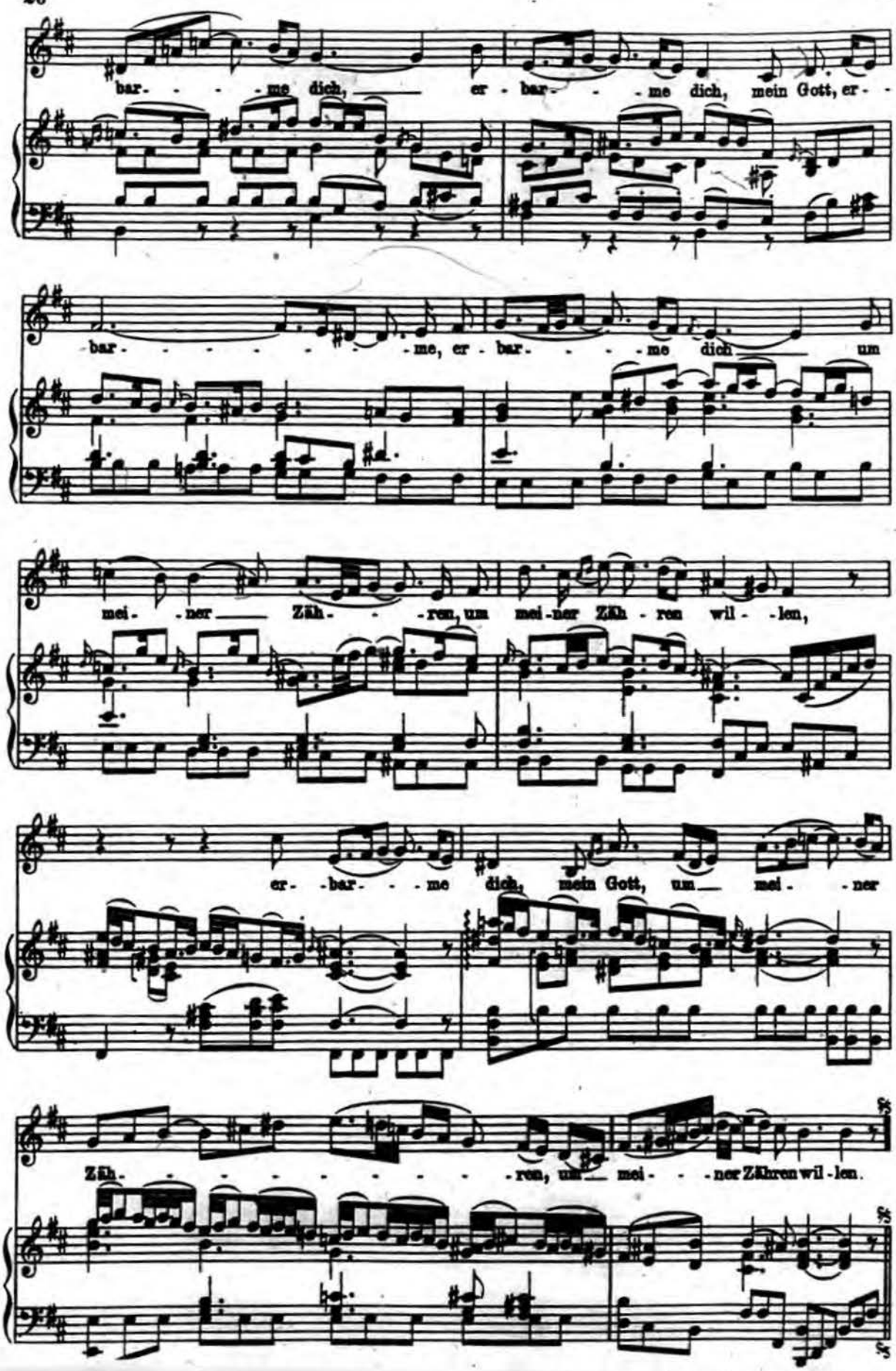
Cantor Nancy R. Ginsberg

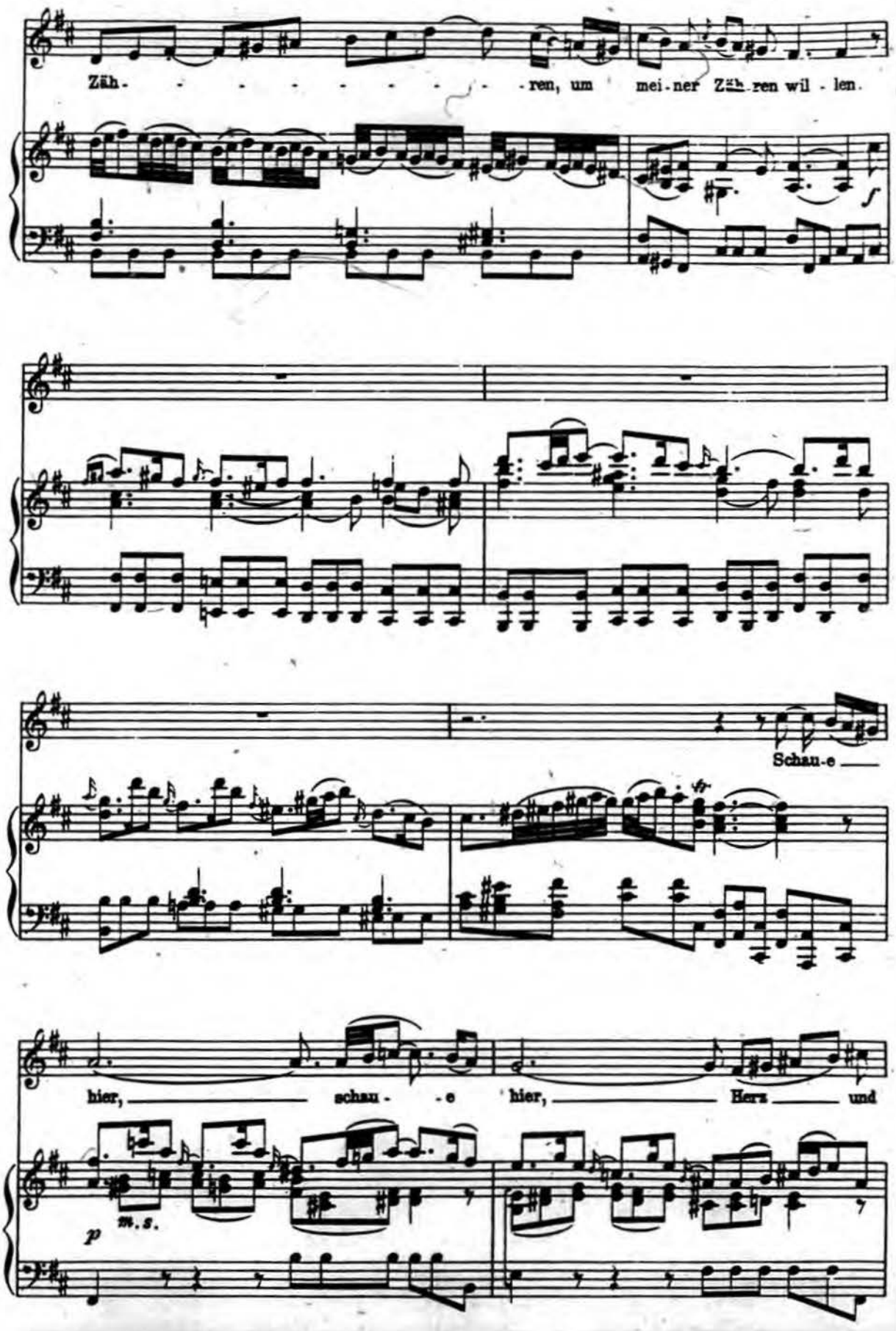
APPENDIX III: Operatic Musical Examples

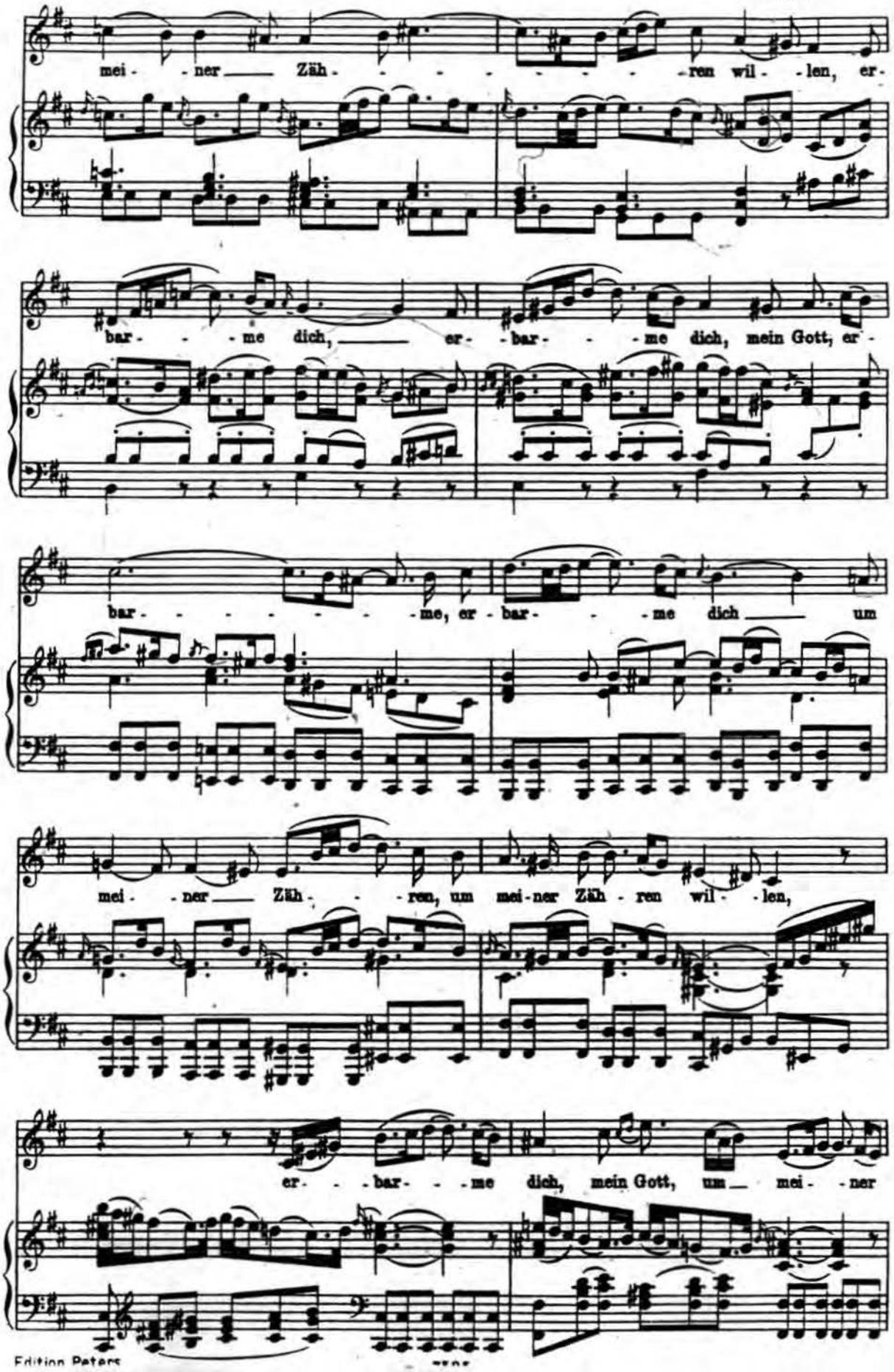
Matthäus-Passion von J. S. Bach




Au - - - - ge weint vor dir, weint vor dir bit - ter -
m.s.
m.d.
lich. Er - bar - - - - - me dich, er - bar - me dich,
er - bar - - - me dich, mein Gott, um
mei - - ner Zäh - - - - - - - - ren wil - len, er -

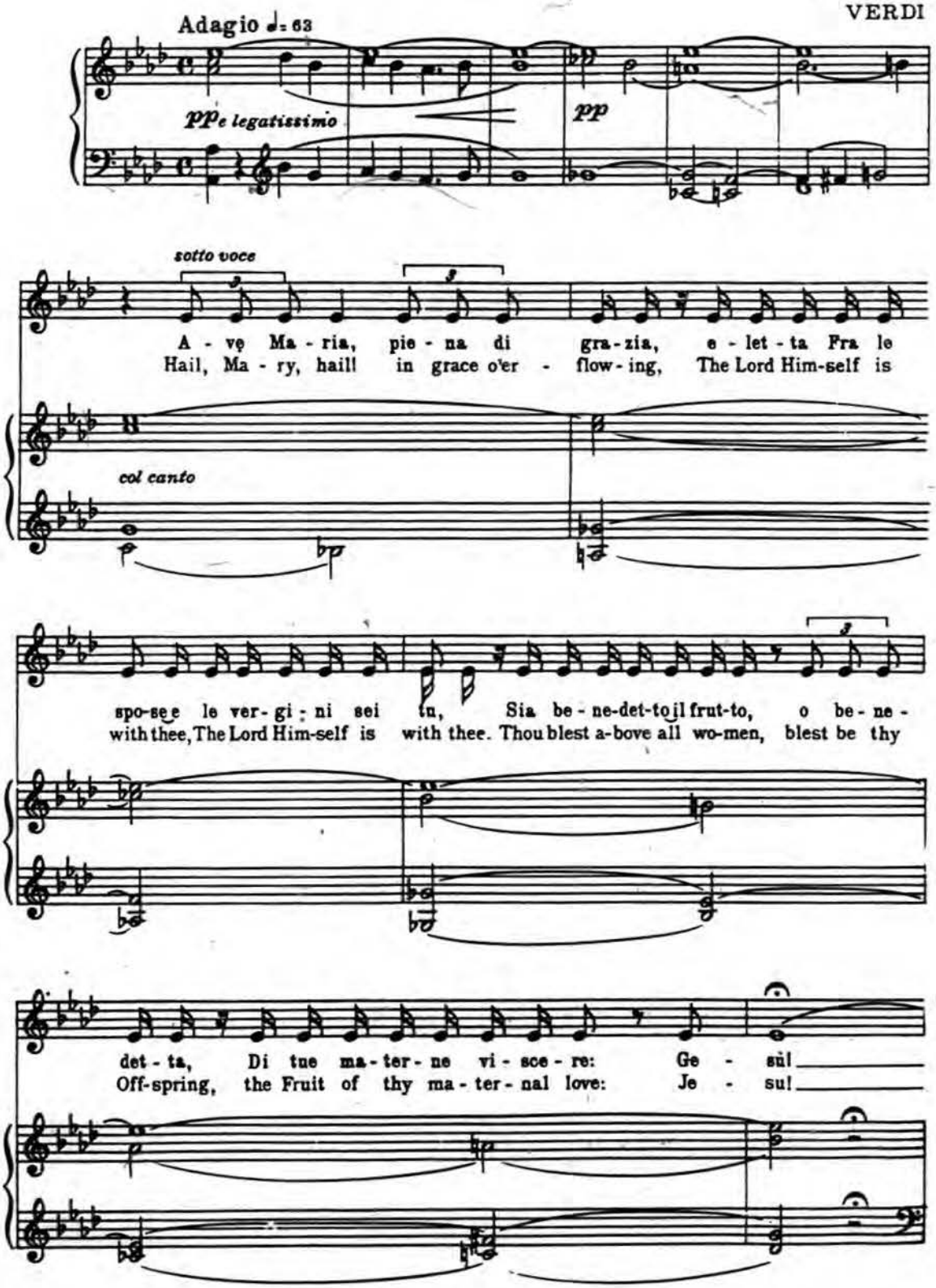

26
bar- - - - me dich, er - bar- - - me dich, mein Gott, er- -
bar- - - - - - - me, er - bar- - - - me dich um
mei- - ner Zäh- - - ren, um mei-ner Zäh - ren wil - len,
er- - bar- - - me dich, mein Gott, um mei- - ner
Zäh- - - - - - - - - ren, um mei- - - ner Zähren wil - len.

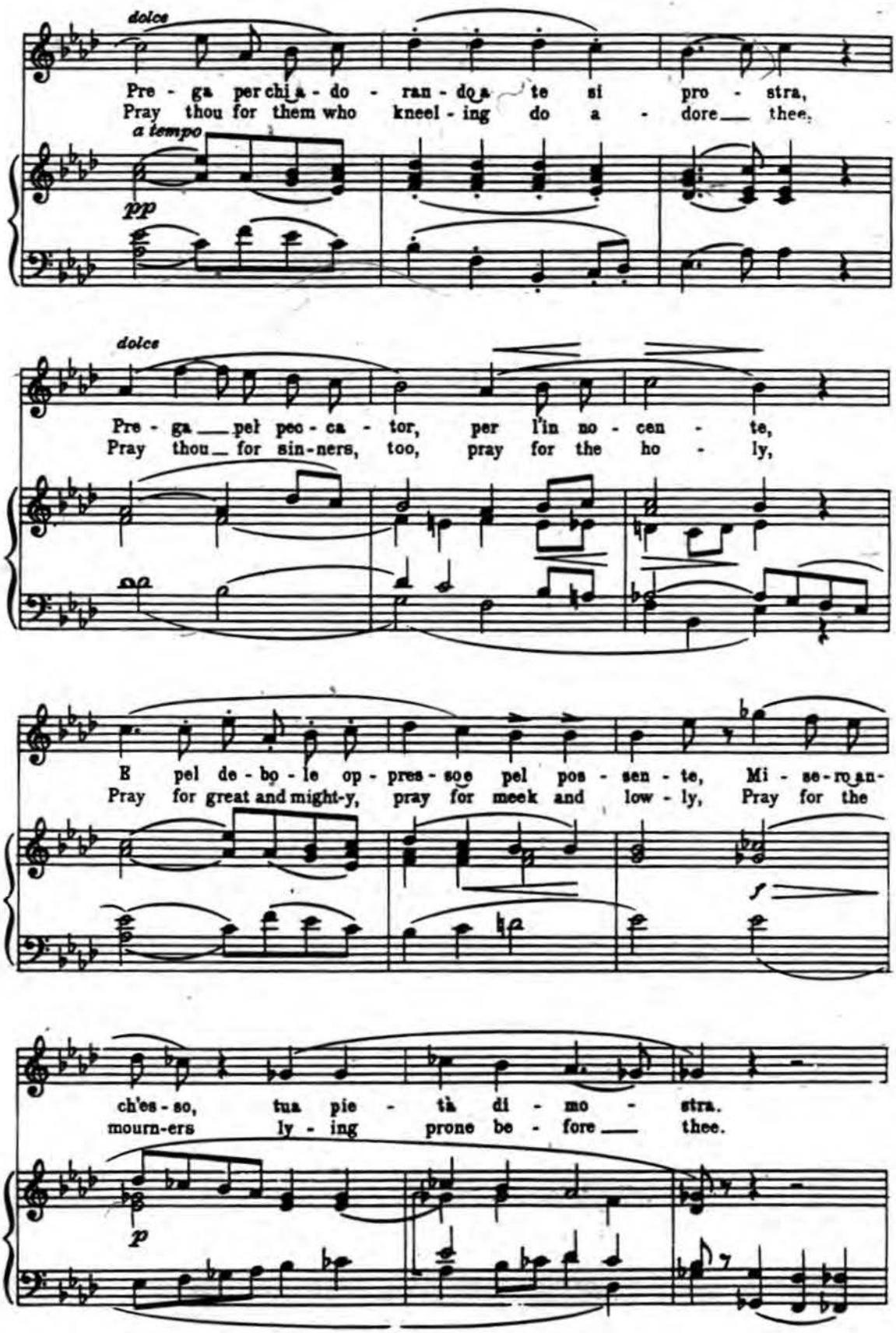

Zäh - - - - - - - - - - - - ren, um mei - ner Zäh - ren wil - len.
Schau - e
hier, schau - e hier, Herz und
m. s.
p

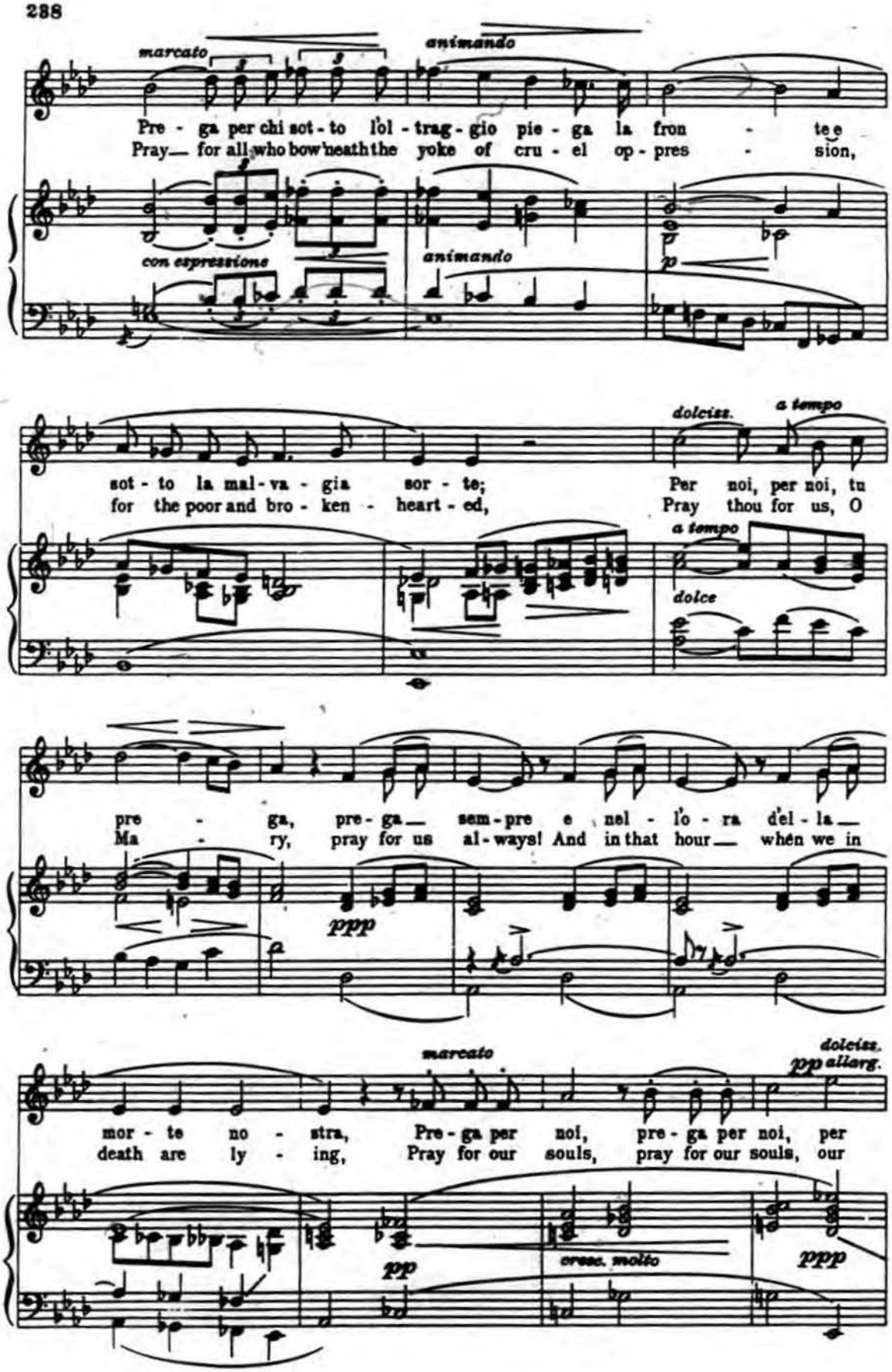

mei - - ner Zäh - - - - - - - - ren wil - - len, er -
bar - - - me dich, er - bar - - - me dich, mein Gott, er -
bar - - - - - - - me, er - bar - - - me dich um
mei - - ner Zäh - - - ren, um mei - ner Zäh - ren wil - - len,
er - - bar - - - me dich, mein Gott, um mei - - ner

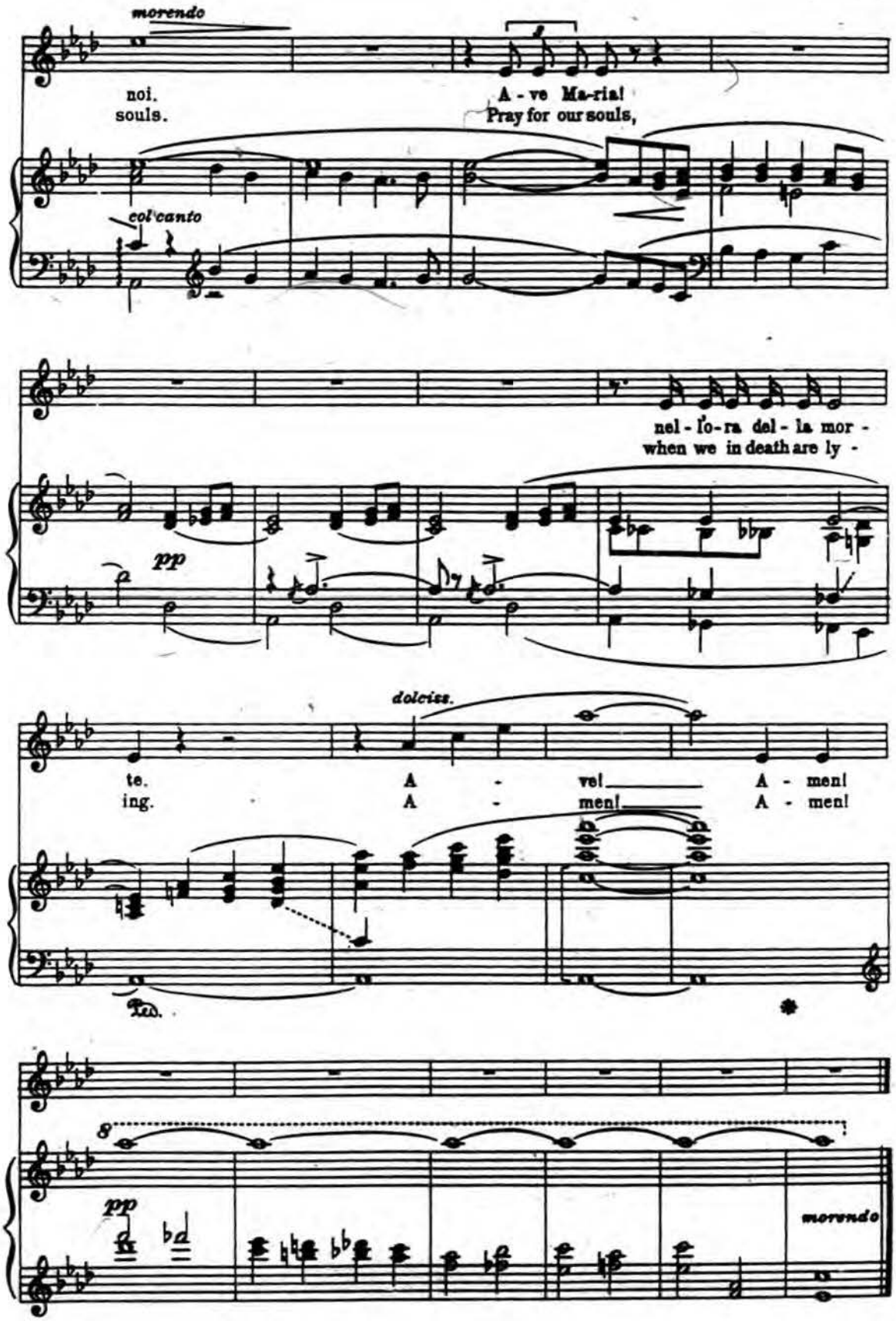
Prayer
Ave Maria
(OTELLO)

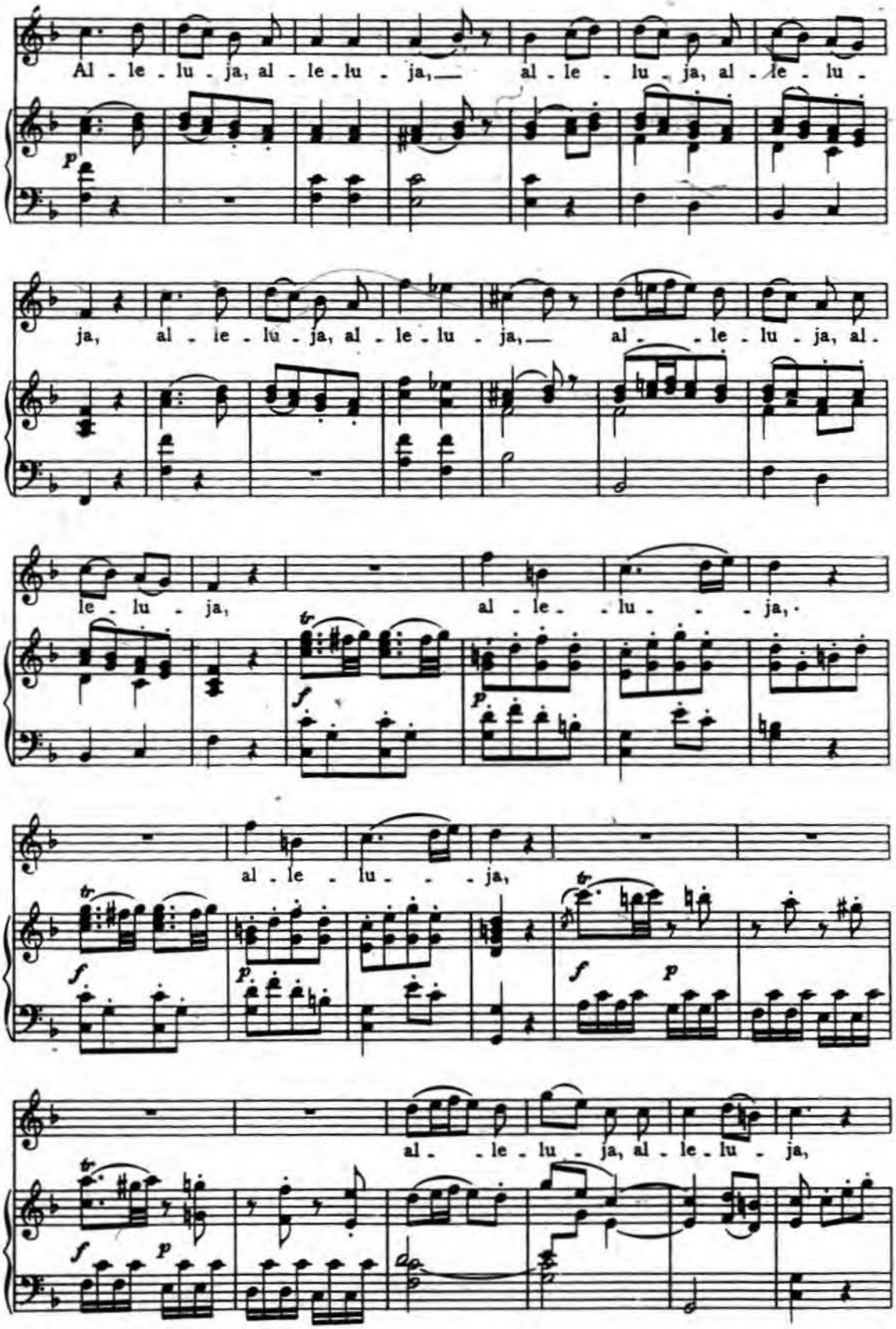
VERDI



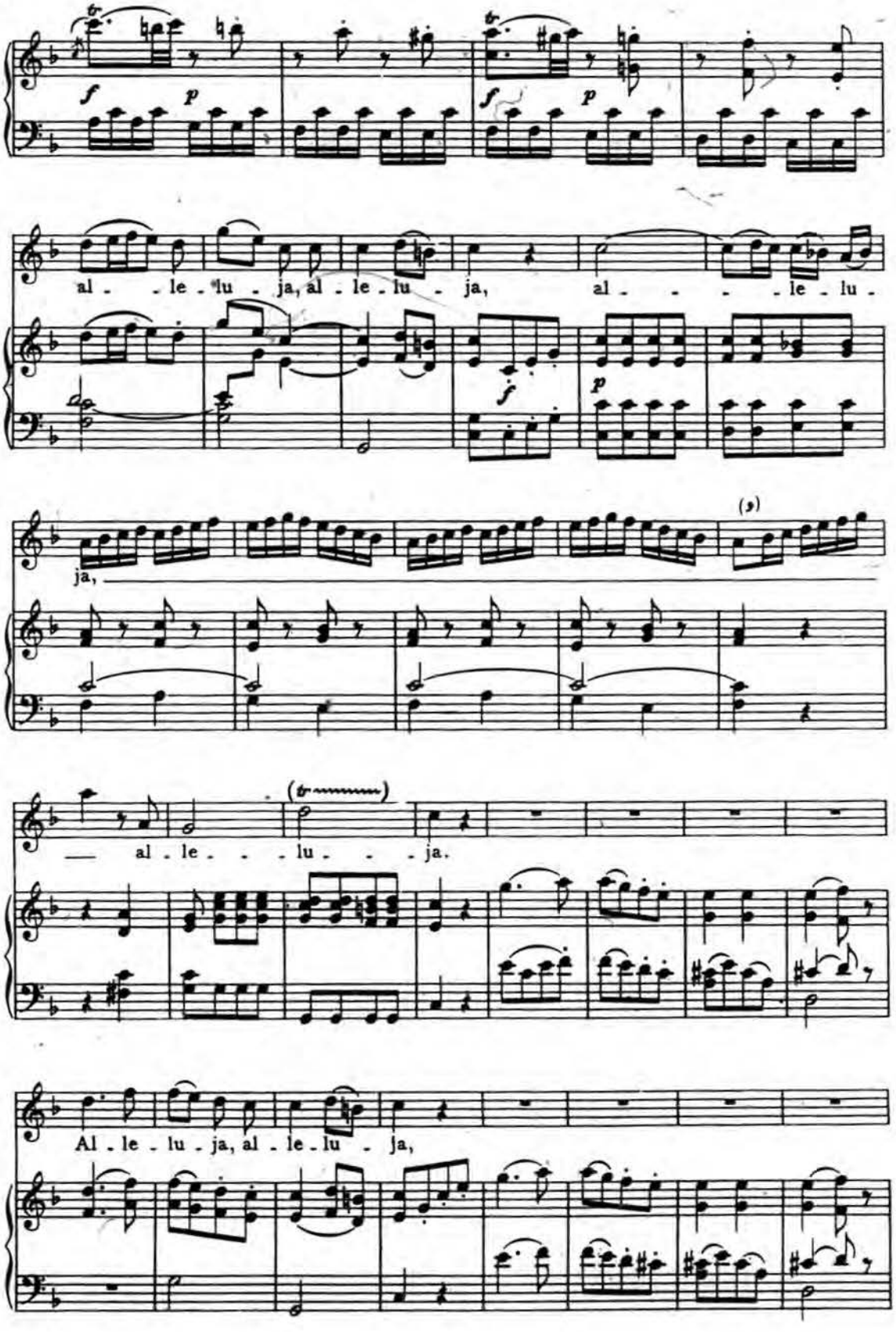

dolce
Pre - ga per chi a - do - ran - do a te si pro - stra,
Pray thou for them who kneel - ing do a - dore thee,
a tempo
pp
dolce
Pre - ga pel pec - ca - tor, per l'in no - cen - te,
Pray thou for sin-ners, too, pray for the ho - ly,
E pel de - bo - le op - pres - so e pel pos - sen - te, Mi - se - ro an-
Pray for great and might-y, pray for meek and low - ly, Pray for the
f
ch'es - so, tua pie - tà di - mo - stra.
mourn-ers ly - ing prone be - fore thee.
p

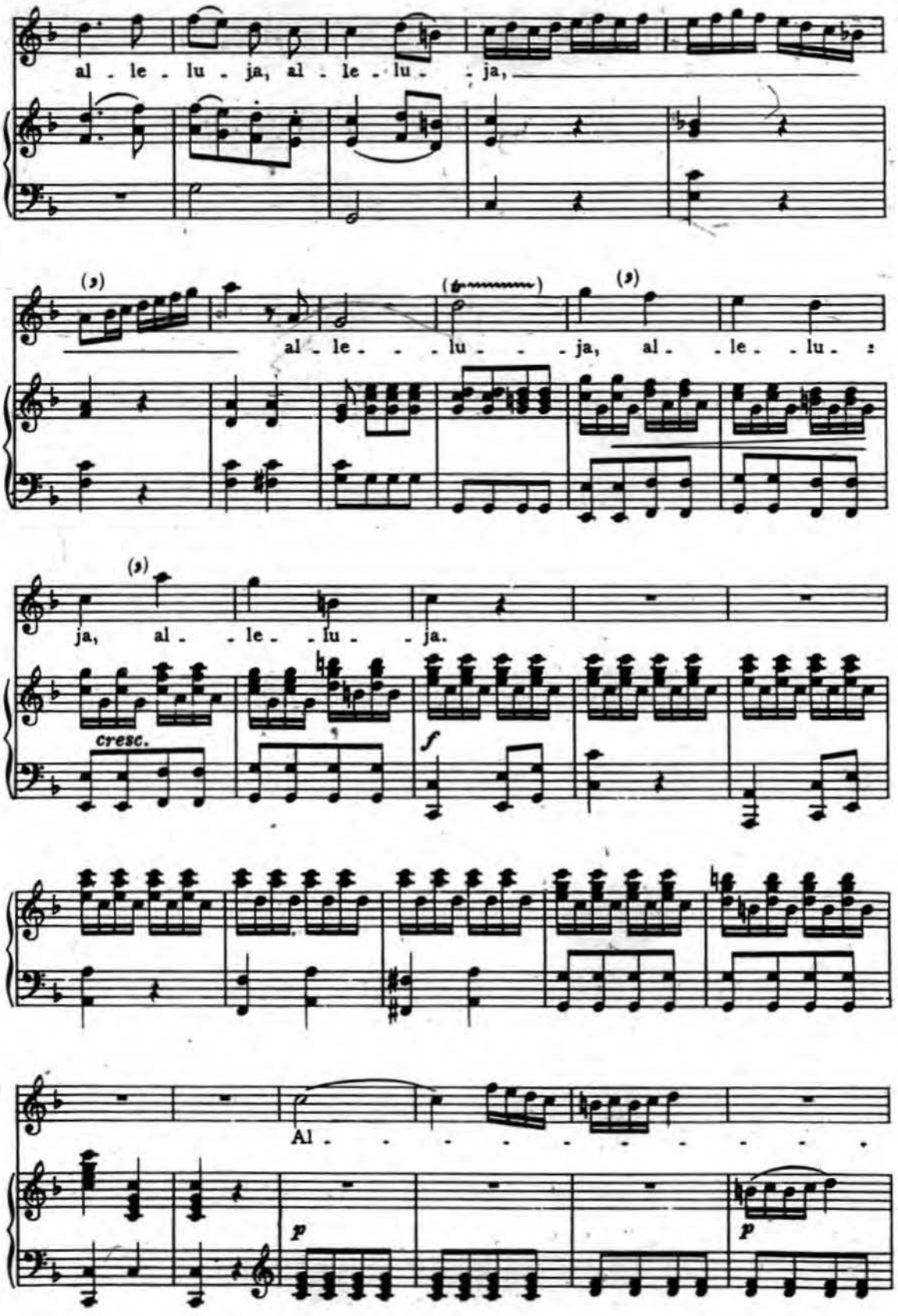

288
marcato
animando
Pre - ga per chi sot - to l'ol - trag - gio pie - ga la fron - te e
Pray for all who bow 'neath the yoke of cru - el op - pres - sion,
con espressione
animando
dolciss.
a tempo
sot - to la mal - va - gia sor - te;
for the poor and bro - ken - heart - ed,
Per noi, per noi, tu
Pray thou for us, O
a tempo
dolce
pre - ga, pre - ga sem - pre e nel - l'o - ra d'el - la
Ma - ry, pray for us al - ways! And in that hour when we in
ppp
marcato
dolciss.
pp allarg.
mor - te no - stra, Pre - ga per noi, pre - ga per noi, per
death are ly - ing, Pray for our souls, pray for our souls, our
pp
cresc. molto
ppp

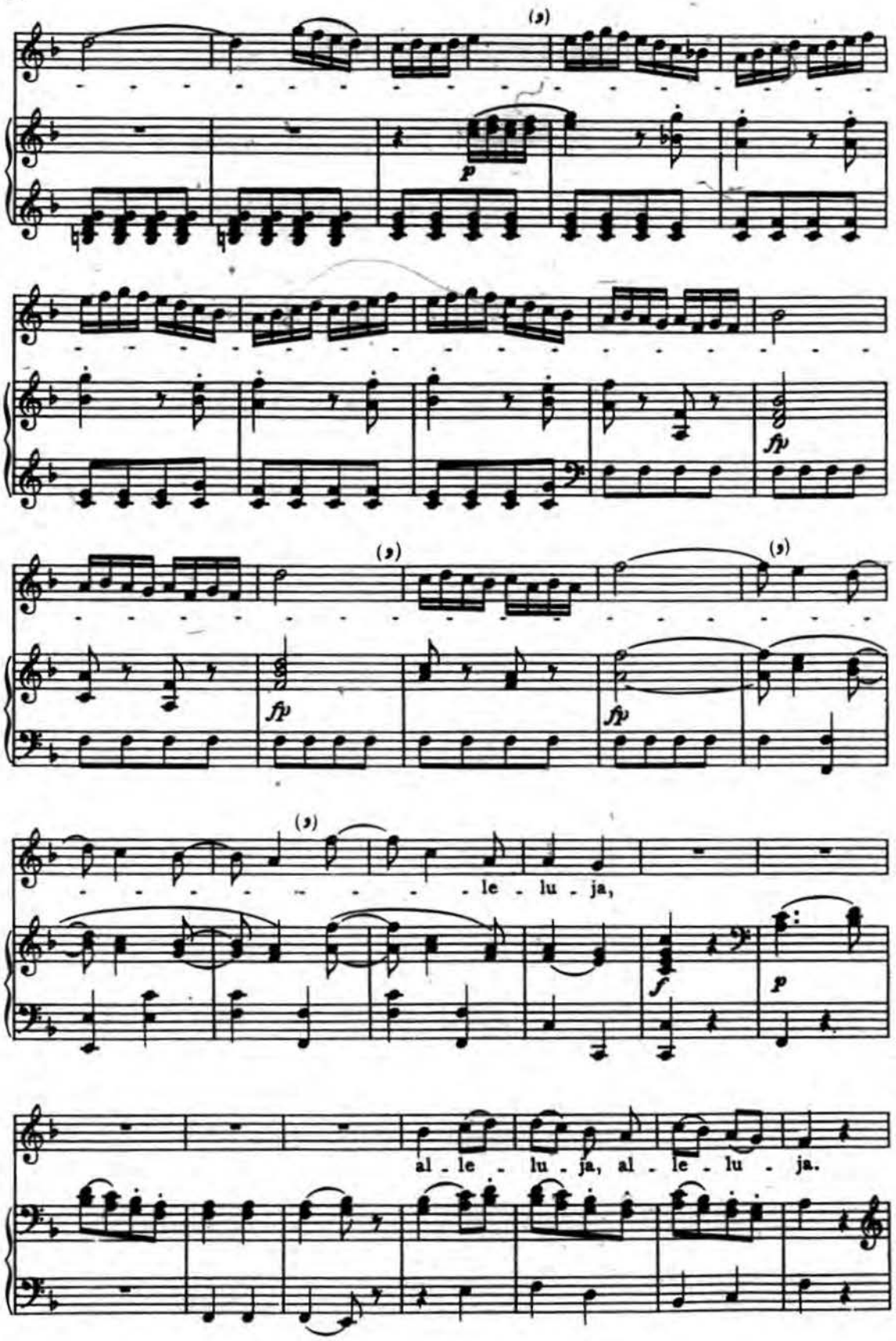

morendo
noi.
souls.
A - ve Ma-ria!
Pray for our souls,
col canto
nel - l'o-ra del - la mor -
when we in death are ly -
pp
dolciss.
te.
ing.
A - vel
A - men!
A - men!
A - men!
Ped.
8
pp
morendo

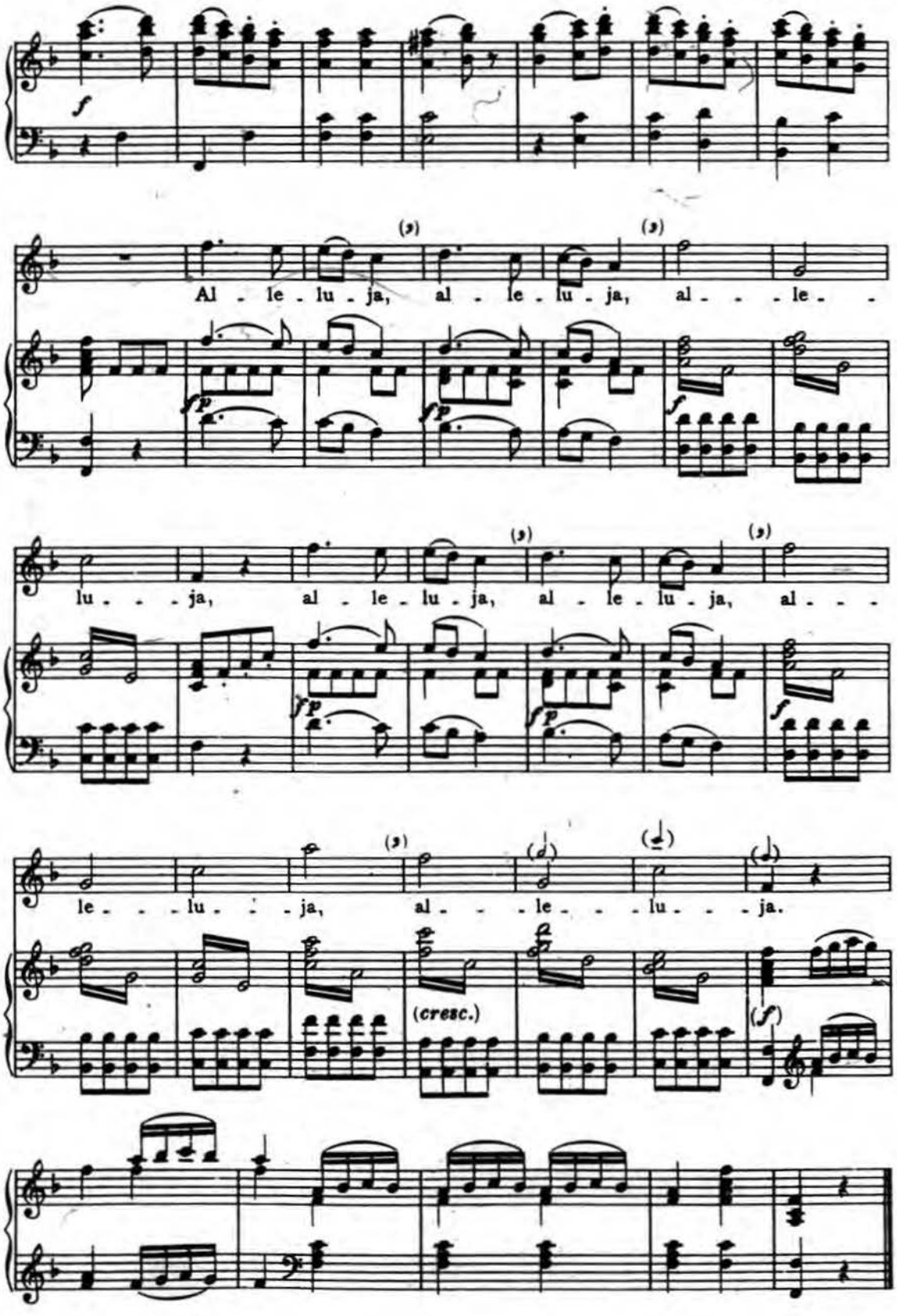

Al - le - lu - ja, al - le - lu - ja, al - le - lu - ja, al - le - lu -
ja, al - le - lu - ja, al - le - lu - ja, al - le - lu - ja, al -
le - lu - ja, al - le - lu - ja,
al - le - lu - ja,
al - le - lu - ja, al - le - lu - ja,

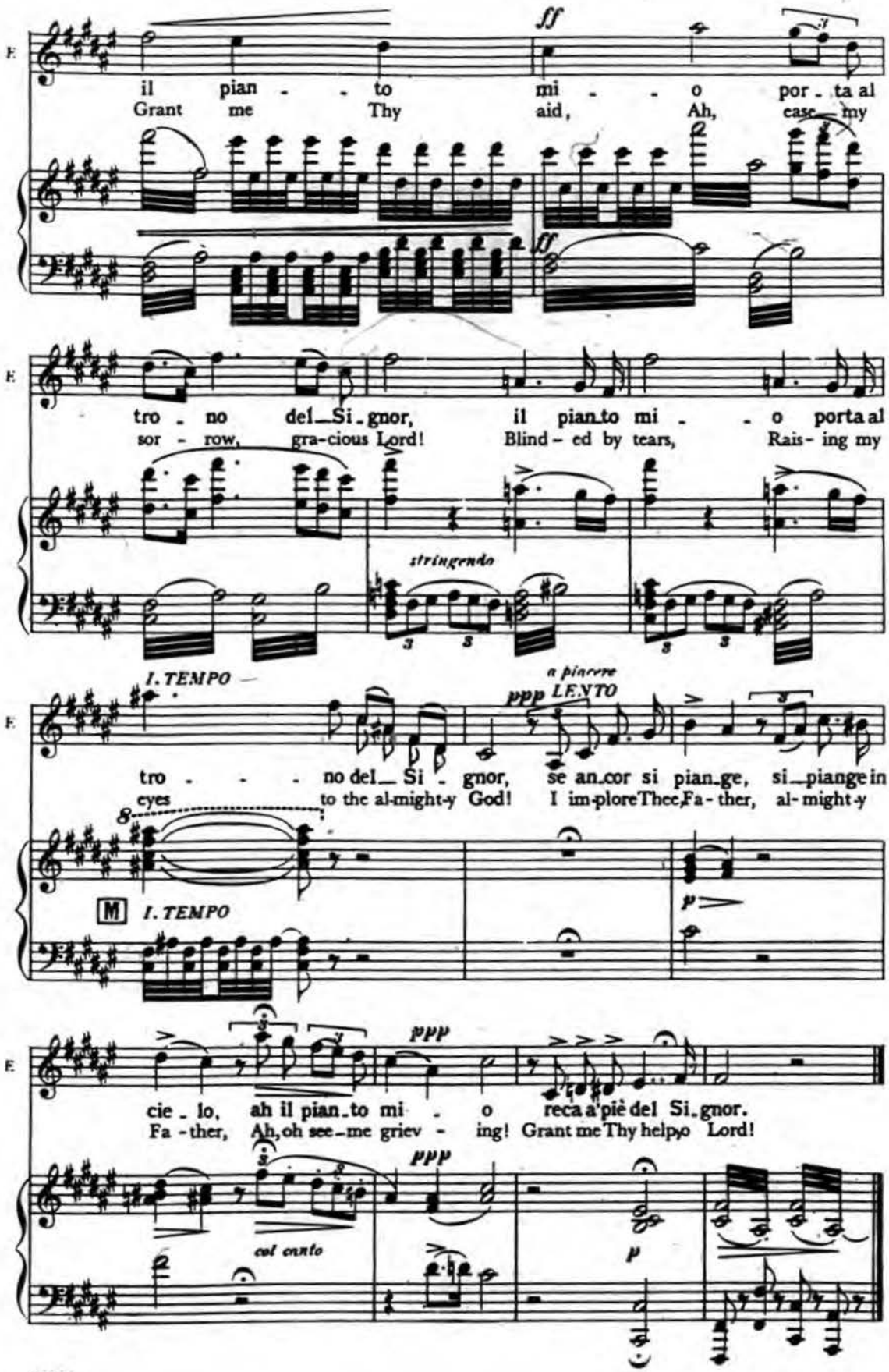
20



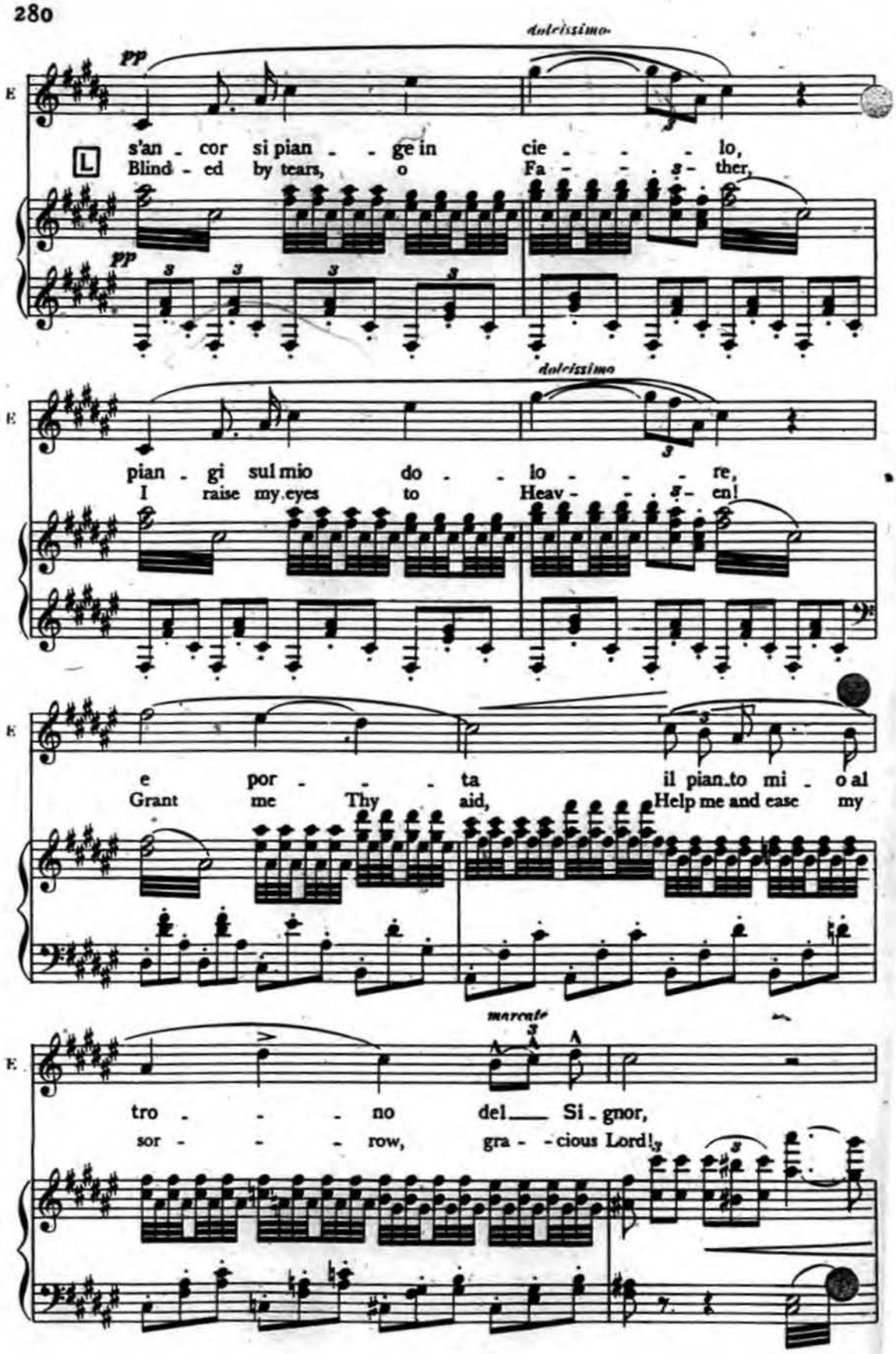

al - le - lu - ja, al - le - lu - ja,
al - le - - - lu - - - ja, al - le - lu - :
ja, al - le - lu - ja.
cresc.
f
Al - - - - - - - - - - -
p
p


p
fp
fp
fp
le - lu - ja,
f
p
al - le - lu - ja, al - le - lu - ja.


Al - le - lu - ja, al - le - lu - ja, al - - - le -
lu - - - ja, al - le - lu - ja, al - le - lu - ja, al - - -
le - - - lu - - - ja, al - - - le - - - lu - - - ja.
(cresc.)

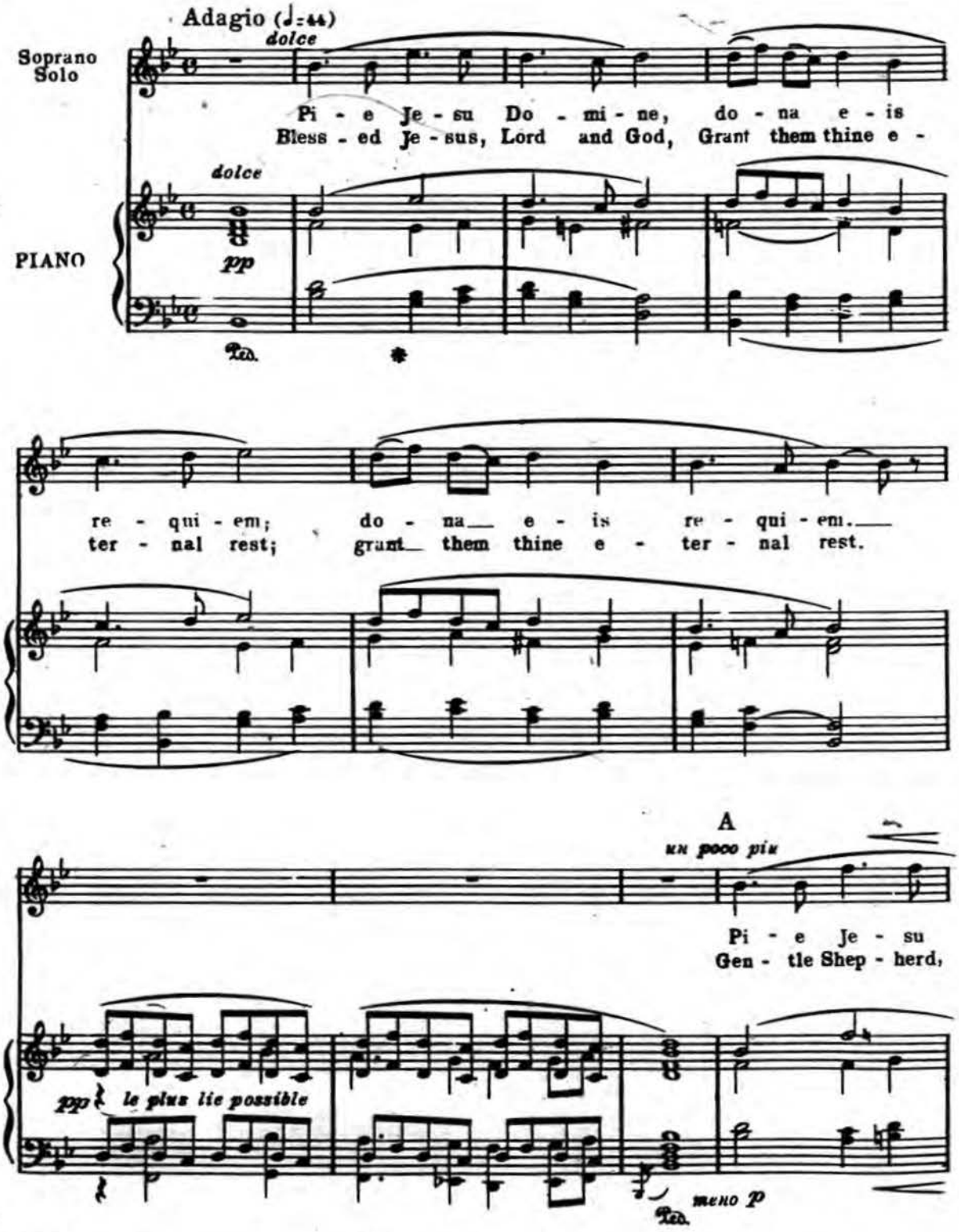

ff
il pian - - to mi - - o por - ta al
Grant me Thy aid, Ah, ease my
tro - no del Si - gnor, il pian to mi - - o porta al
sor - row, gra-cious Lord! Blind - ed by tears, Rais - ing my
stringendo
I. TEMPO
a piacere
ppp LENTO
tro - - - no del Si - gnor, se an cor si pian ge, si piange in
eyes to the al-might-y God! I im-plore Thee, Fa - ther, al-might-y
M I. TEMPO
p
ppp
cie - lo, ah il pian to mi - o reca a'piè del Si gnor.
Fa - ther, Ah, oh see - me griev - ing! Grant me Thy help, o Lord!
ppp
col canto
p

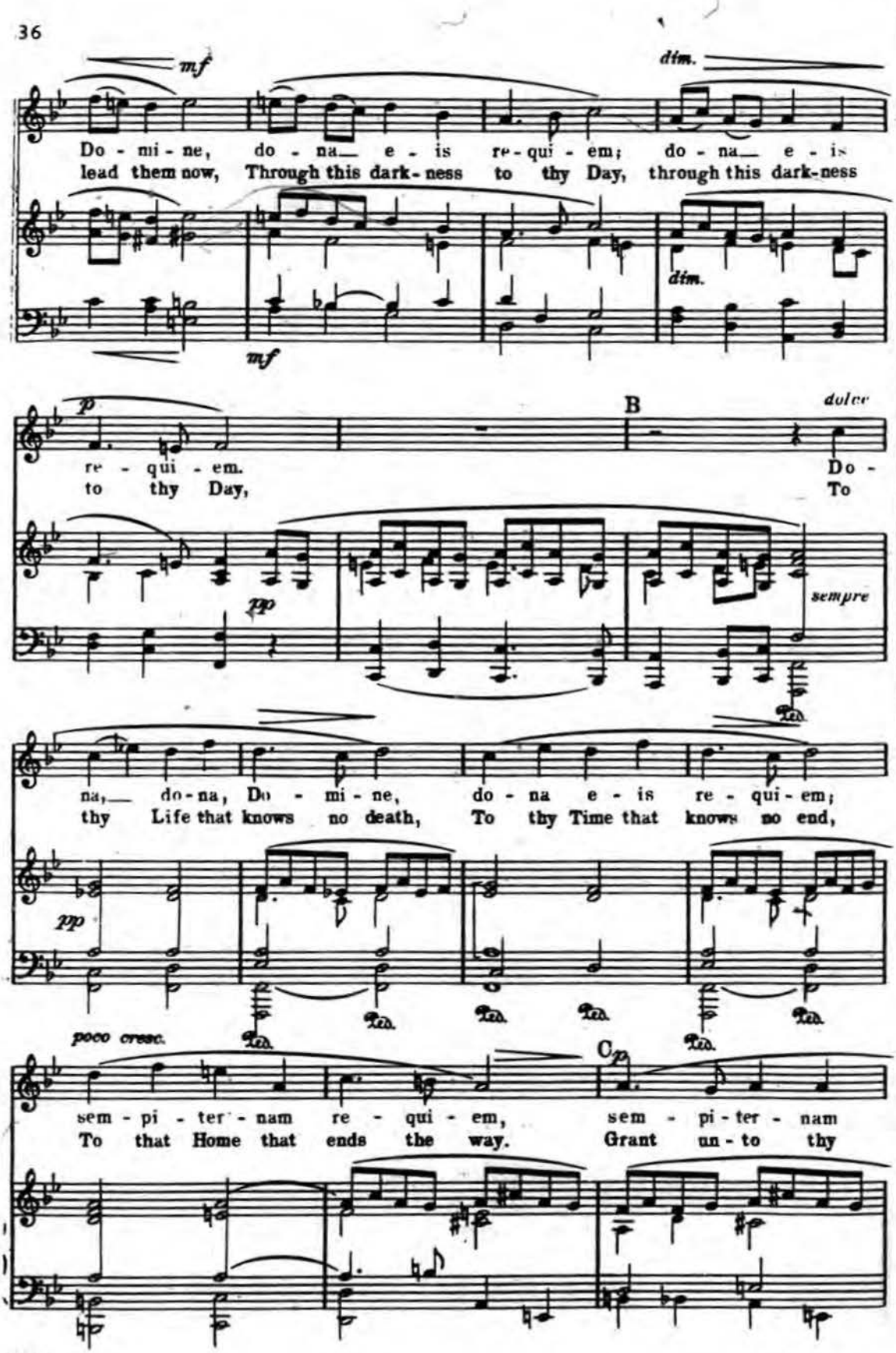
280

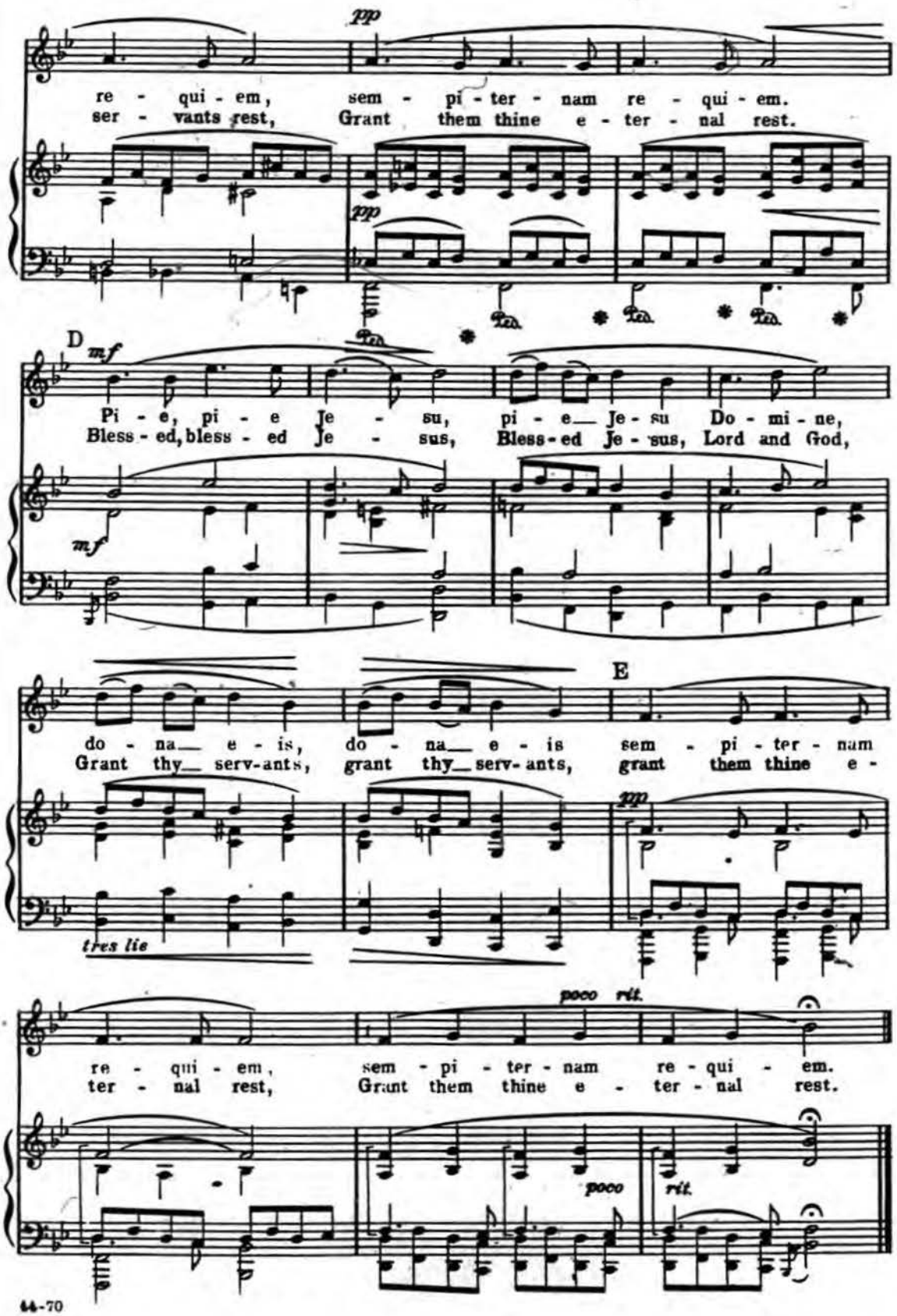

dolcissimo
pp
E
L
s'an - cor si pian - - ge in cie - - - lo,
Blind - ed by tears, o Fa - - - ther,
pp
3 3 3 3
dolcissimo
E
pian - gi sul mio do - - lo - - - re,
I raise my eyes to Heav - - - en!
E
e por - - - ta il pian.to mi - o al
Grant me Thy aid, Help me and ease my
marcato
E
tro - - - no del Si - gnor,
sor - - - row, gra - - cious Lord!

IV - Pie Jesu

(Blessed Jesus)



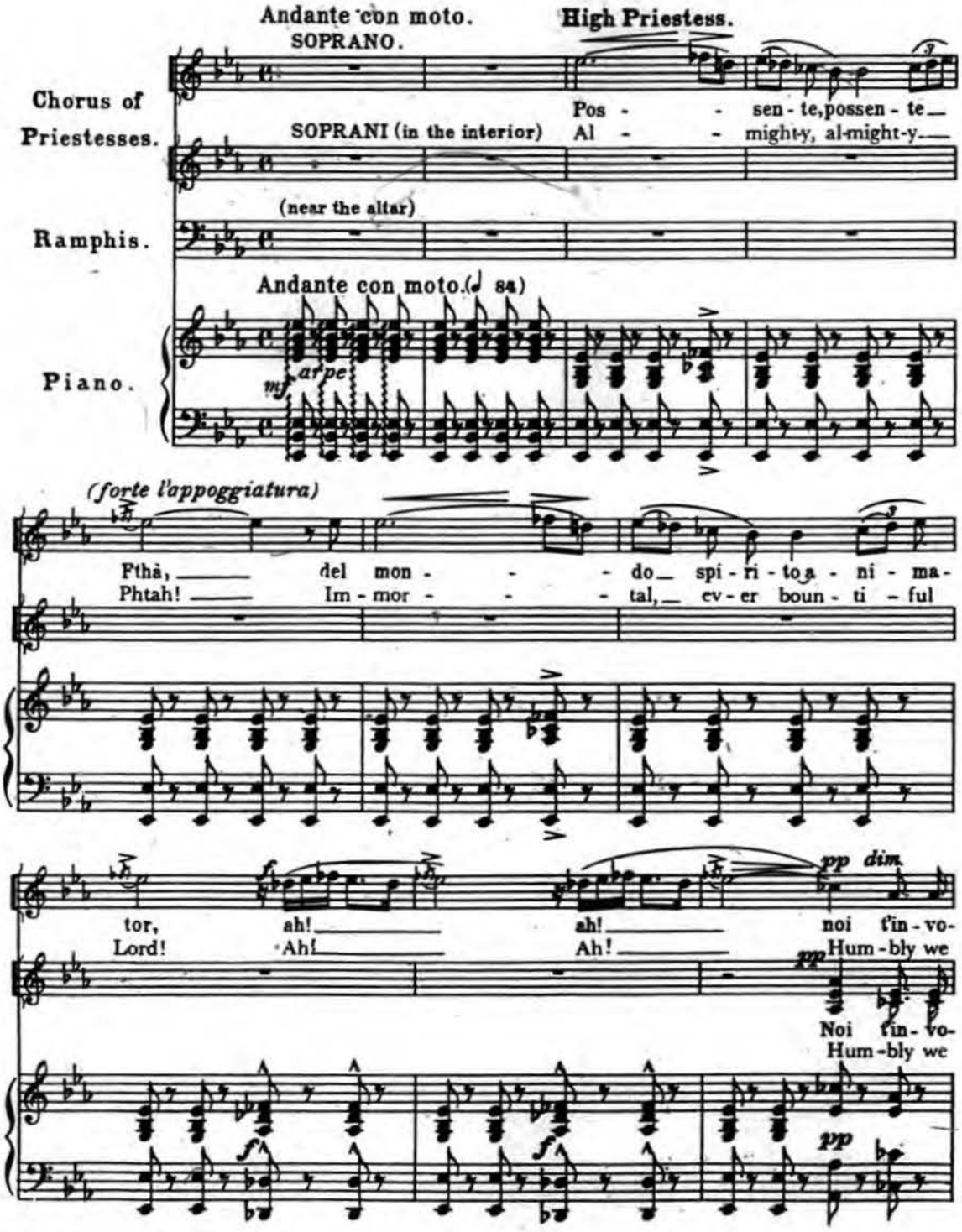

36
mf
dim.
Do - mi - ne, do - na e - is re - qui - em; do - na e - is
lead them now, Through this dark - ness to thy Day, through this dark - ness
dim.
mf
p
B
dolce
re - qui - em.
to thy Day,
Do -
To
pp
sempre
na, do - na, Do - mi - ne, do - na e - is re - qui - em;
thy Life that knows no death, To thy Time that knows no end,
pp
poco cresc.
C
p
sem - pi - ter - nam re - qui - em, sem - pi - ter - nam
To that Home that ends the way. Grant un - to thy

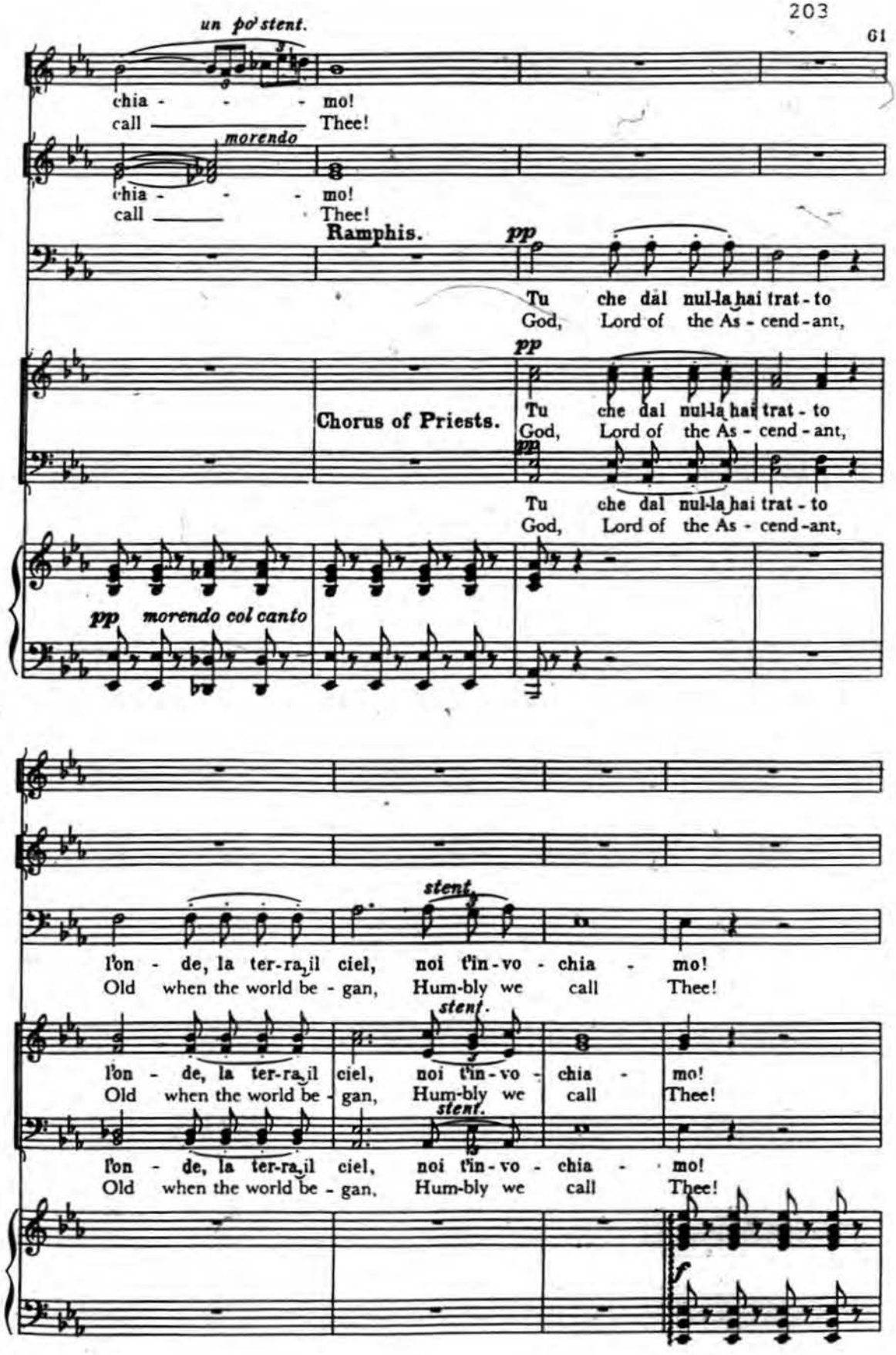

pp
re - qui - em, sem - pi - ter - nam re - qui - em.
ser - vants rest, Grant them thine e - ter - nal rest.
pp
D
mf
Pi - e, pi - e Je - su, pi - e Je - su Do - mi - ne,
Bless - ed, bless - ed Je - sus, Bless - ed Je - sus, Lord and God,
mf
E
do - na e - is, do - na e - is sem - pi - ter - nam
Grant thy serv-ants, grant thy serv-ants, grant them thine e -
pp
très lie
poco rit.
re - qui - em, sem - pi - ter - nam re - qui - em.
ter - nal rest, Grant them thine e - ter - nal rest.
poco
rit.

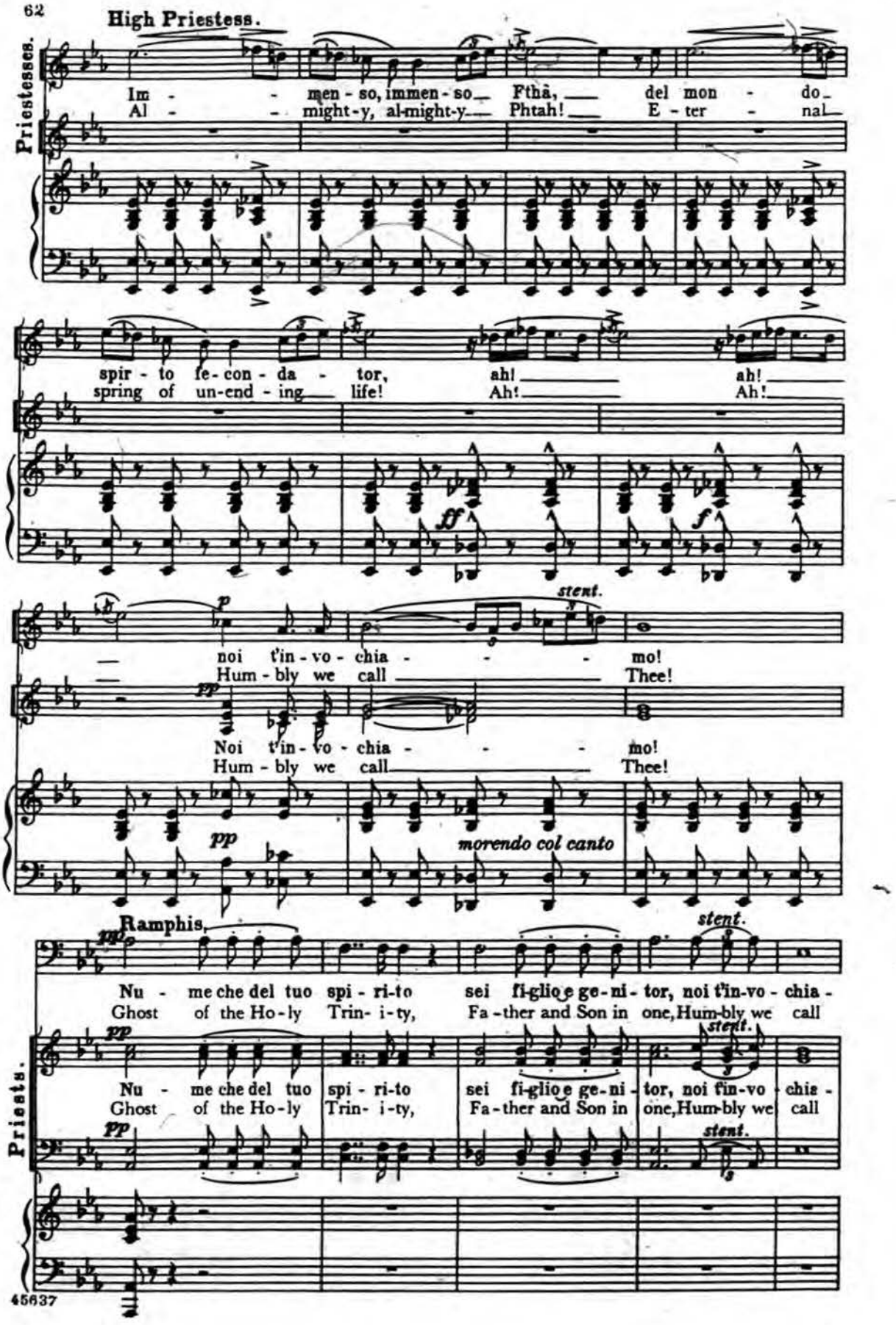
60

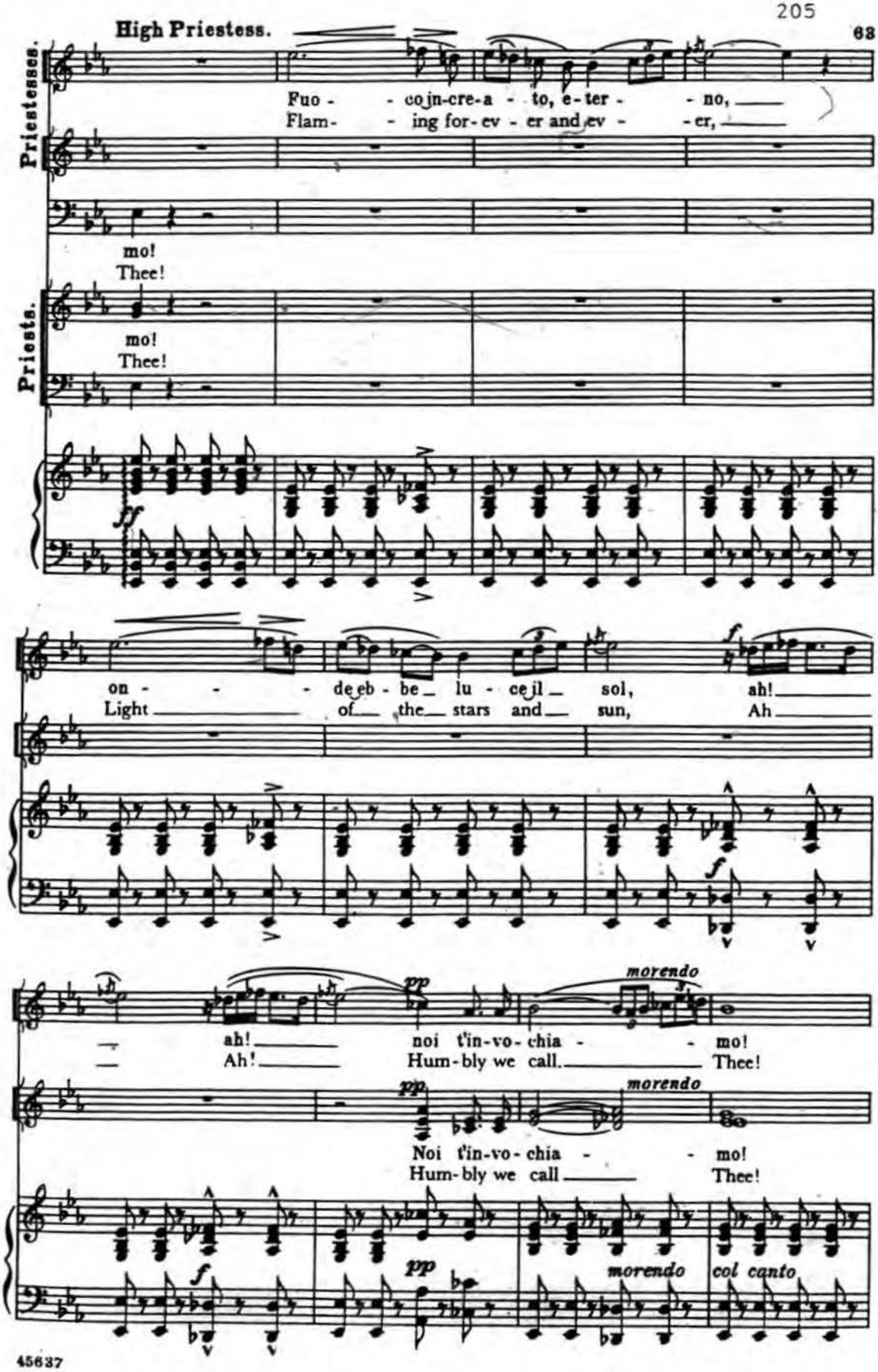
Grand Scene of the Consecration, and first Finale.

SCENE II. Interior of the Temple of Vulcan at Memphis.
A mysterious light from above. A long row of columns, one behind the other, vanishing in darkness. Statues of various deities. In the middle of the stage, above a platform covered with carpet, rises the altar, surmounted with sacred emblems. Golden tripods emitting the fumes of incense.



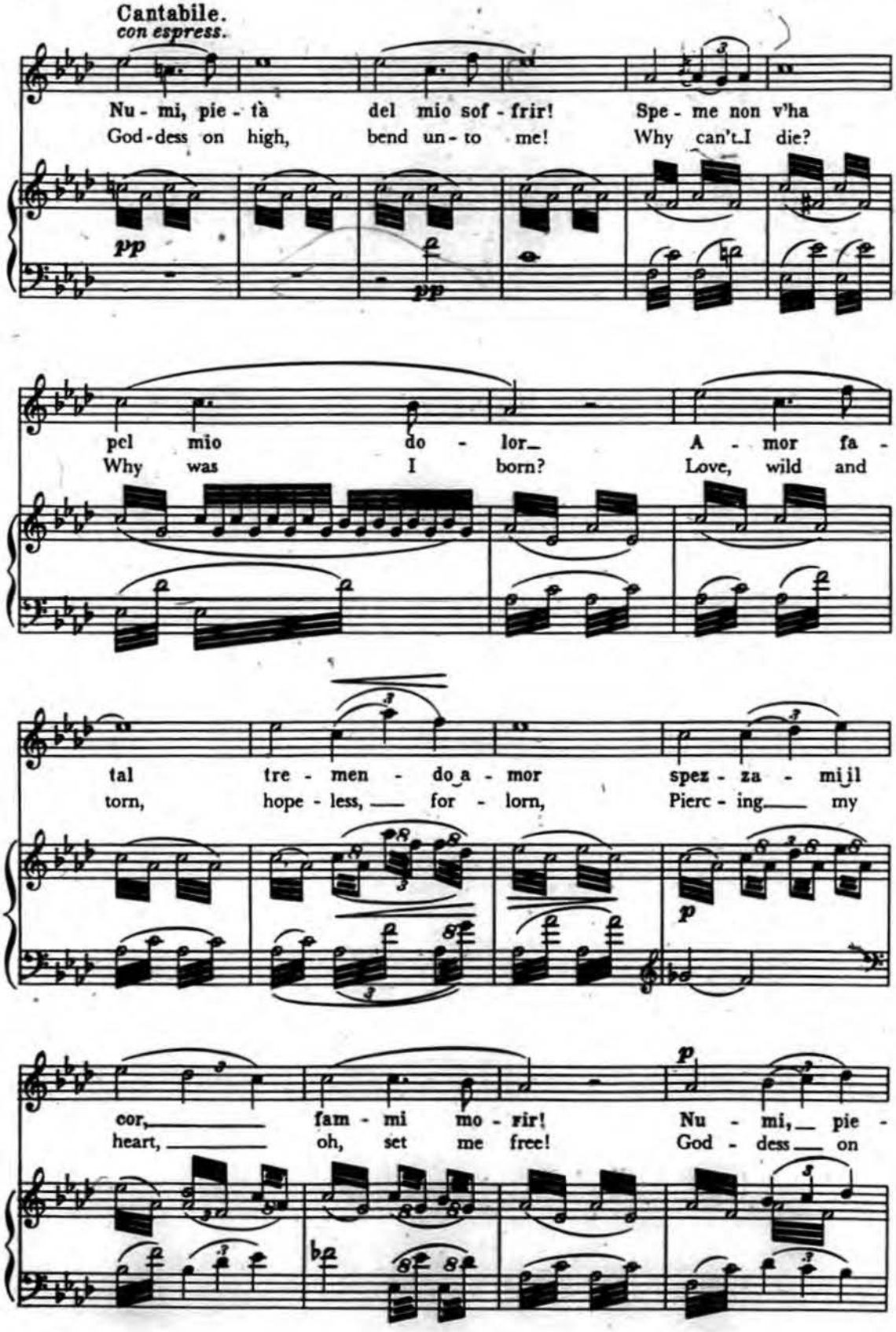

un po' stent.
chia - - - mo!
call ——— Thee!
morendo
chia - - - mo!
call ——— Thee!
Ramphis.
pp
Tu che dal nul-la hai trat - to
God, Lord of the As - cend - ant,
pp
Chorus of Priests.
Tu che dal nul-la hai trat - to
God, Lord of the As - cend - ant,
pp
Tu che dal nul-la hai trat - to
God, Lord of the As - cend - ant,
pp morendo col canto
stent.
l'on - de, la ter-ra, il ciel, noi t'in - vo - chia - mo!
Old when the world be - gan, Hum-bly we call Thee!
stent.
l'on - de, la ter-ra, il ciel, noi t'in - vo - chia - mo!
Old when the world be - gan, Hum-bly we call Thee!
stent.
l'on - de, la ter-ra, il ciel, noi t'in - vo - chia - mo!
Old when the world be - gan, Hum-bly we call Thee!
f

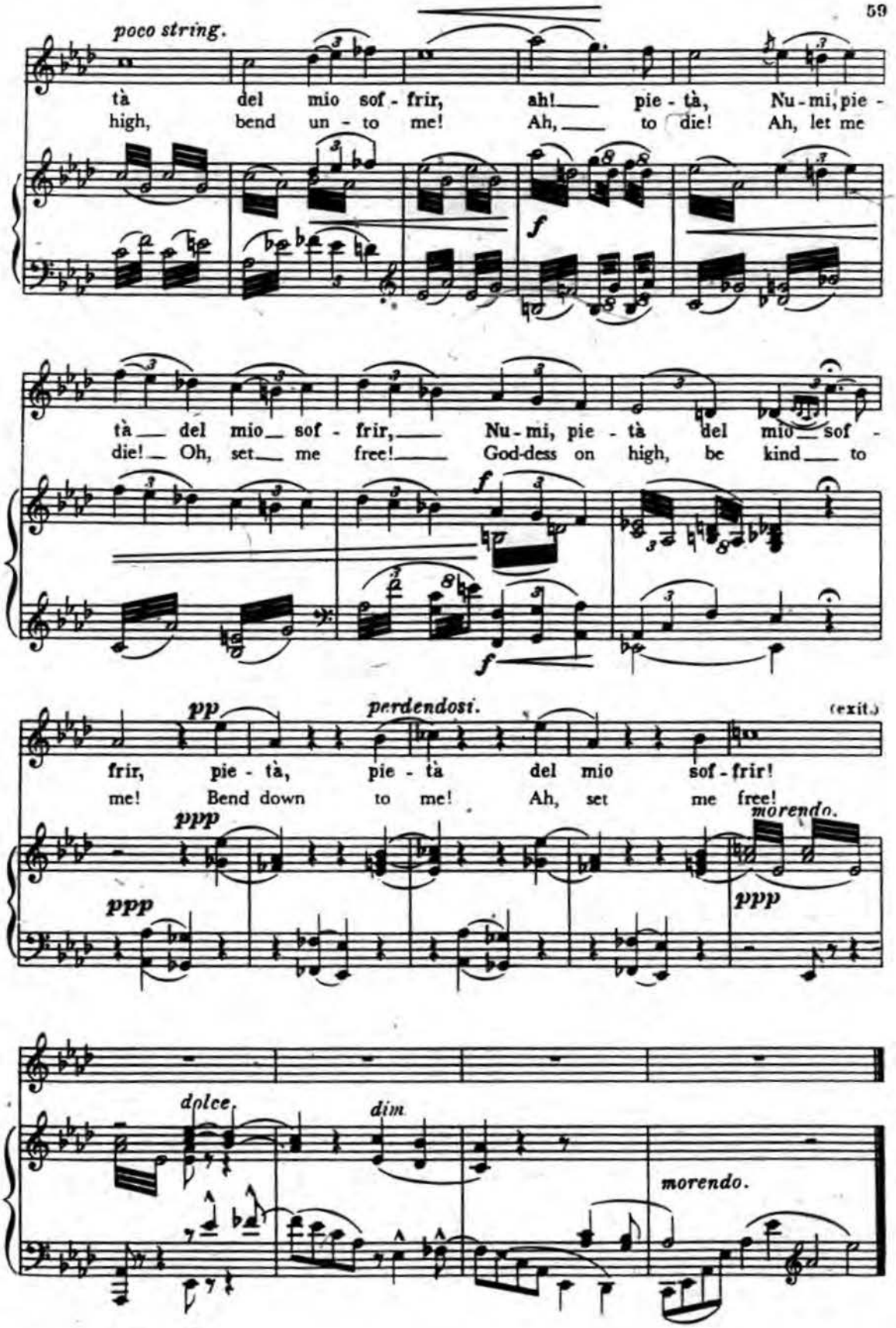

62
High Priestess.
Priestesses.
Im - men - so, immen - so Fthà, del mon - do
Al - might-y, al-might-y Phtah! E - ter - nal
spir - to fe - con - da - tor, ah! ah!
spring of un-end - ing life! Ah! Ah!
ff
f
stent.
p
noi t'in - vo - chia - mo!
Hum - bly we call Thee!
pp
Noi t'in - vo - chia - mo!
Hum - bly we call Thee!
pp
morendo col canto
Ramphis.
ppp
stent.
Nu - me che del tuo spi - ri-to sei fi-glio e ge-ni - tor, noi t'in-vo - chia -
Ghost of the Ho-ly Trin- i-ty, Fa-ther and Son in one, Hum-bly we call
pp
stent.
Priests.
Nu - me che del tuo spi - ri-to sei fi-glio e ge-ni - tor, noi t'in-vo - chia -
Ghost of the Ho-ly Trin- i-ty, Fa-ther and Son in one, Hum-bly we call
pp
stent.
45637


High Priestess.
Priestesses.
Fuo - - co jn-cre-a - to, e-ter - - no,
Flam- - ing for-ev - er and ev - - er,
mo!
Thee!
Priests.
mo!
Thee!
ff
on - - - de eb - be lu - ce jl sol, ah!
Light of the stars and sun, Ah
f
pp
morendo
ah! noi t'in-vo-chia - - mo!
Ah! Hum-bly we call. Thee!
pp
morendo
Noi t'in-vo-chia - - mo!
Hum-bly we call Thee!
f
pp
morendo
col canto

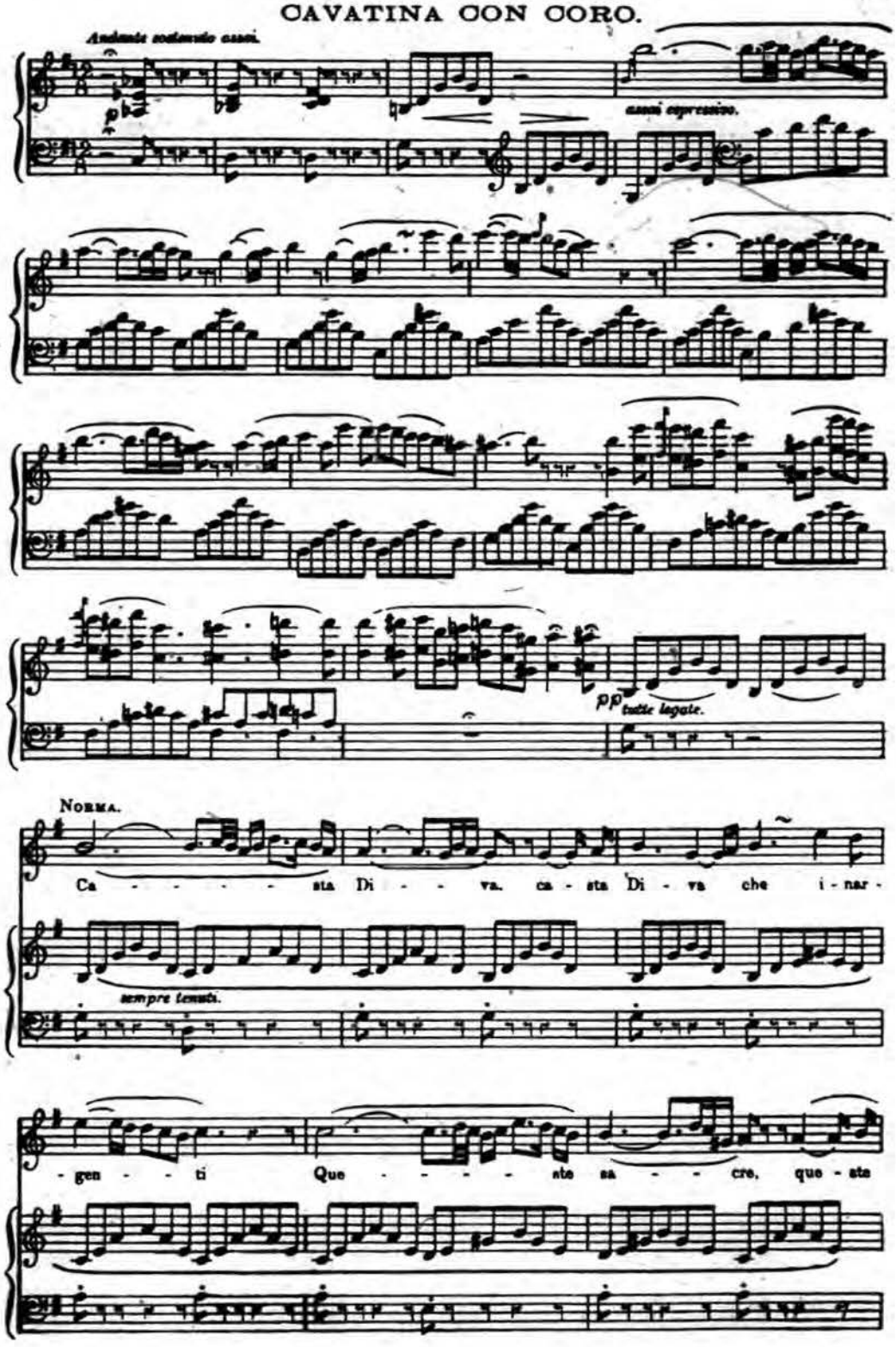
58

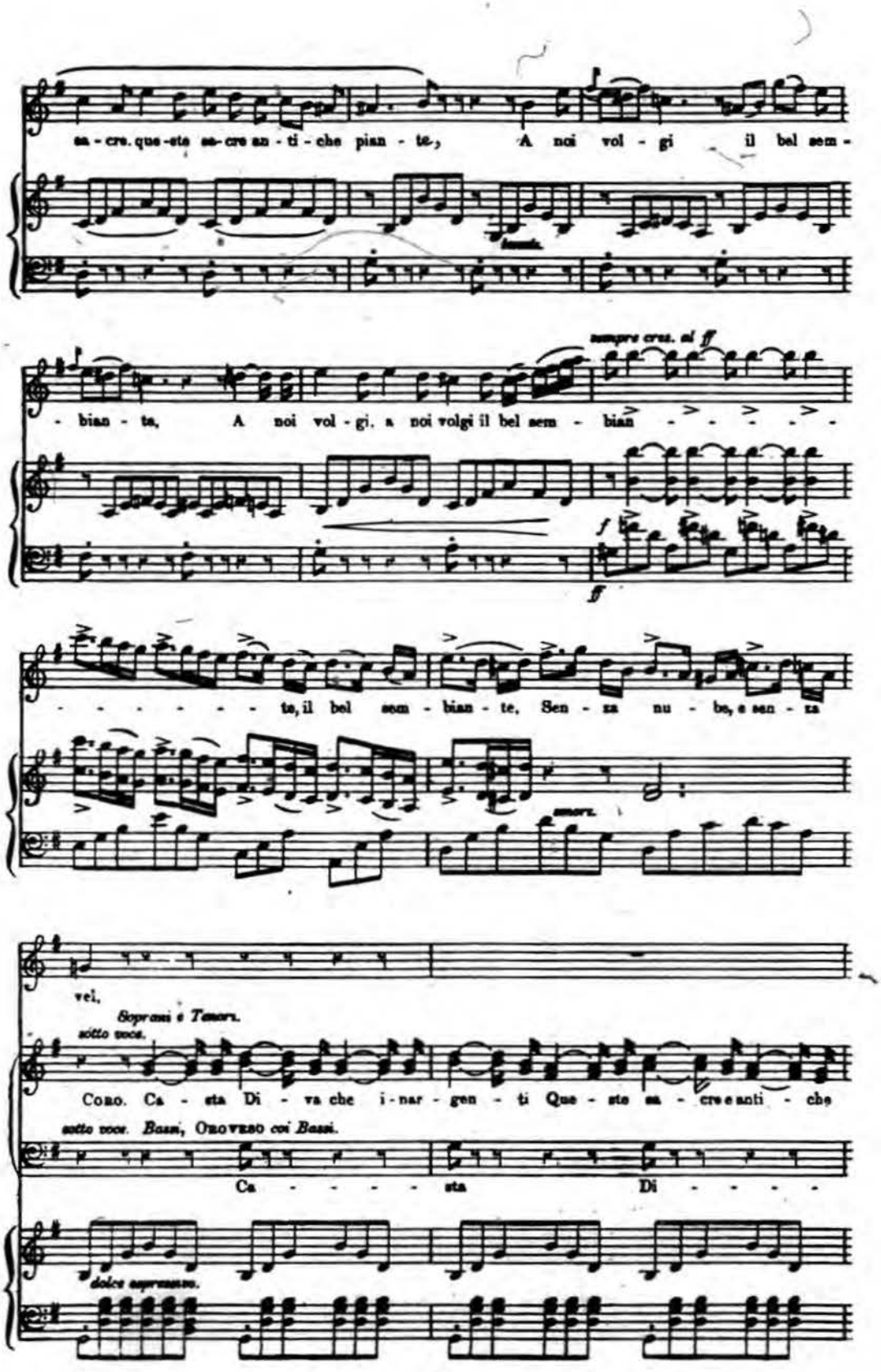
Cantabile.
con espress.

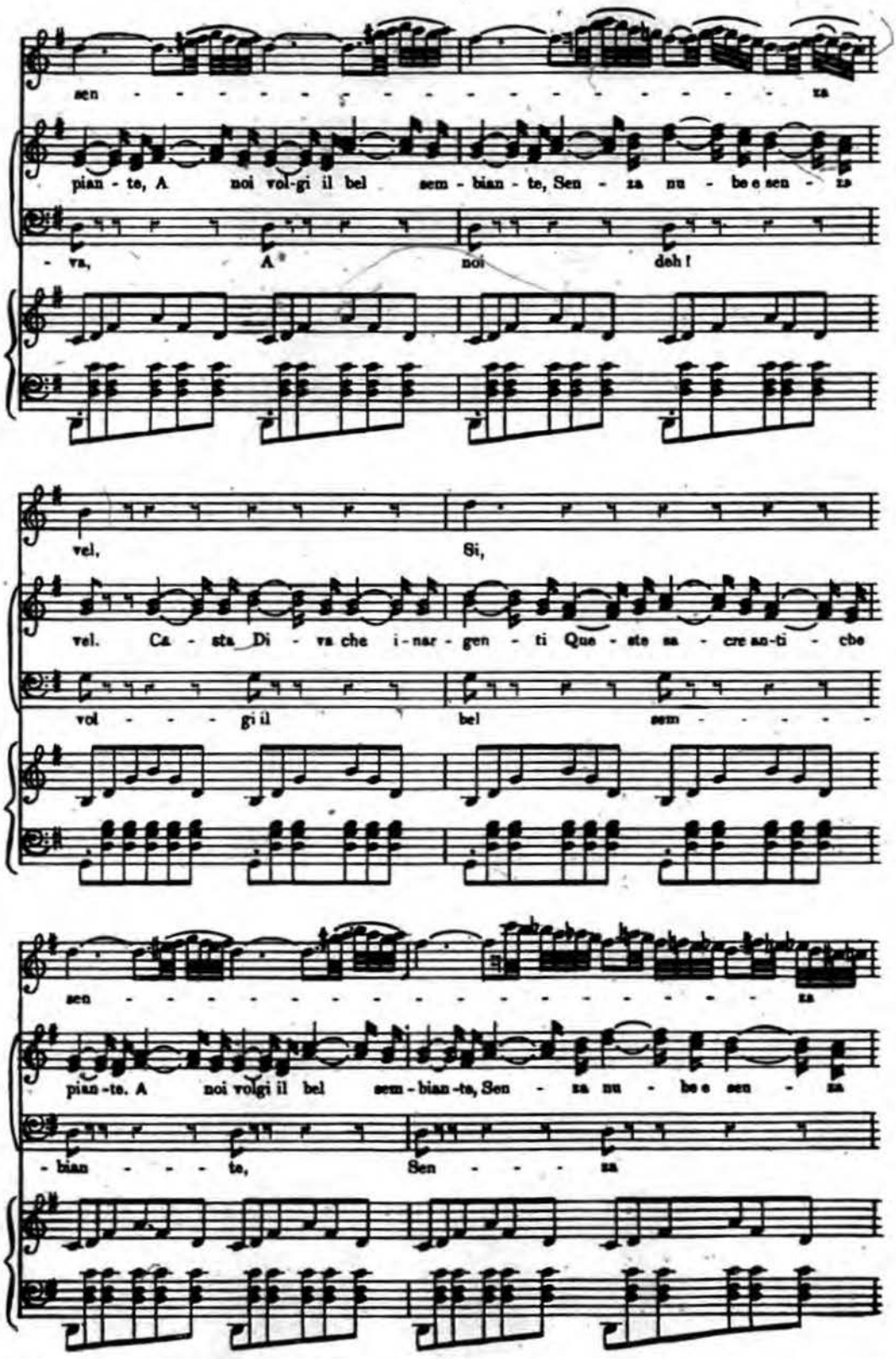


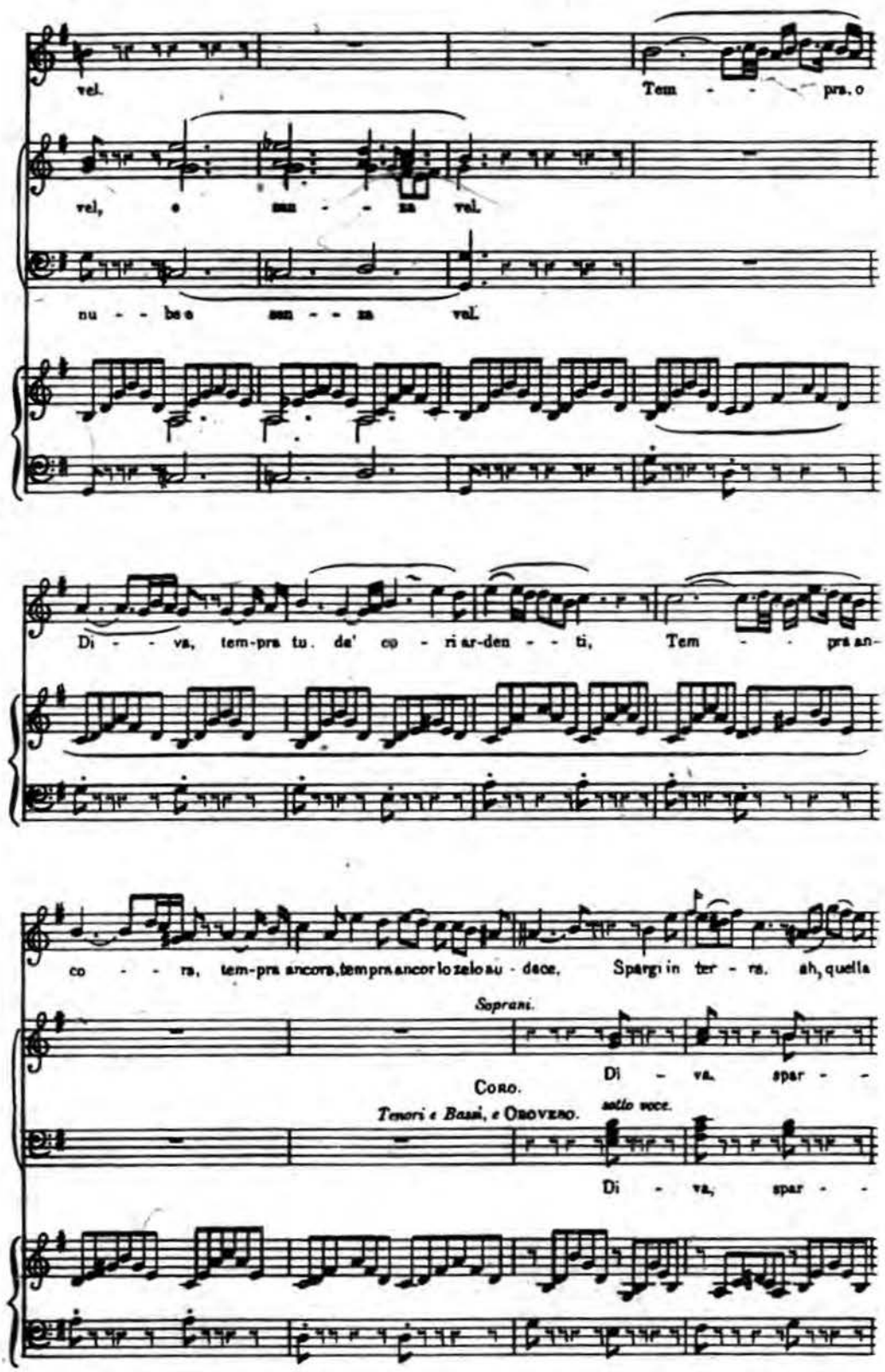

poco string.
tà del mio sof - frir, ah! pie - tà, Nu - mi, pie -
high, bend un - to me! Ah, to die! Ah, let me
f
tà del mio sof - frir, Nu - mi, pie - tà del mio sof -
die! Oh, set me free! God-dess on high, be kind to
f
f
pp
perdendosi.
(exit.)
frir, pie - tà, pie - tà del mio sof - frir!
me! Bend down to me! Ah, set me free!
ppp
morendo.
ppp
ppp
dolce.
dim.
morendo.

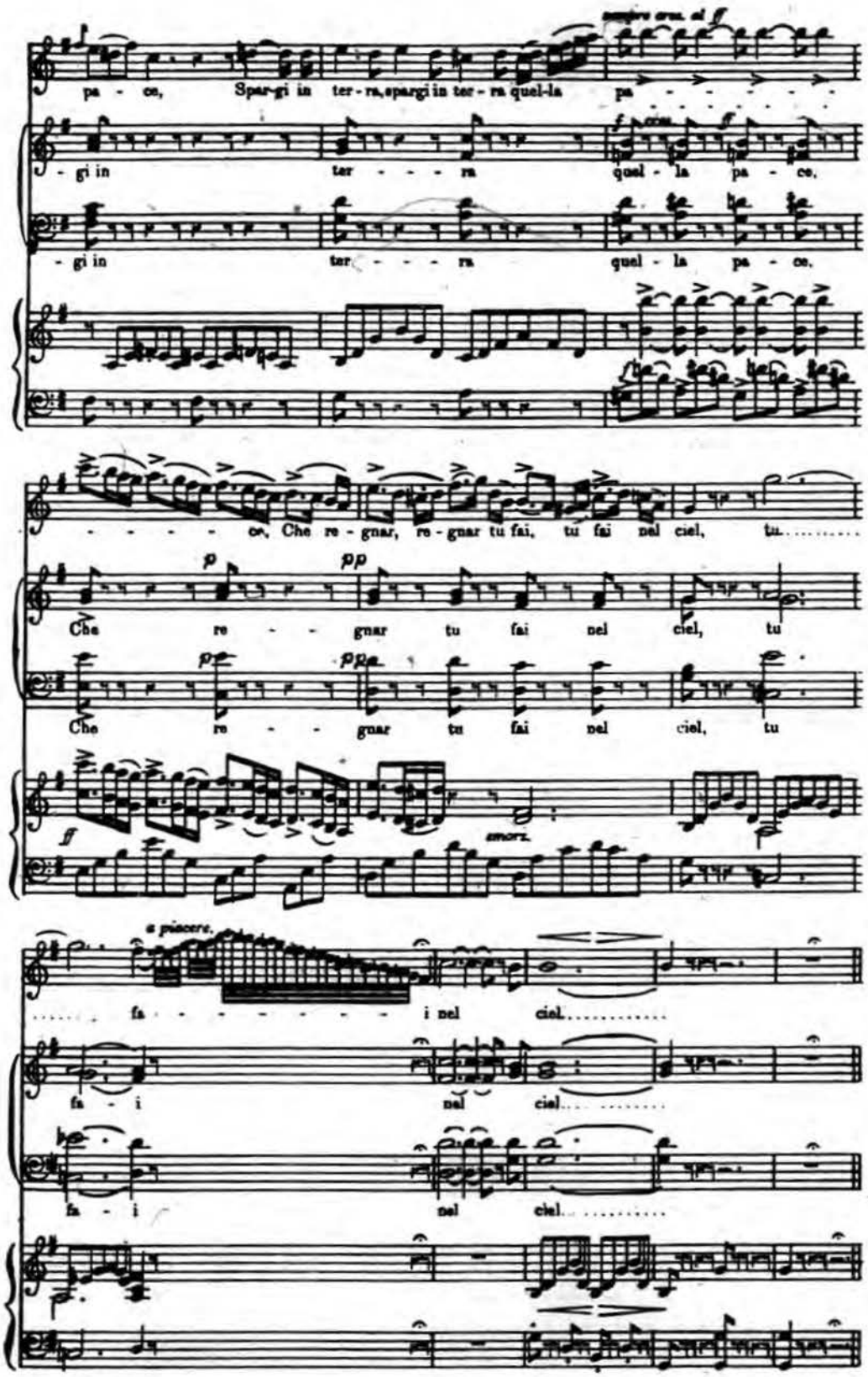
CAVATINA CON CORO.



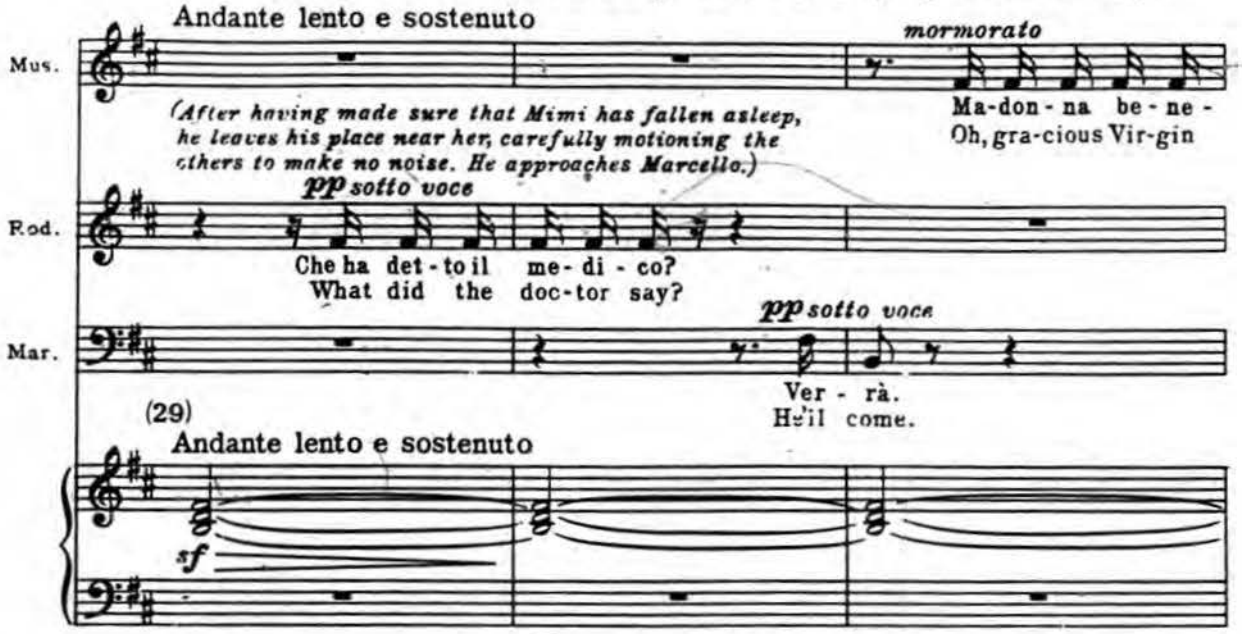

sa - cre. que - sta sa - cre an - ti - che pian - te, A noi vol - gi il bel sem -
sempre cres. al ff
- bian - te, A noi vol - gi. a noi volgi il bel sem - bian
f
ff
- - - - - - te, il bel sem - bian - te, Sen - za nu - be, e sen - za
smorz.
vel.
Soprani e Tenori.
sotto voce.
Cono. Ca - sta Di - va che i - nar - gen - ti Que - ste sa - cre sanli - che
sotto voce. Bassi, Ondeggio coi Bassi.
Ca - - - - - sta Di - - - - -
dolce espressivo.


sen - - - - - - - - - - - - - - za
pian - te, A noi vol-gi il bel sem - bian - te, Sen - za nu - be o sen - za
- va, A noi deh!
vel, Si,
vel. Ca - sta Di - va che i - nar - gen - ti Que - ste sa - cre an-ti - che
vol - - - gi il bel sem - - - - -
sen - - - - - - - - - - - - - - za
pian-te. A noi volgi il bel sem-bian-te, Sen - za nu - be o sen - za
- bian - - - te, Sen - - - za

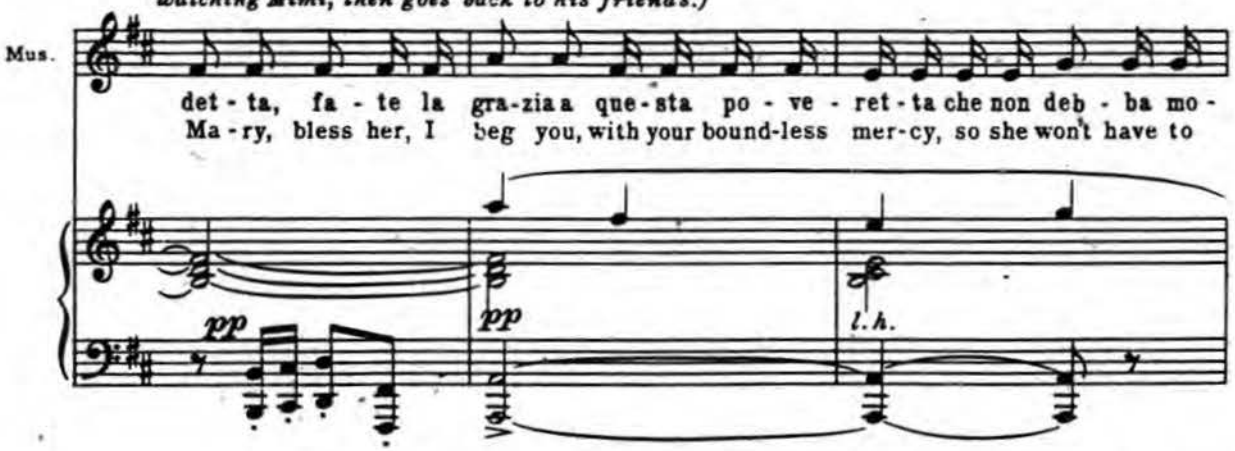

vel.
Tem - - - pra, o
vel, e san - - za vel.
nu - - be o san - - za vel.
Di - - va, tem-pra tu. de' co - ri ar-den - - ti, Tem - - pra an-
co - - - ra, tem-pra ancora, tempra ancor lo zelo au - dace. Spargi in ter - ra. ah, quella
Soprani.
Di - va, spar - -
CORO.
Tenori e Bassi, e OBOVERO.
sotto voce.
Di - va, spar - -


sempre cresc. al ff
pa - ce, Spar-gi in ter - ra, spargi in ter - ra quel-la pa - - - - - - -
- gi in ter - - - - ra quel - la pa - ce.
- gi in ter - - - - ra quel - la pa - ce.
- - - - - ce, Che re - gnar, re - gnar tu fai, tu fai nel ciel, tu.....
p pp
Che re - - - gnar tu fai nel ciel, tu
Che re - - - gnar tu fai nel ciel, tu
ff
smorz.
a piacere.
fa - - - - - - - - i nel ciel.....
fa - i nel ciel.....
fa - i nel ciel.....

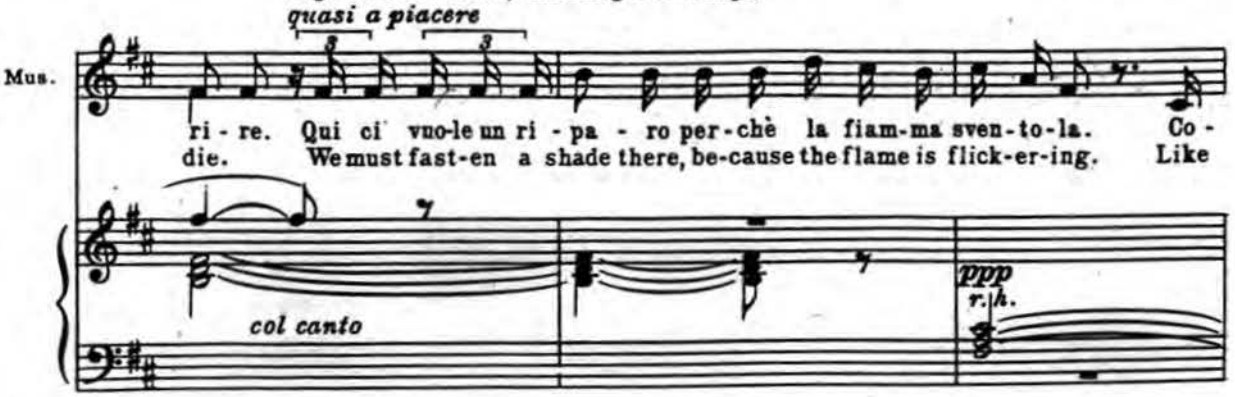
(Meanwhile, on the burner she has warmed up the medicine Marcello had brought, and while she is busily engaged in this action, she murmurs a prayer as if subconsciously.)

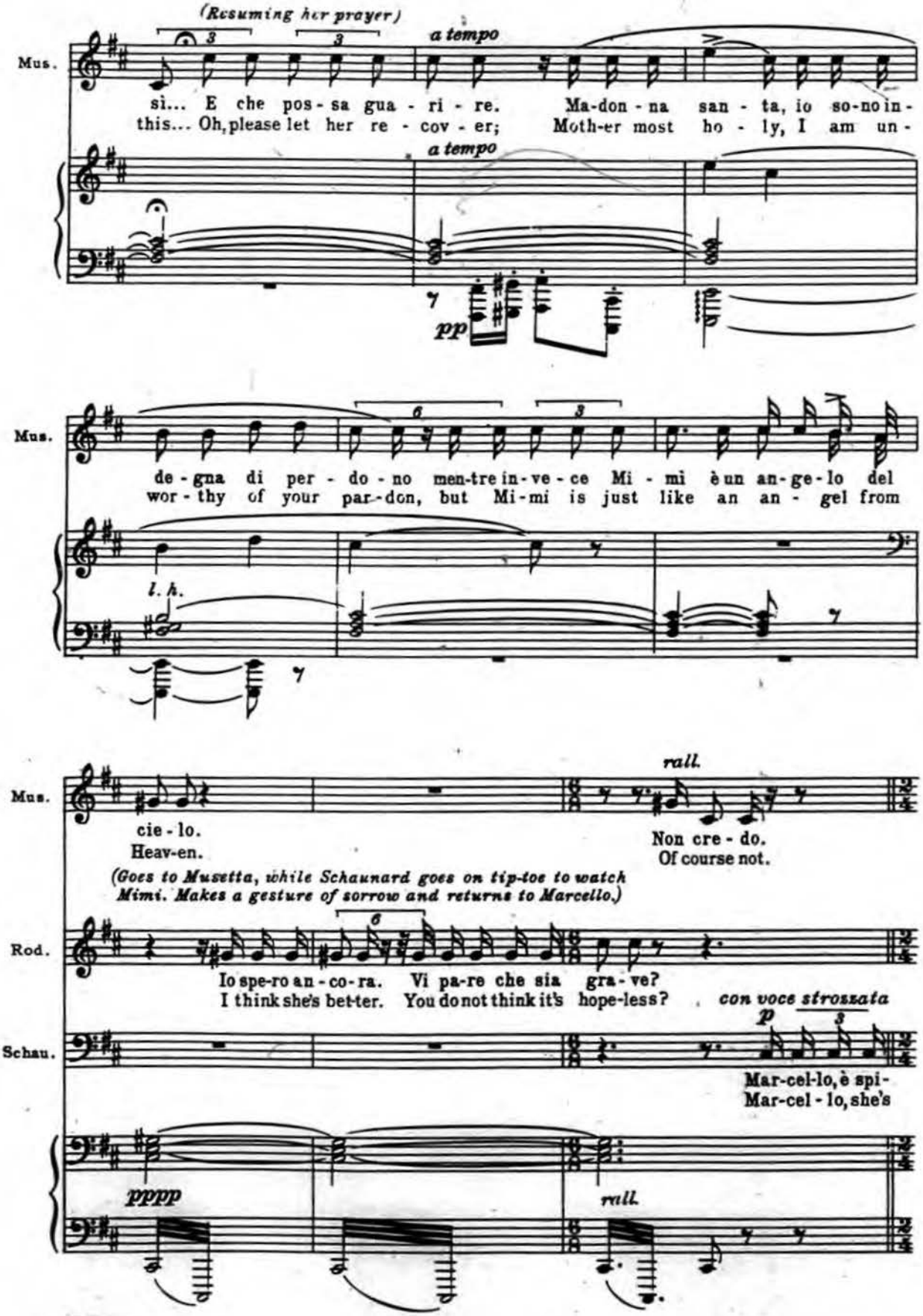


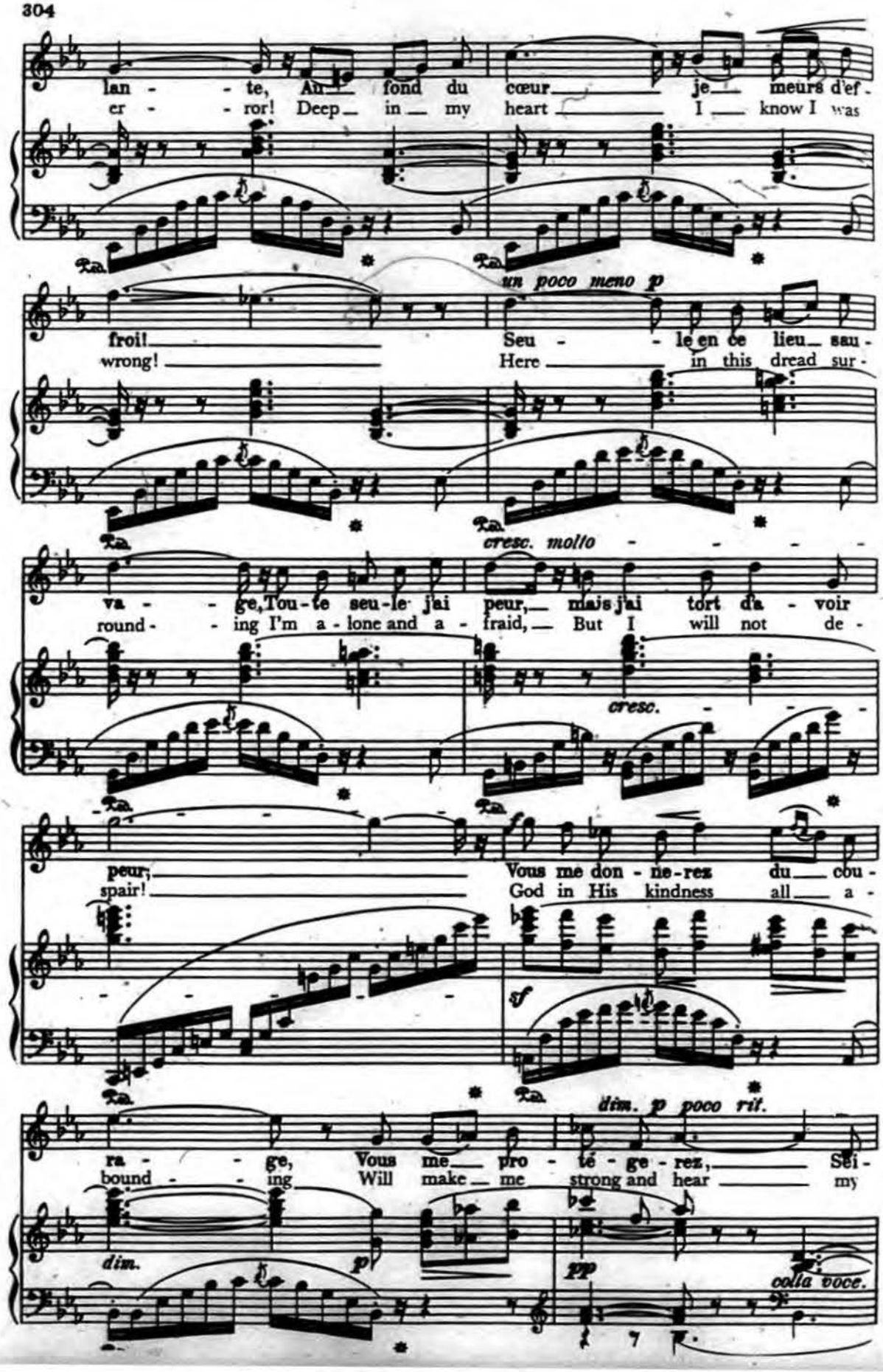
(Rodolfo, Marcello and Schaunard are talking in a low voice among themselves. Rodolfo steps again to the bed, watching Mimi, then goes back to his friends.)

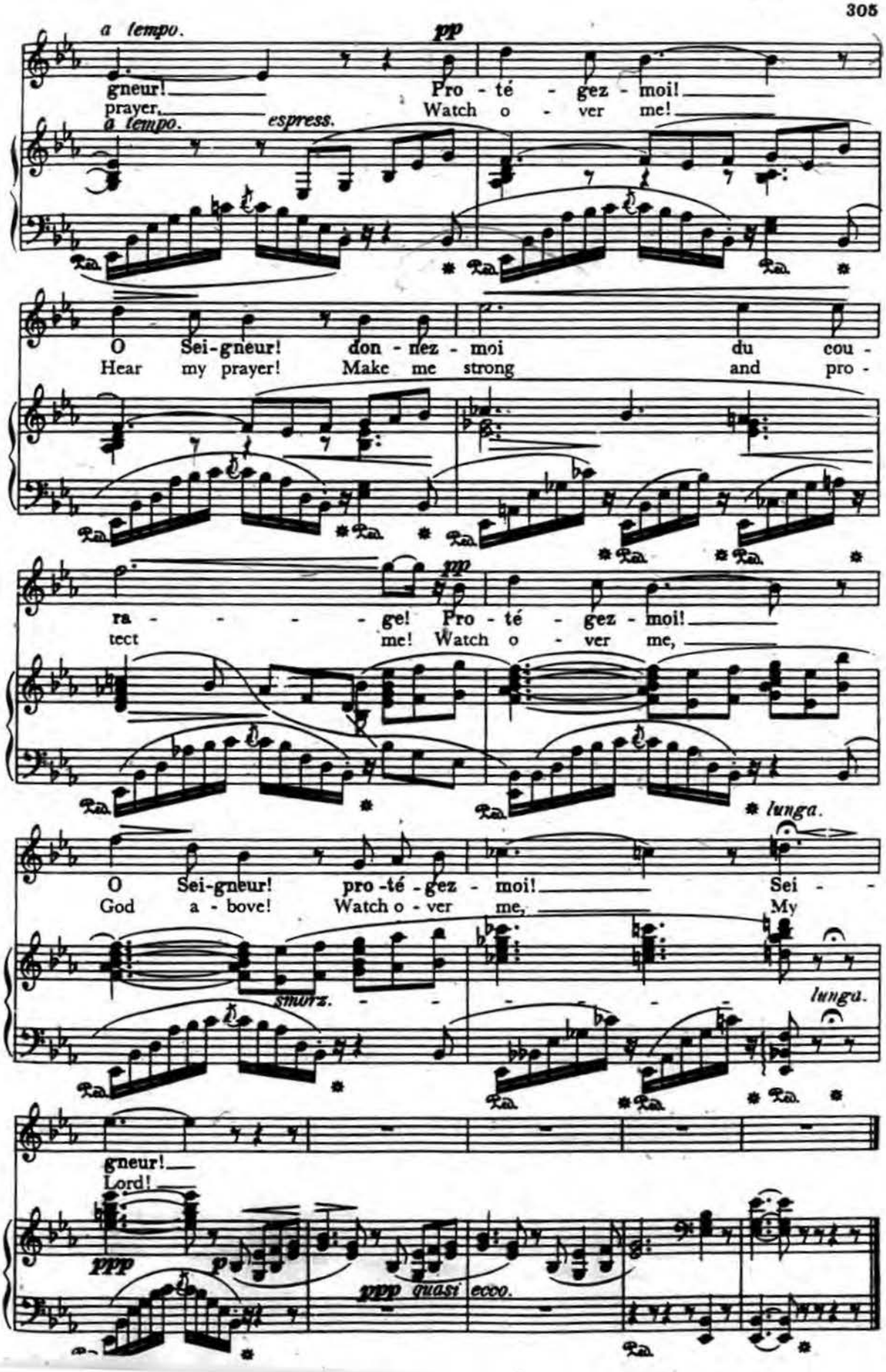


(interrupts herself, motions to Marcello, who comes to her and puts a book upright on the table, shading the lamp.)



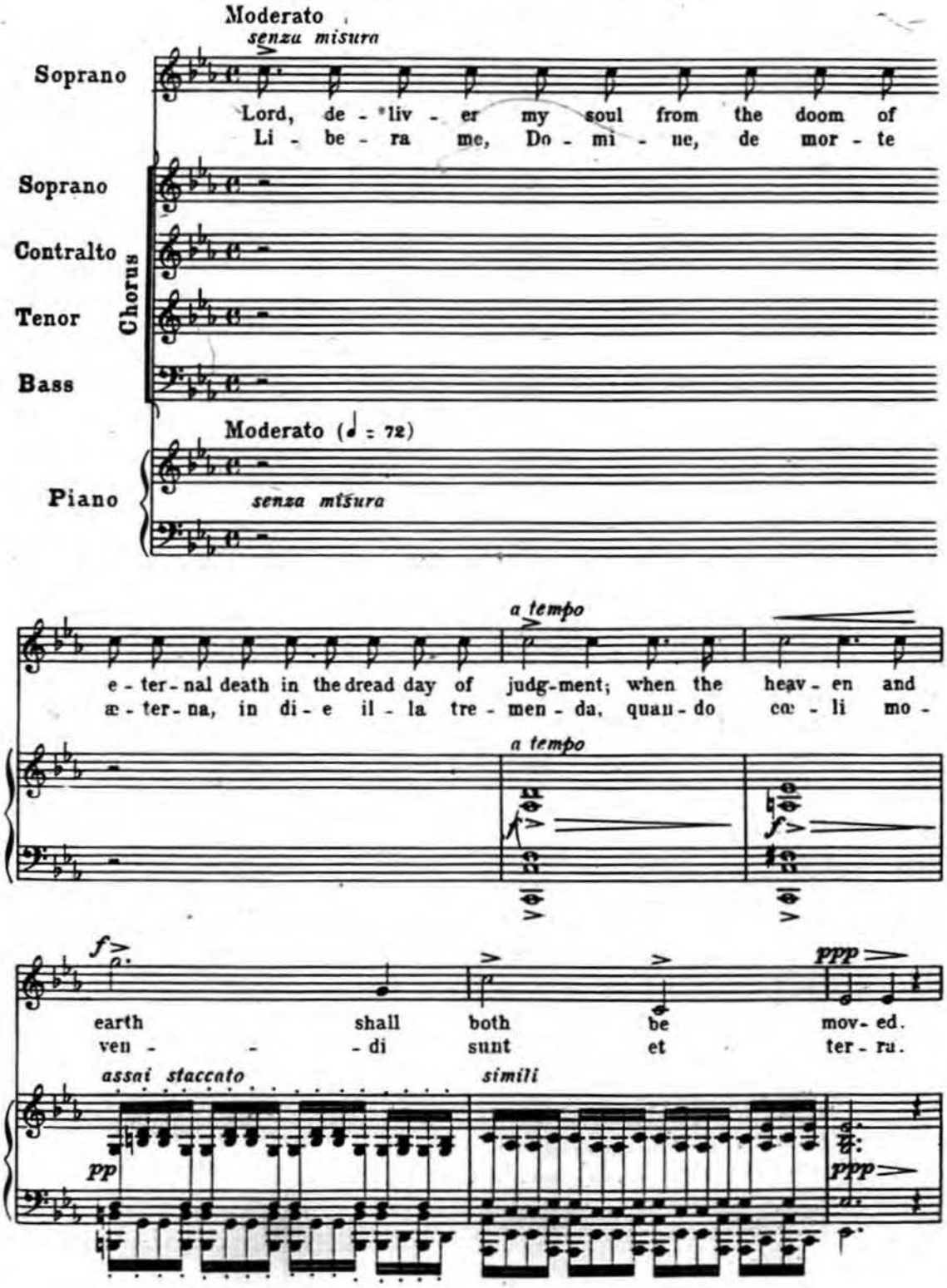

(Resuming her prayer)
a tempo
Mus.
sì... E che pos-sa gua-ri-re. Ma-don-na san-ta, io so-no in-
this... Oh, please let her re-cov-er; Moth-er most ho-ly, I am un-
a tempo
pp
Mus.
de-gna di per-do-no men-tre in-ve-ce Mi-mi è un an-ge-lo del
wor-thy of your par-don, but Mi-mi is just like an an-gel from
l. h.
rall.
Mus.
cie-lo.
Heav-en.
Non cre-do.
Of course not.
(Goes to Musetta, while Schaunard goes on tip-toe to watch Mimi. Makes a gesture of sorrow and returns to Marcello.)
Rod.
Io spe-ro an-co-ra. Vi pa-re che sia gra-ve?
I think she's bet-ter. You do not think it's hope-less?
con voce strozzata
p
Schau.
Mar-cel-lo, è spi-
Mar-cel-lo, she's
pppp
rall.

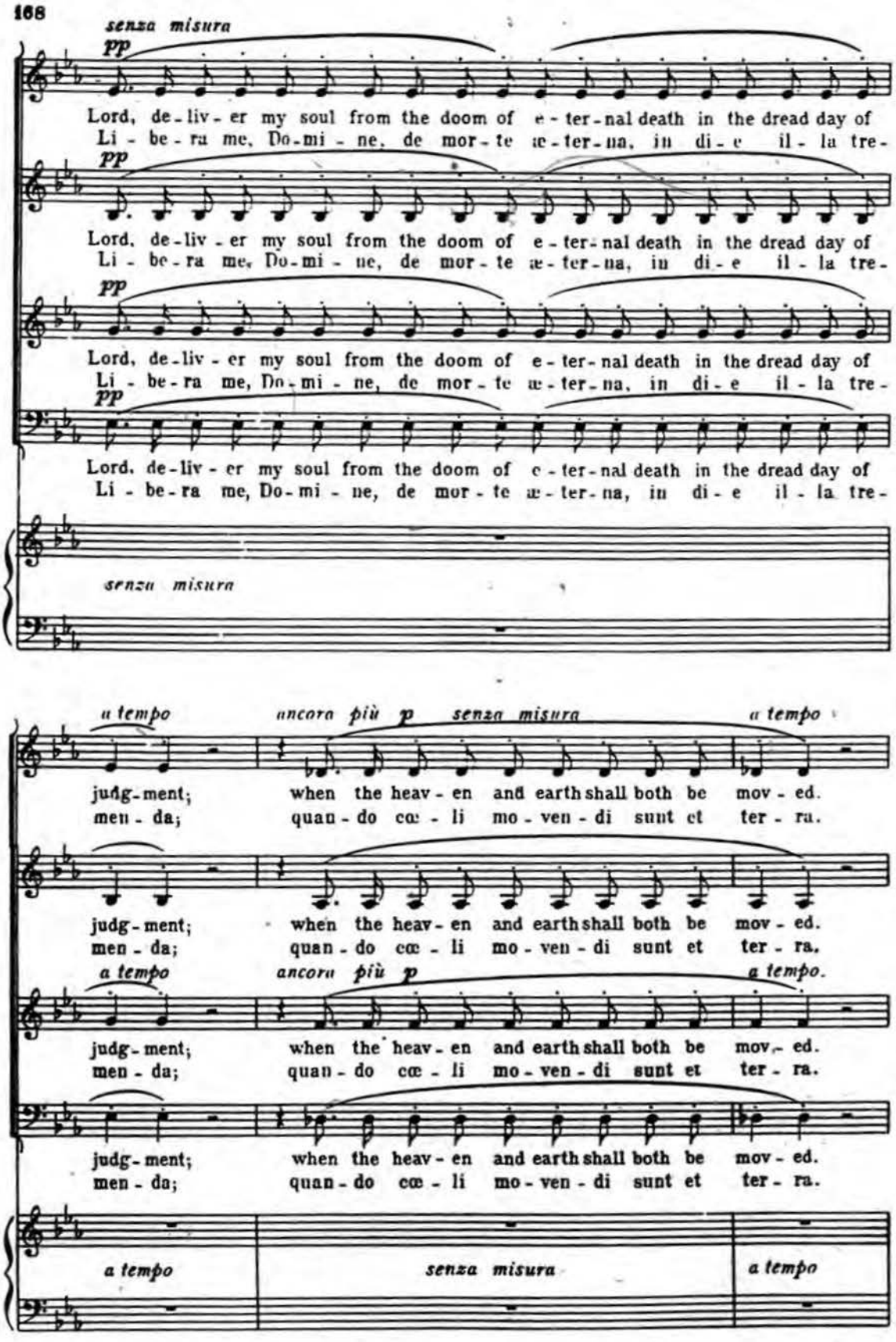

304
lan - - te, Au fond du cœur je meurs d'ef -
er - - ror! Deep in my heart I know I was
un poco meno p
froi! Seu - le en ce lieu sau -
wrong! Here in this dread sur -
cresc. molto
va - - ge, Tou-te seu-le j'ai peur, mais j'ai tort d'a - voir
round - - ing I'm a-lone and a-fraid, But I will not de -
cresc.
peur, Vous me don-ne-rez du cou -
spair! God in His kindness all a -
sf
dim. p poco rit.
ra - - ge, Vous me pro - té - ge - rez, Sei -
bound - - ing Will make me strong and hear my
dim.
p
pp
colla voce.

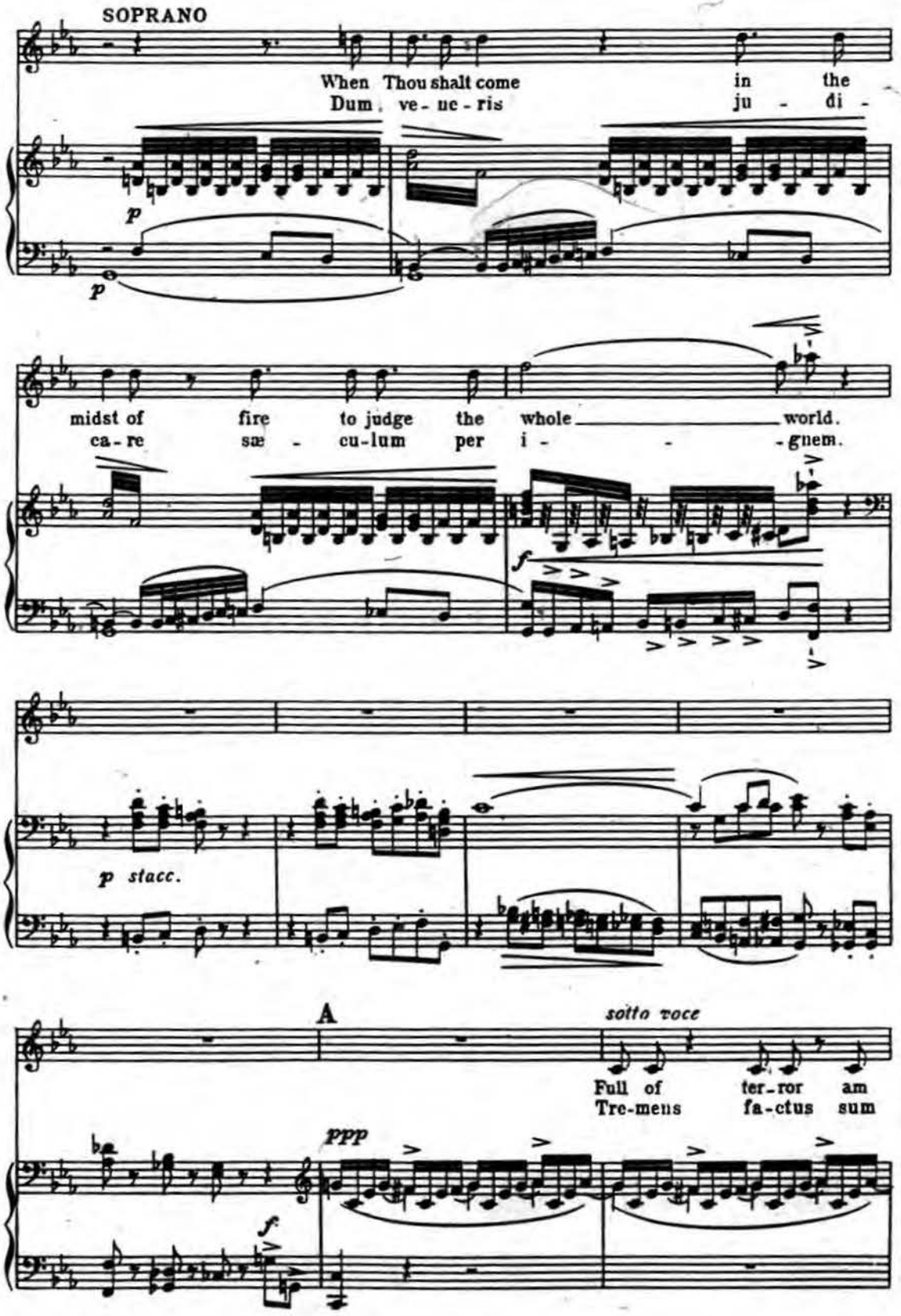

305
a tempo.
pp
gneur!
prayer.
Pro - té - gez - moi!
Watch o - ver me!
a tempo.
espress.
O Sei-gneur! don - nez - moi du cou -
Hear my prayer! Make me strong and pro -
pp
ra - - - - ge! Pro - té - gez - moi!
tect me! Watch o - ver me,
lunga.
O Sei-gneur! pro-té-gez - moi! Sei - -
God a - bove! Watch o - ver me, My
smorz.
lunga.
gneur!
Lord!
ppp
p
ppp quasi ecco.

Lord. deliver my soul
(Libera me)

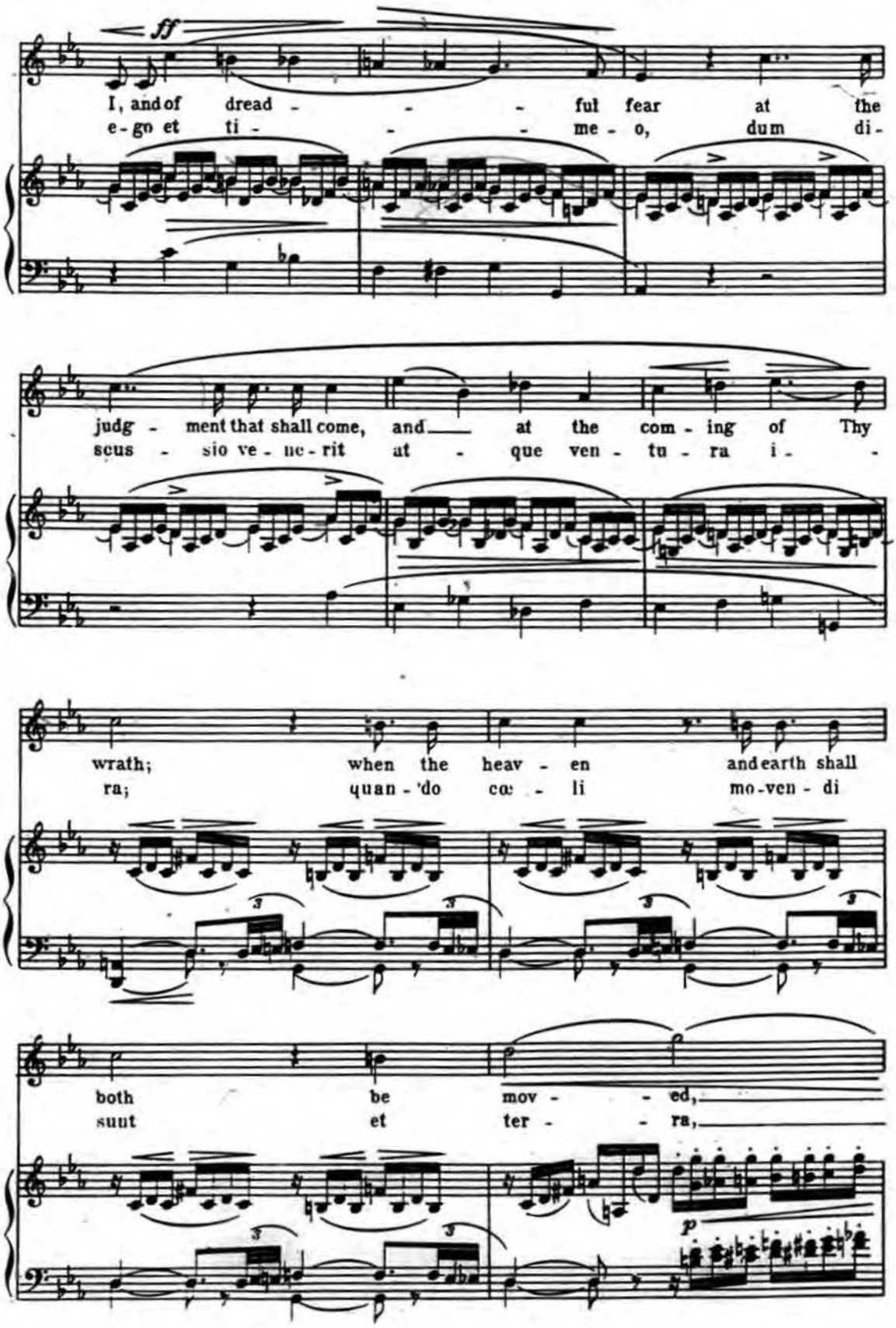
Solo for Soprano, Chorus and Fugue Finale



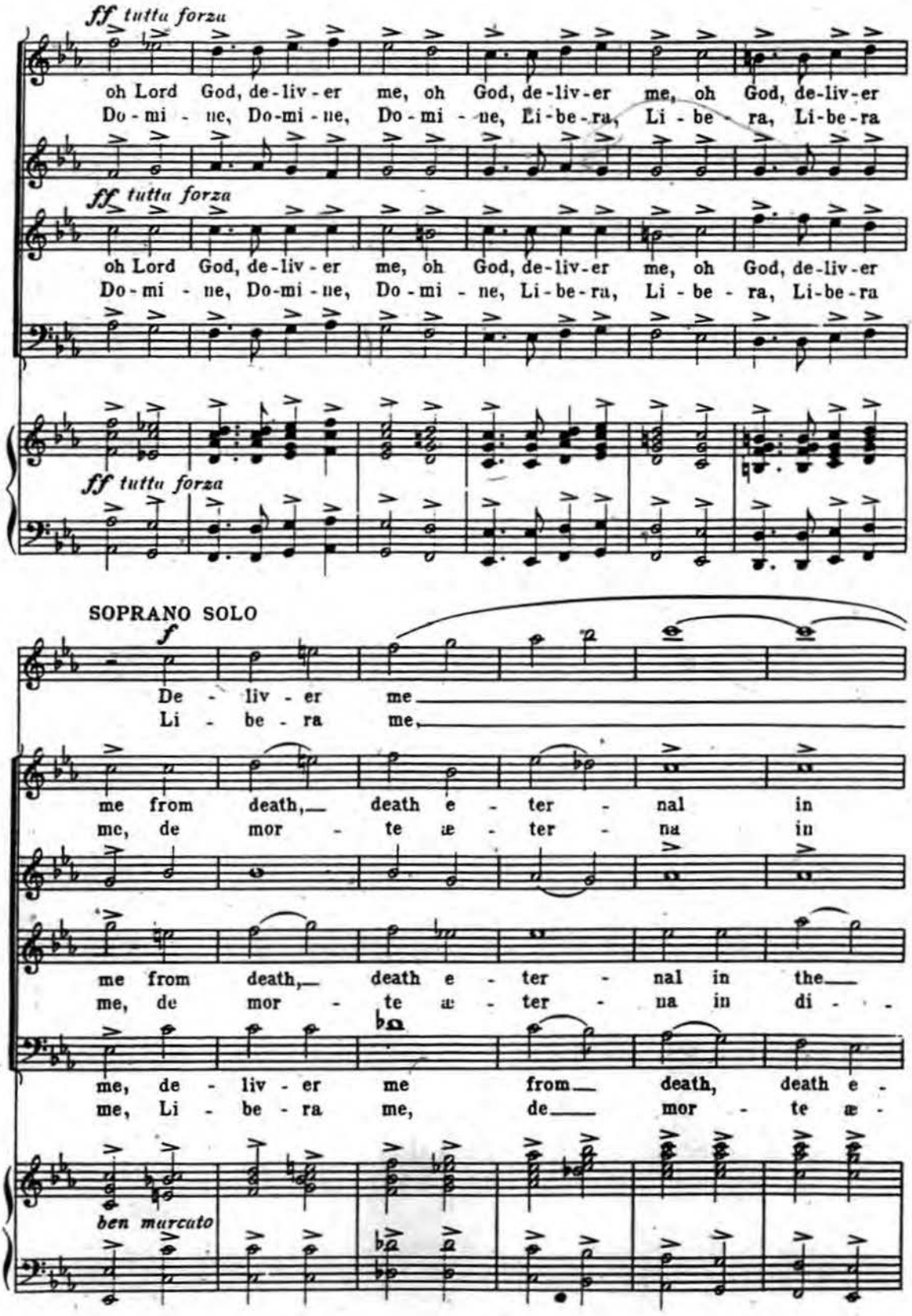

senza misura
pp
Lord, de-liv-er my soul from the doom of e-ter-nal death in the dread day of
Li-be-ra me, Do-mi-ne, de mor-te æ-ter-na, in di-e il-la tre-
senza misura
a tempo
ancora più p
senza misura
a tempo
judg-ment; when the heav-en and earth shall both be mov-ed.
men-da; quan-do cœ-li mo-ven-di sunt et ter-ra.
a tempo
senza misura
a tempo

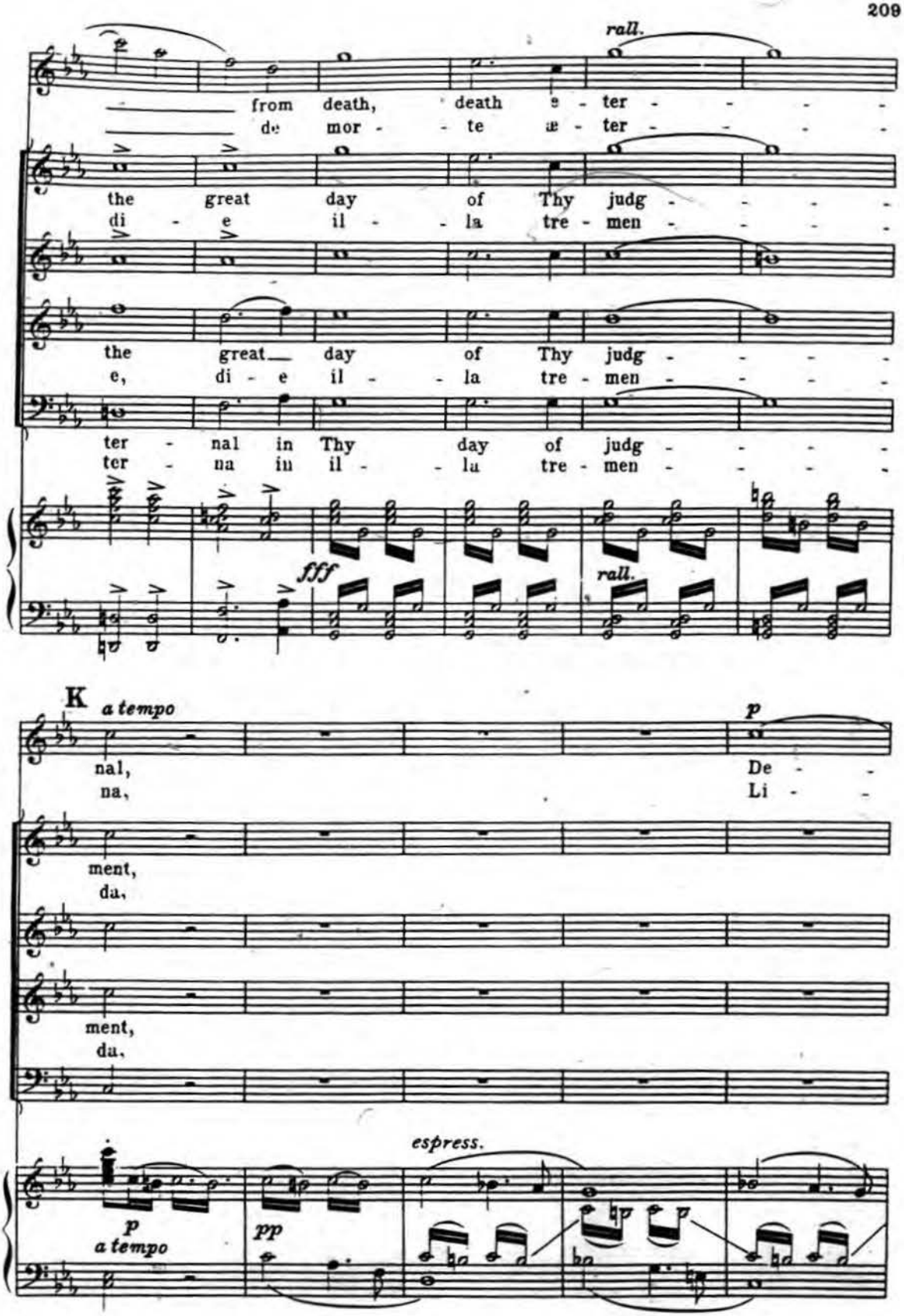

SOPRANO
When Thou shalt come in the
Dum ve-ue-ris ju - di -
p
p
midst of fire to judge the whole world.
ca-re sæ - cu-lum per i - - gnem.
f
p stacc.
A
sotto voce
Full of ter-ror am
Tre-mens fa-ctus sum
ppp
f

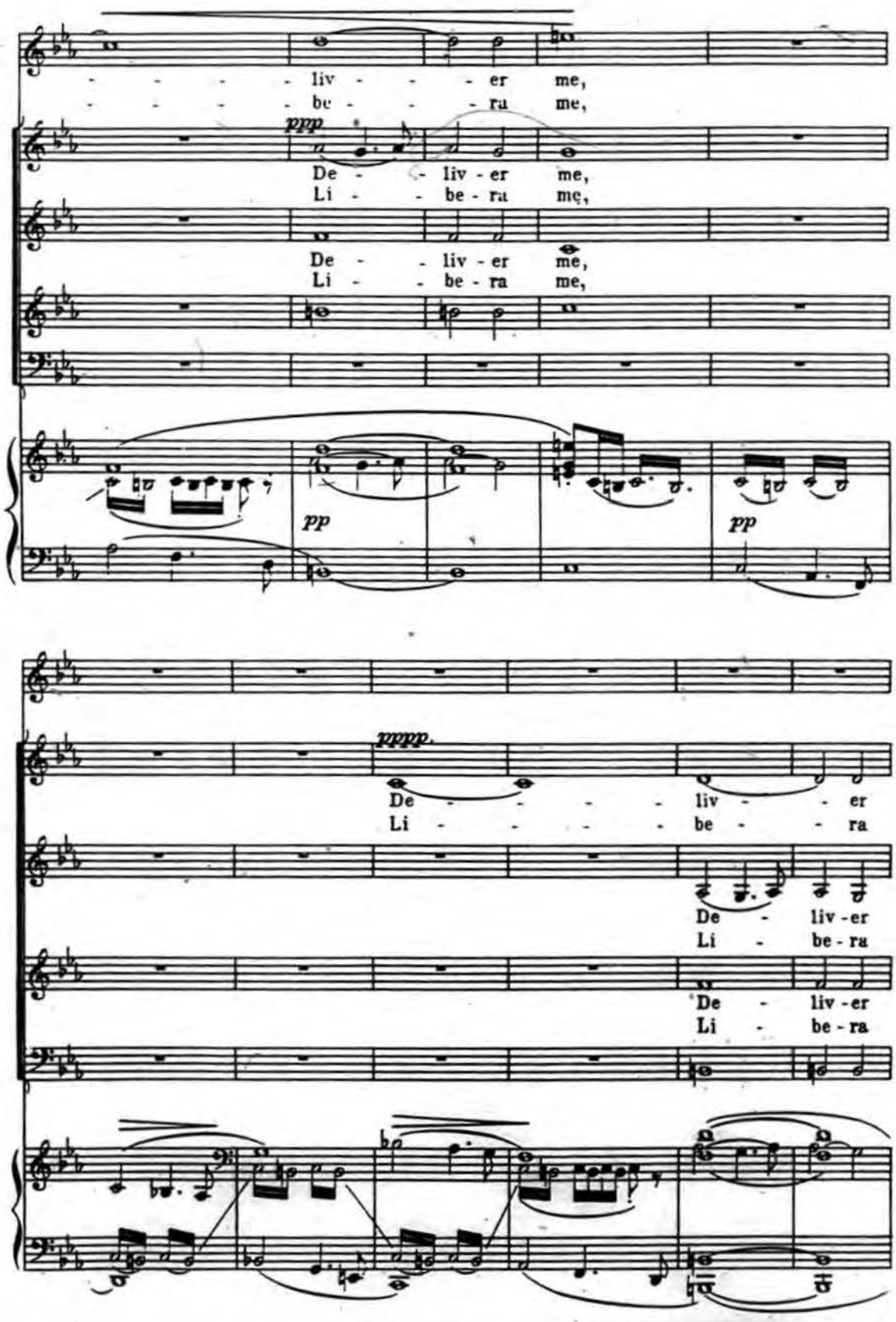
170

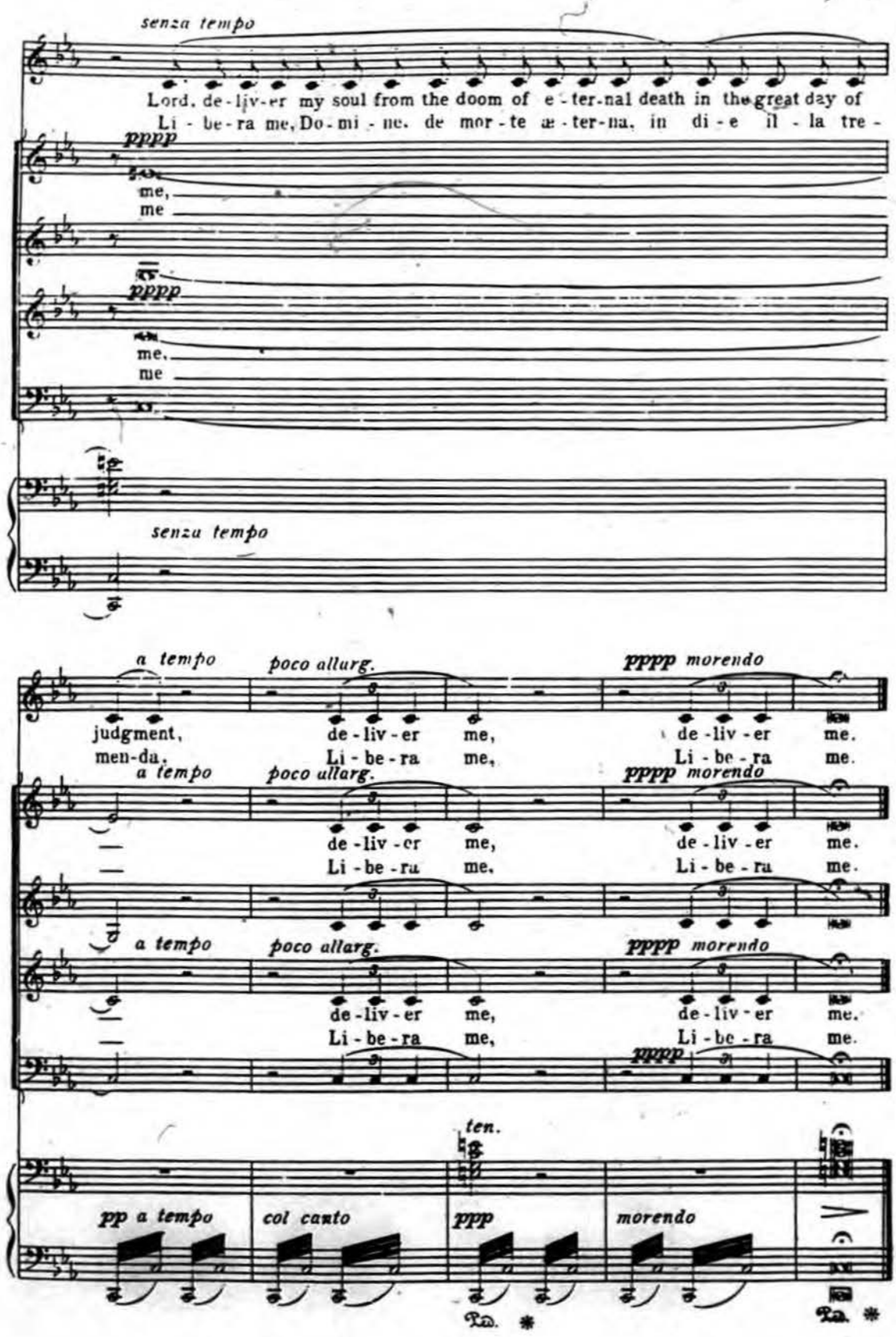

ff
I, and of dread - - - ful fear at the
e - go et ti - - - me - o, dum di -
judg - ment that shall come, and at the com - ing of Thy
scus - sio ve - ne - rit at - que ven - tu - ra i -
wrath; when the heav - en and earth shall
ra; quan - 'do co: - li mo - ven - di
both be mov - - ed,
sunt et ter - - ra,
p

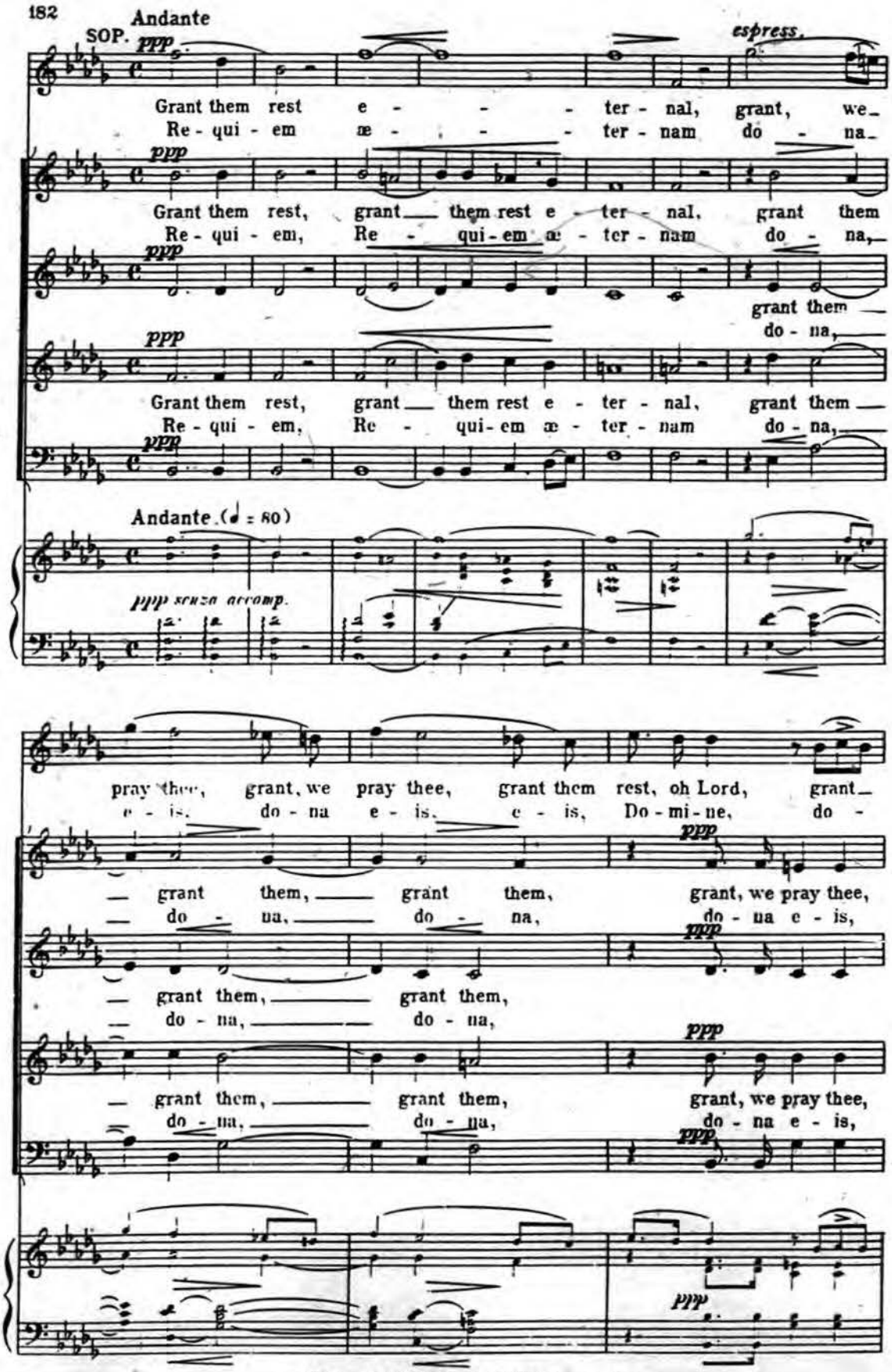
208

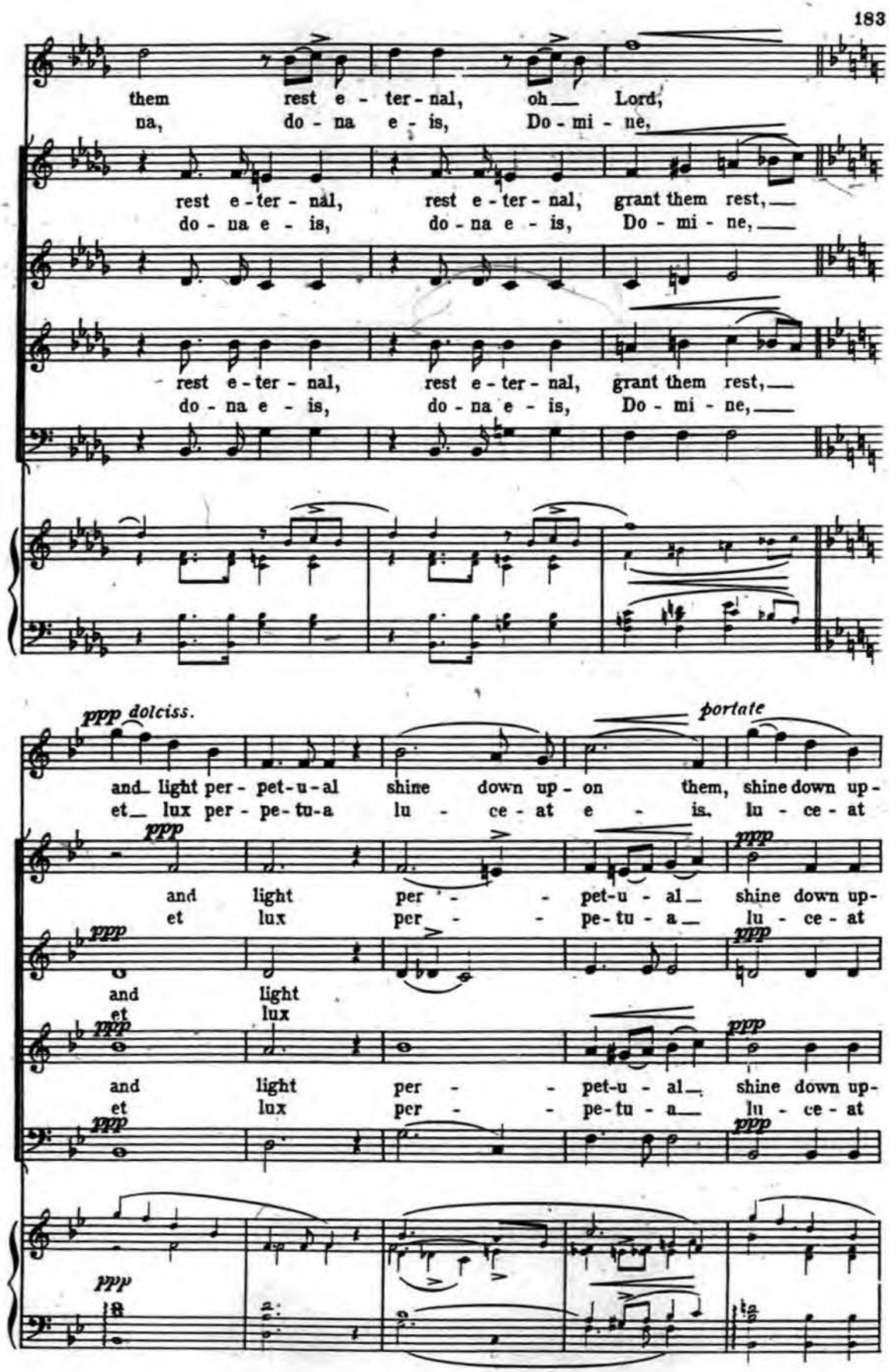

ff tutta forza
oh Lord God, de-liv-er me, oh God, de-liv-er me, oh God, de-liv-er
Do-mi-ne, Do-mi-ne, Do-mi-ne, Li-be-ra, Li-be-ra, Li-be-ra
ff tutta forza
oh Lord God, de-liv-er me, oh God, de-liv-er me, oh God, de-liv-er
Do-mi-ne, Do-mi-ne, Do-mi-ne, Li-be-ra, Li-be-ra, Li-be-ra
ff tutta forza
SOPRANO SOLO
f
De-liv-er me
Li-be-ra me,
me from death, death e-ter-nal in
me, de mor-te æ-ter-na in
me from death, death e-ter-nal in the
me, de mor-te æ-ter-na in di-
me, de-liv-er me from death, death e-
me, Li-be-ra me, de mor-te æ-
ben marcato


rall.
from death, death e - ter - - - -
de mor - - te æ - ter - - - -
the great day of Thy judg - - - -
di - e il - - la tre - men - - - -
the great day of Thy judg - - - -
e, di - e il - - la tre - men - - - -
ter - nal in Thy day of judg - - - -
ter - na in il - - la tre - men - - - -
fff
rall.
K
a tempo
p
nal,
na,
De - -
Li - -
ment,
da,
ment,
da,
espress.
p
a tempo
pp

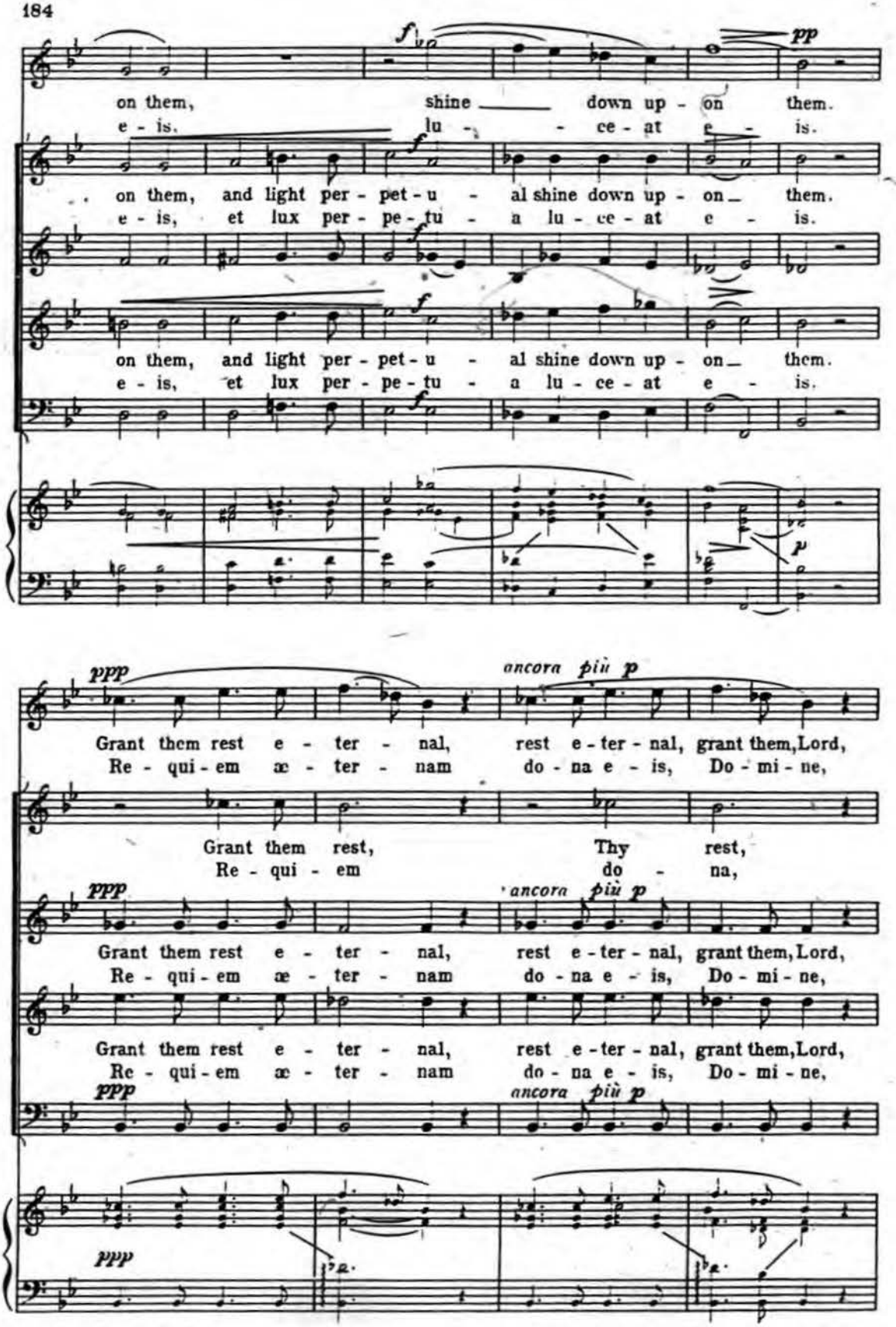

210
liv - - - - er me,
be - - - - ra me,
ppp
De - - liv - er me,
Li - - be - ra me,
De - - liv - er me,
Li - - be - ra me,
pp
pp
pppp
De - - - - liv - - er
Li - - - - be - - ra
De - liv - er
Li - be - ra
De - liv - er
Li - be - ra

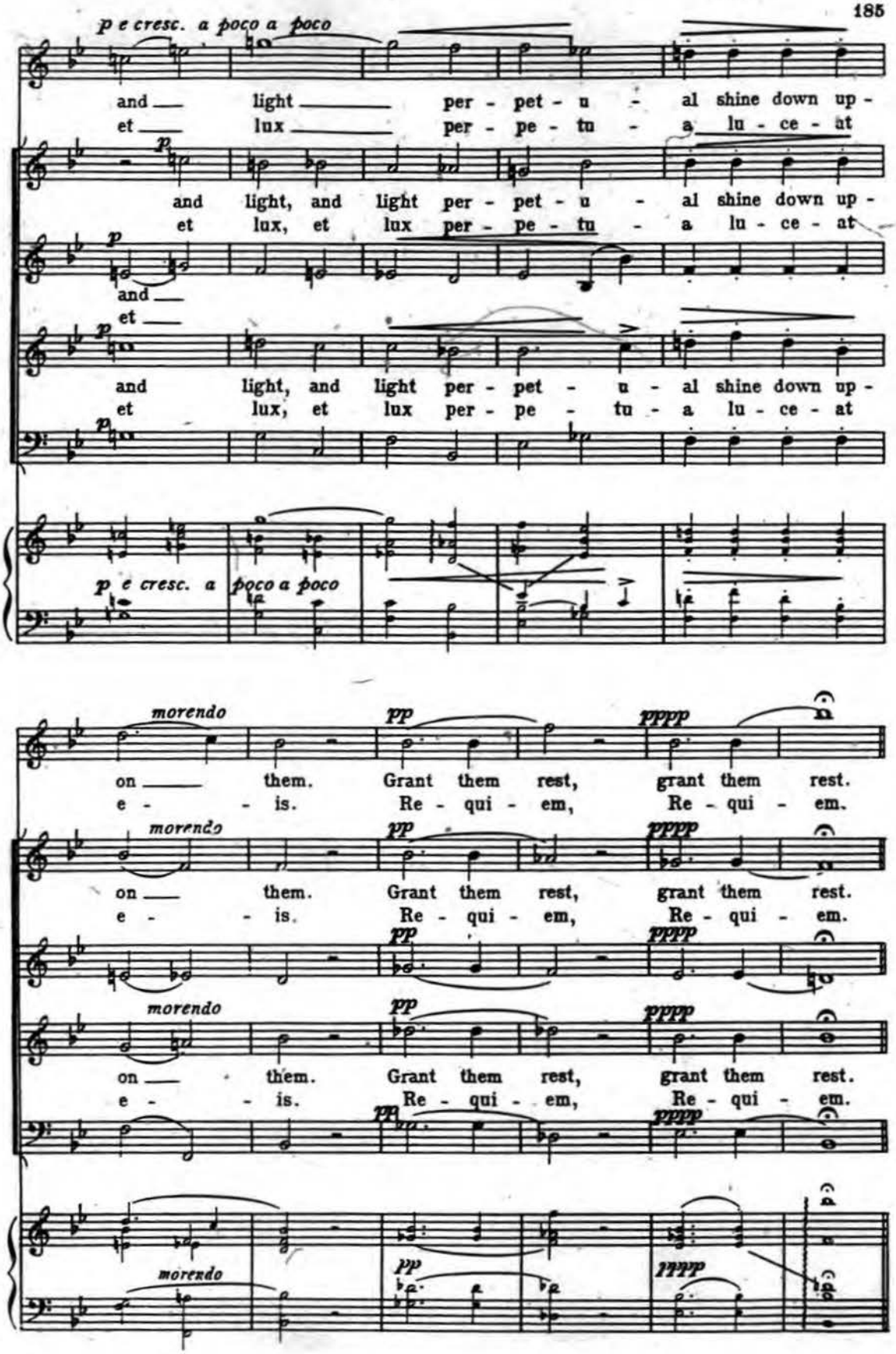

senza tempo
Lord, de-liv-er my soul from the doom of e-ter-nal death in the great day of
Li-be-ra me, Do-mi-ne, de mor-te æ-ter-na, in di-e il-la tre-
pppp
me,
me
pppp
me,
me
senza tempo
a tempo
poco allarg.
pppp morendo
judgment,
men-da.
de-liv-er me,
Li-be-ra me,
de-liv-er me.
Li-be-ra me.
a tempo
poco allarg.
pppp morendo
de-liv-er me,
Li-be-ra me,
de-liv-er me.
Li-be-ra me.
a tempo
poco allarg.
pppp morendo
de-liv-er me,
Li-be-ra me,
de-liv-er me.
Li-be-ra me.
pppp
ten.
pp a tempo
col canto
ppp
morendo
Ped. *
Ped. *


182
Andante
SOP.
ppp
espress.
Grant them rest e - - - ter - nal, grant, we_
Re - qui - em æ - - - ter - nam do - na_
Grant them rest, grant them rest e - ter - nal, grant them
Re - qui - em, Re - qui - em æ - ter - nam do - na,
grant them
do - na,
Grant them rest, grant them rest e - ter - nal, grant them
Re - qui - em, Re - qui - em æ - ter - nam do - na,
Andante (♩ = 80)
ppp senza accomp.
pray thee, grant, we pray thee, grant them rest, oh Lord, grant
e - is, do - na e - is, e - is, Do - mi - ne, do -
grant them, grant them, grant, we pray thee,
do - na, do - na, do - na e - is,
grant them, grant them,
do - na, do - na,
grant them, grant them, grant, we pray thee,
do - na, do - na, do - na e - is,


them rest e - ter - nal, oh Lord,
na, do - na e - is, Do - mi - ne,
rest e - ter - nal, rest e - ter - nal, grant them rest,
do - na e - is, do - na e - is, Do - mi - ne,
rest e - ter - nal, rest e - ter - nal, grant them rest,
do - na e - is, do - na e - is, Do - mi - ne,
ppp dolciss.
portate
and light per - pet-u-al shine down up - on them, shine down up-
et lux per - pe-tu-a lu - ce - at e - is. lu - ce - at
ppp
and light per - - pet-u - al shine down up-
et lux per - - pe-tu - a lu - ce - at
and light
et lux
and light per - - pet-u - al shine down up-
et lux per - - pe-tu - a lu - ce - at

184


on them, shine down up - on them.
e - is, lu - ce - at e - is.
on them, and light per - pet - u - al shine down up - on them.
e - is, et lux per - pe - tu - a lu - ce - at e - is.
on them, and light per - pet - u - al shine down up - on them.
e - is, et lux per - pe - tu - a lu - ce - at e - is.
Grant them rest e - ter - nal, rest e - ter - nal, grant them, Lord,
Re - qui - em æ - ter - nam do - na e - is, Do - mi - ne,
Grant them rest, Thy rest,
Re - qui - em do - na,
Grant them rest e - ter - nal, rest e - ter - nal, grant them, Lord,
Re - qui - em æ - ter - nam do - na e - is, Do - mi - ne,
Grant them rest e - ter - nal, rest e - ter - nal, grant them, Lord,
Re - qui - em æ - ter - nam do - na e - is, Do - mi - ne,


p e cresc. a poco a poco
and light per - pet - u - al shine down up -
et lux per - pe - tu - a lu - ce - at
and light, and light per - pet - u - al shine down up -
et lux, et lux per - pe - tu - a lu - ce - at
and
et
and light, and light per - pet - u - al shine down up -
et lux, et lux per - pe - tu - a lu - ce - at
p e cresc. a poco a poco
morendo
pp
pppp
on them. Grant them rest, grant them rest.
e - is. Re - qui - em, Re - qui - em.
morendo
pp
pppp
on them. Grant them rest, grant them rest.
e - is. Re - qui - em, Re - qui - em.
morendo
pp
pppp
on them. Grant them rest, grant them rest.
e - is. Re - qui - em, Re - qui - em.
morendo
pp
pppp

APPENDIX IV: Musical Arrangements/Composition of Traditional Chazanut:

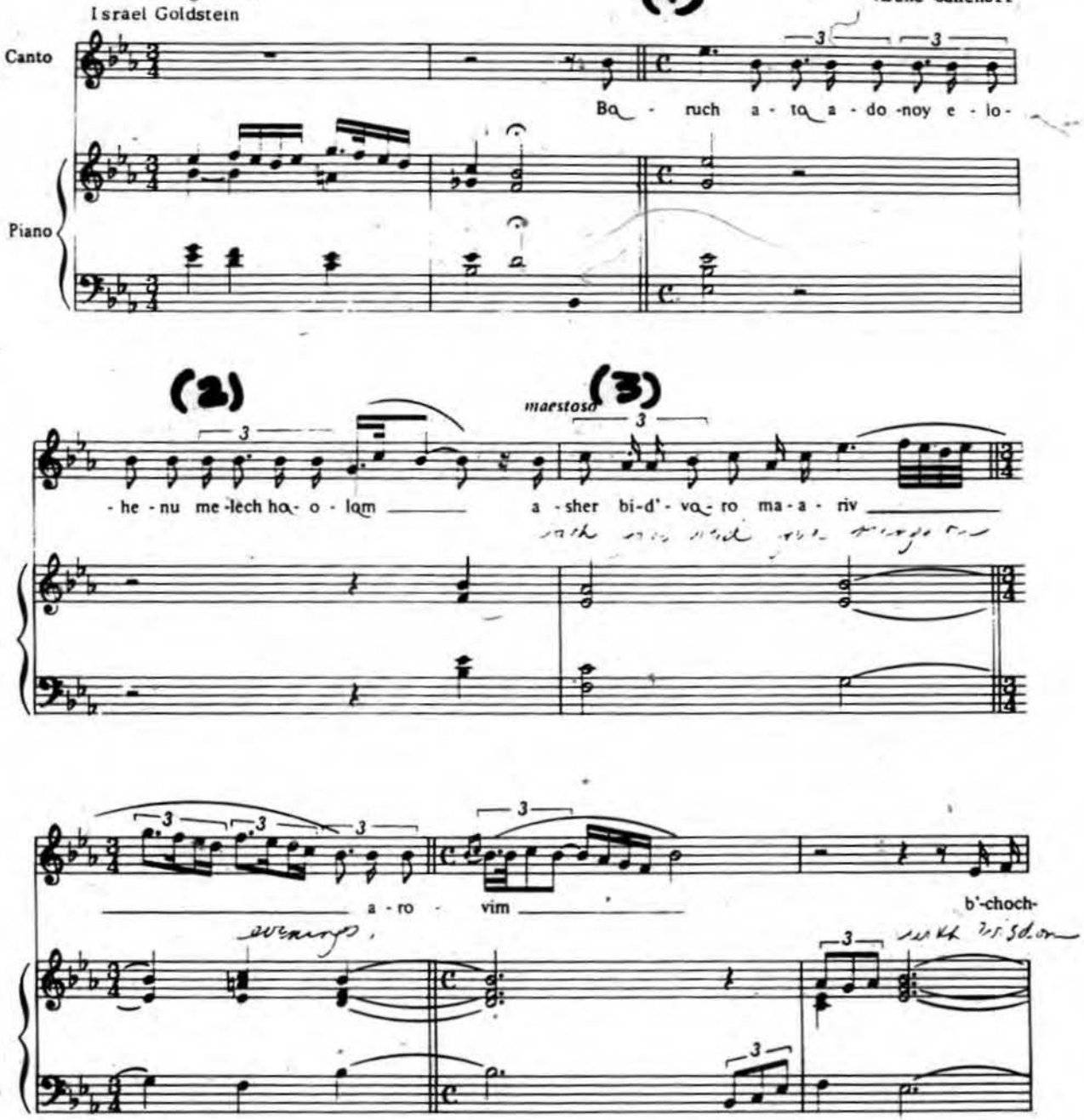
1)	Asher Bidvaro	M. Ganchoff
	Piano Arrangement	I. Goldstein
	Vocal Arrangement	P. Kordan
2)	Eylu Devarim	J. Rappaport
	Piano Arrangement	I. Goldstein
	Vocal Arrangement	P. Kordan
3)	Sh'ma Yisrael	L. Glanz
	Vocal Arrangement	P. Kordan
4)	Meloch	Y. Rosenblatt
	Adjustment	P. Kordan
5)	B'rach Dodi	P. Kordan
	Original Composition	

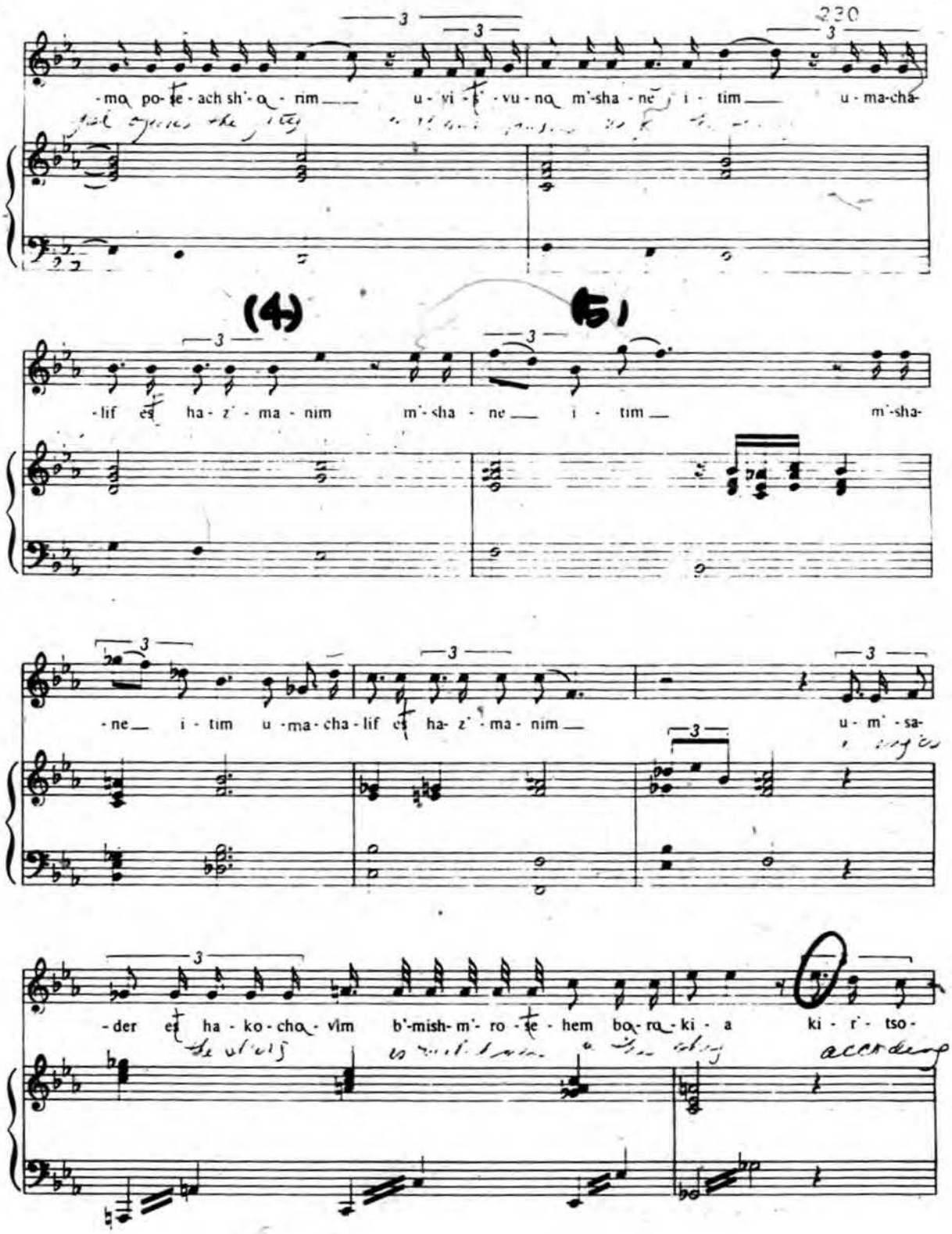
ASHER BID'VORO

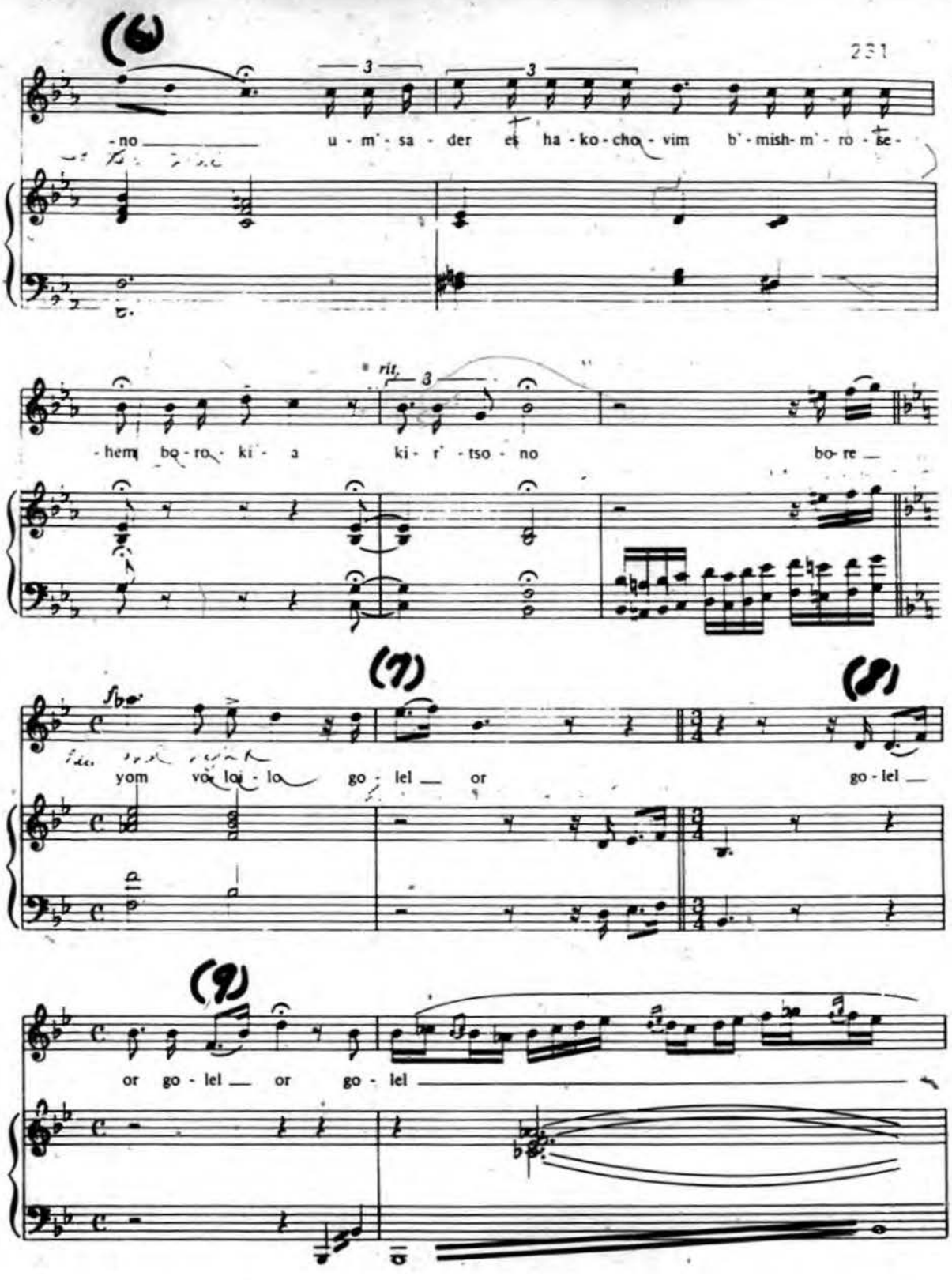
Piano arrangement:
Israel Goldstein

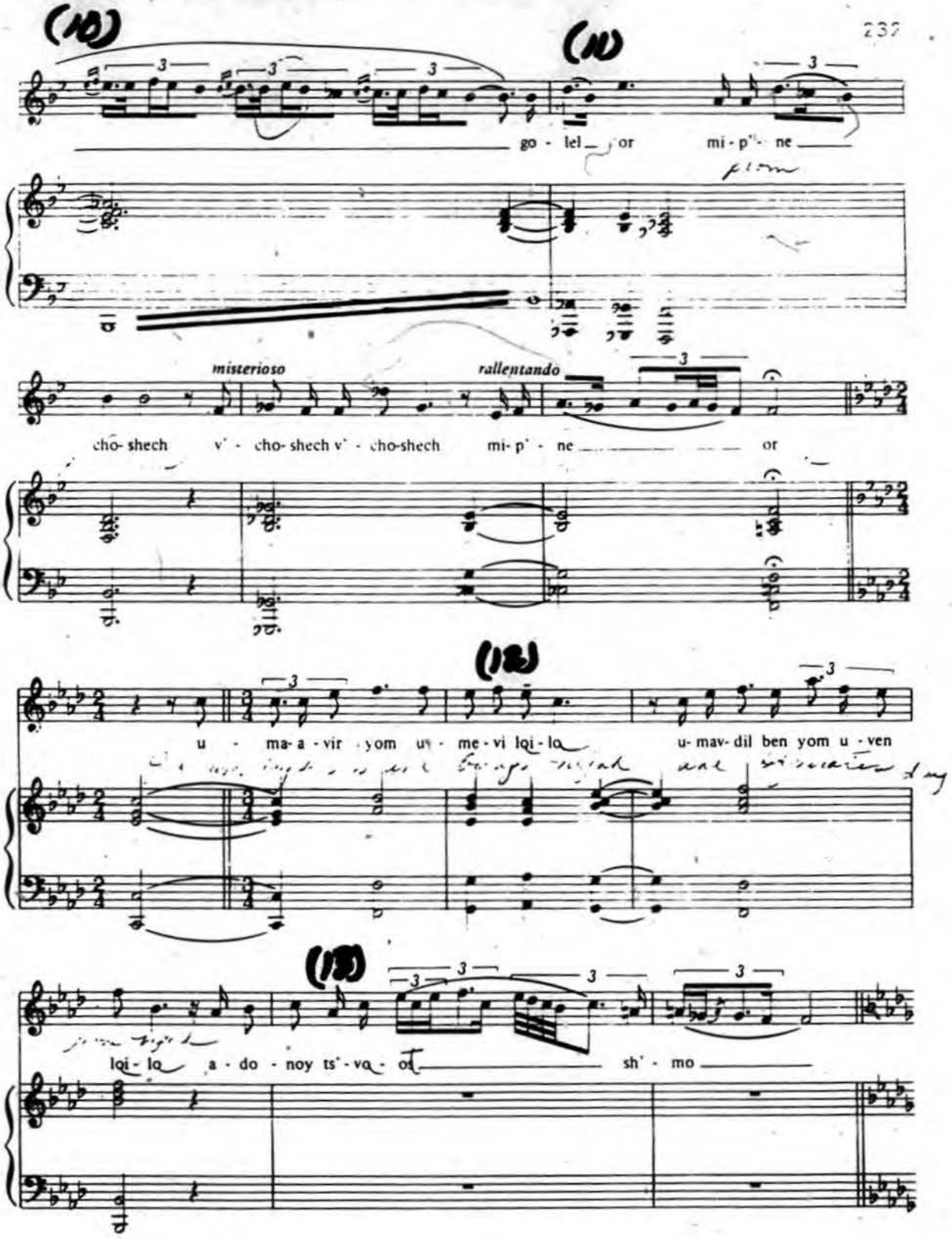
(1)

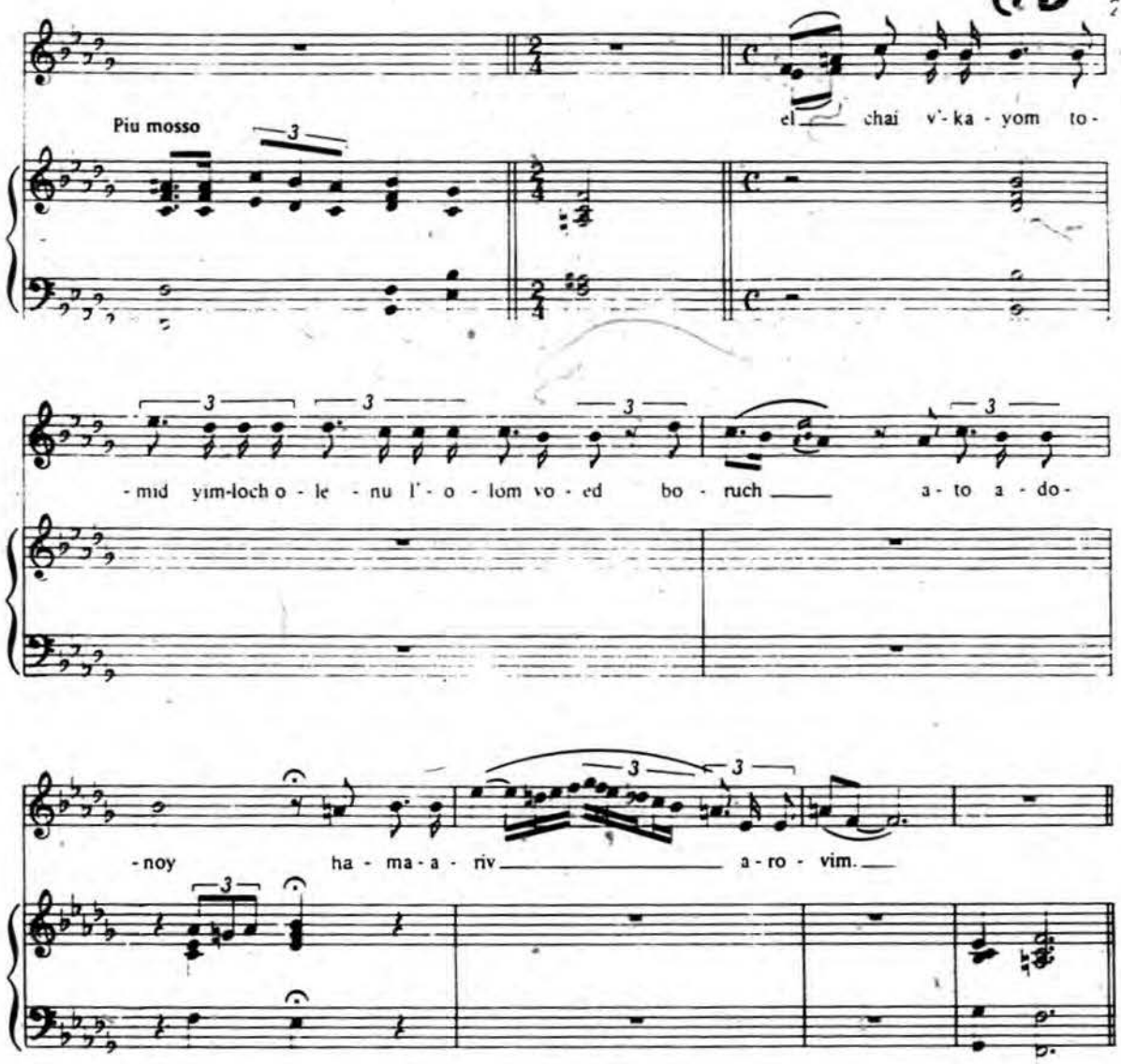
Moshe Ganchoff




-ma po-te-ach sh'-a-rim u-vi-t'-vu-na m'-sha-ne-i-tim u-ma-cha-
(4)
(5)
-lif es ha-z'-ma-nim m'-sha-ne i-tim m'-sha-
-ne i-tim u-ma-cha-lif es ha-z'-ma-nim u-m'-sa-
-der es ha-ko-cha-vim b'-mish-m'-ro-te-hem bo-ra-ki-a ki-r'-tso-

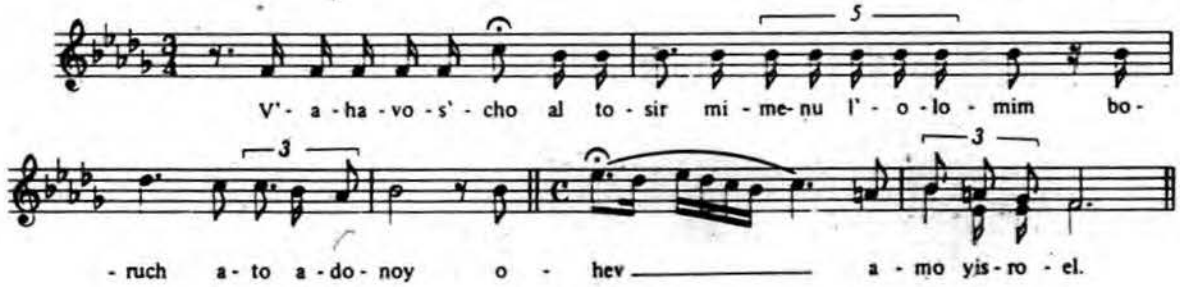

(6)
-no u - m' - sa - der es ha - ko - cho - vim b' - mish- m' - ro - se -
rit.
-hem bo - ro - ki - a ki - r' - tso - no bo - re
(7)
(8)
yom vo - loi - lo go - lel or go - lel
(9)
or go - lel or go - lel


(10)
(11)
go - lel or mi - p'- ne
misterioso
rallentando
cho- shech v' - cho- shech v' - cho-shech mi- p' - ne or
(12)
u - ma-a - vir yom u' - me - vi lqi - lo u- mav- dil ben yom u - ven
(13)
lqi - lo a - do - noy ts' - va - ot sh' - mo

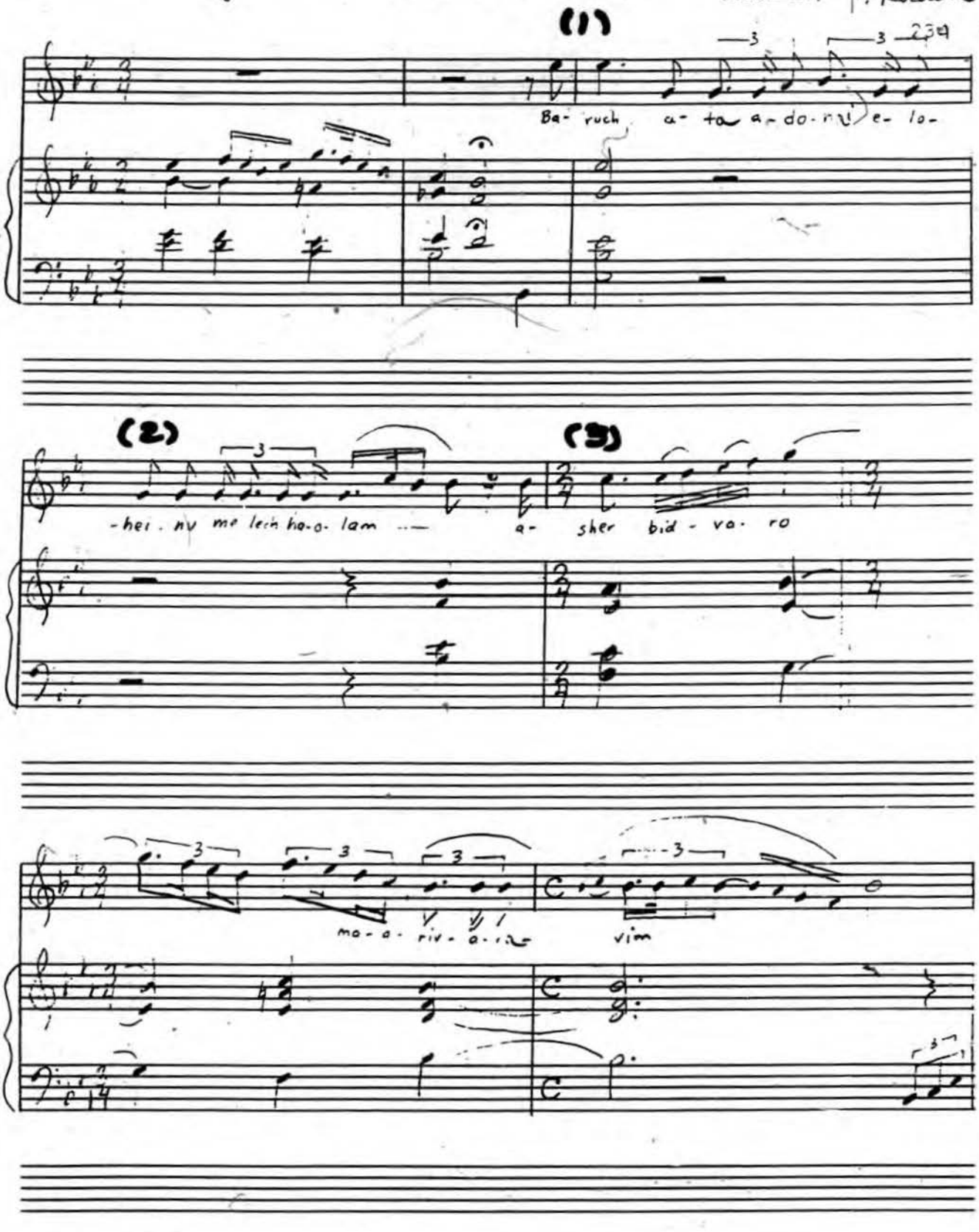


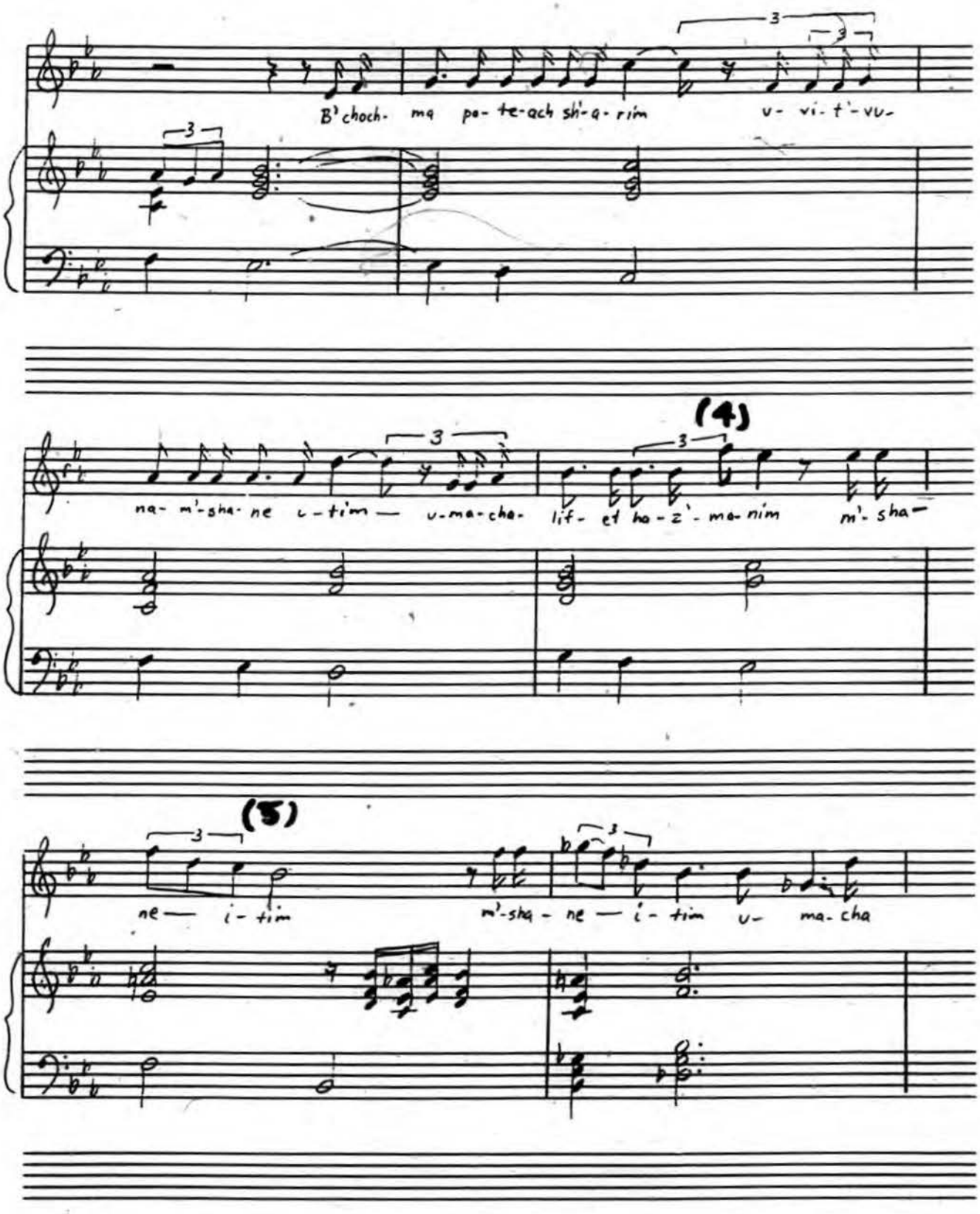
V'AHAVOS'CHO

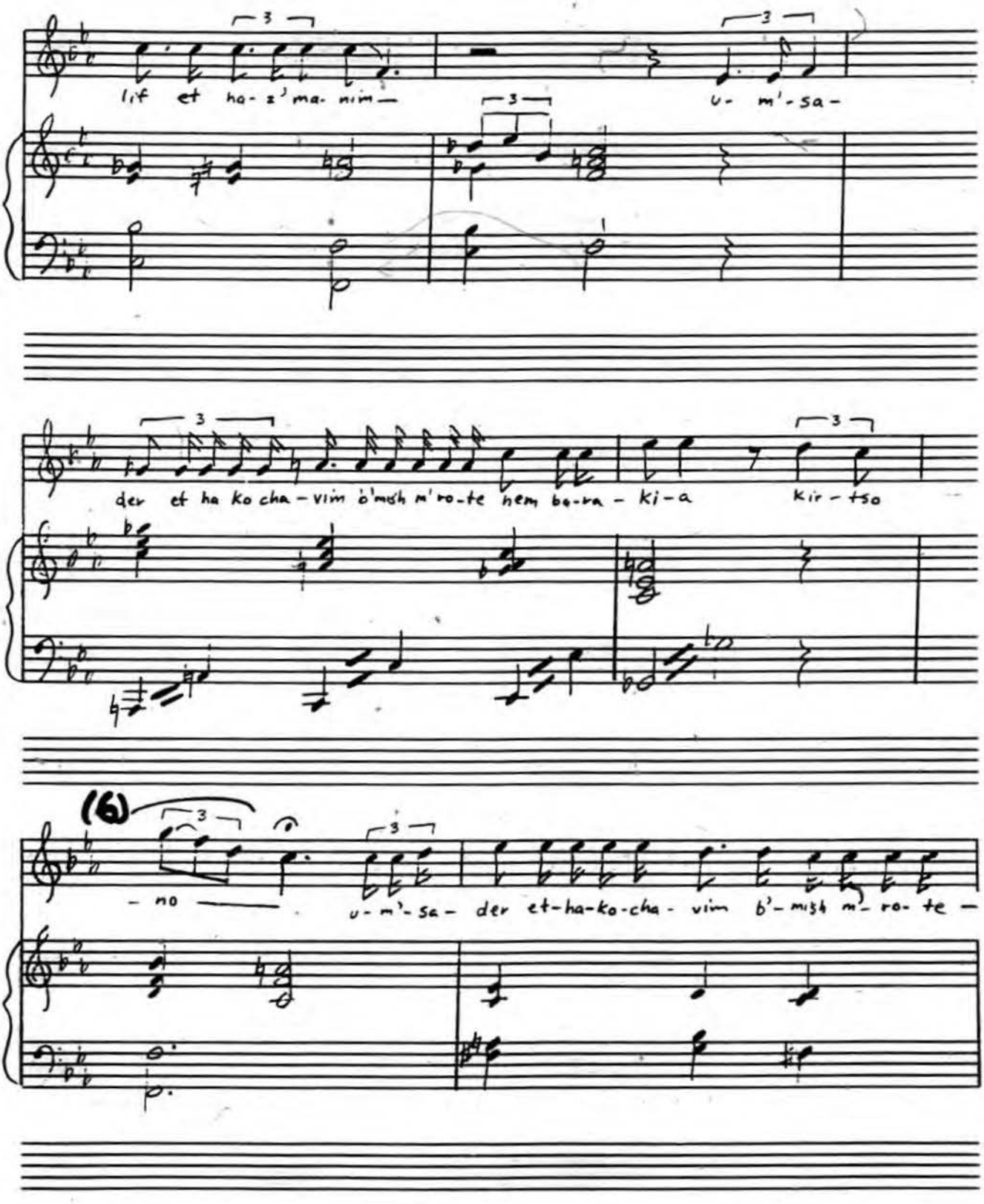
Moshe Ganchoff

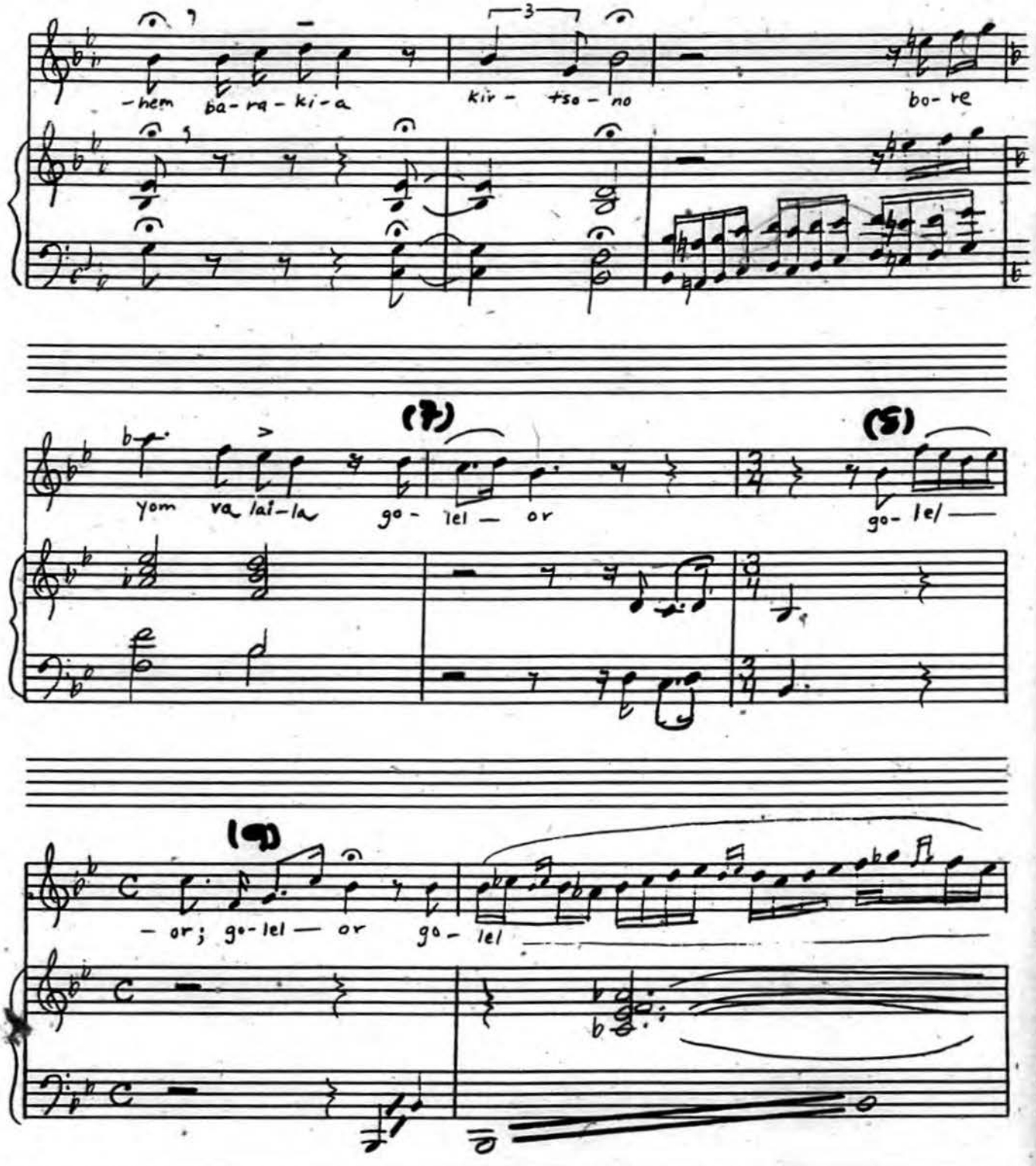


Piano arr. I Goldstein Asher Bidvaro Moishe - Michlott vocal arr F. Kordan



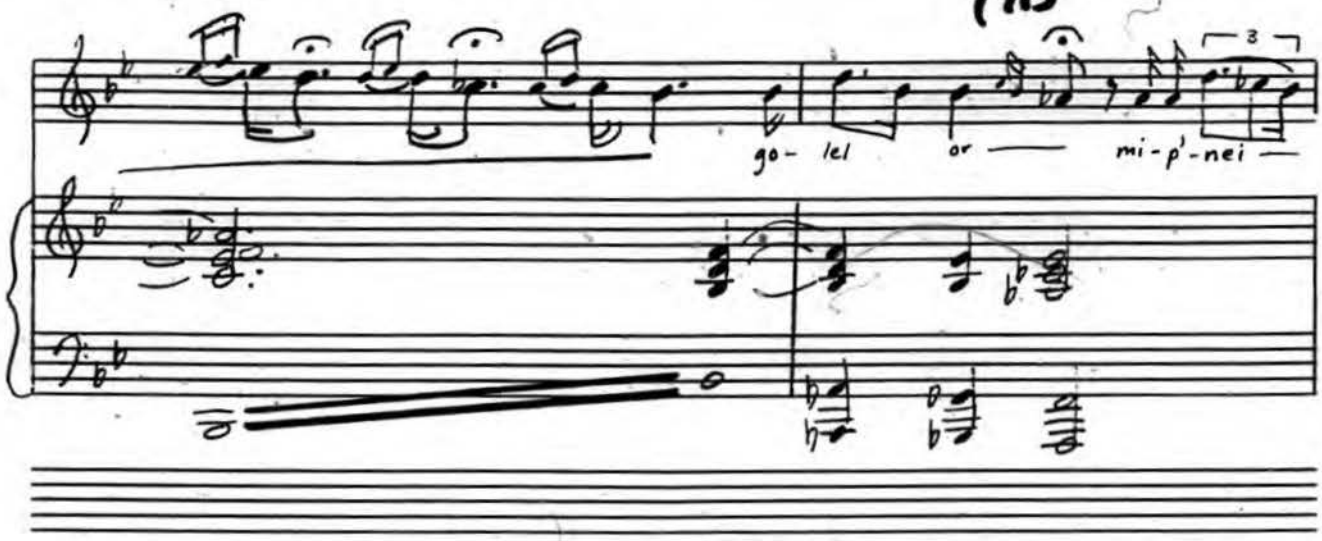


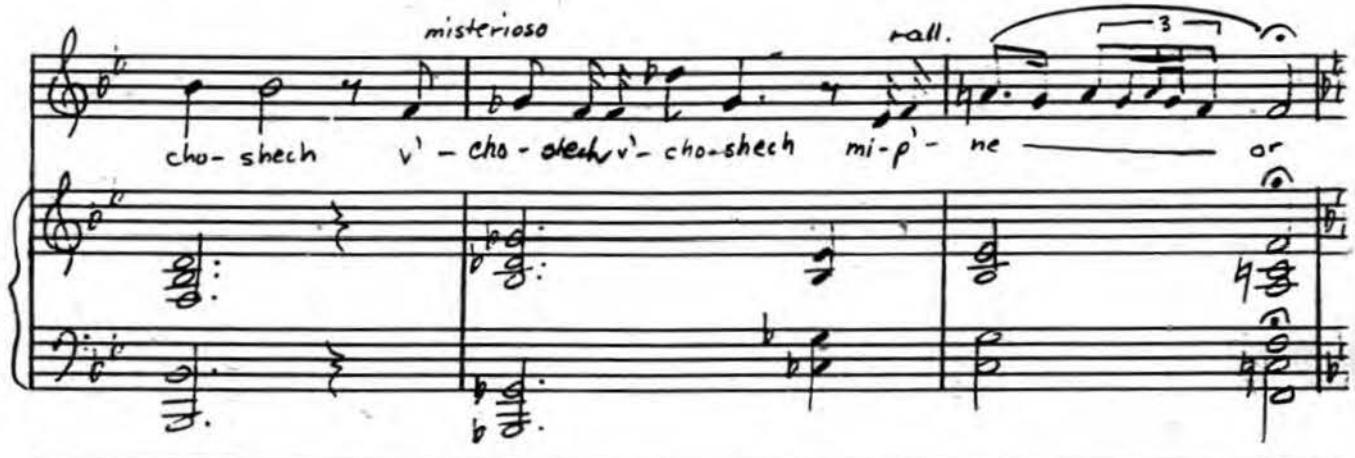




(10)

(11)





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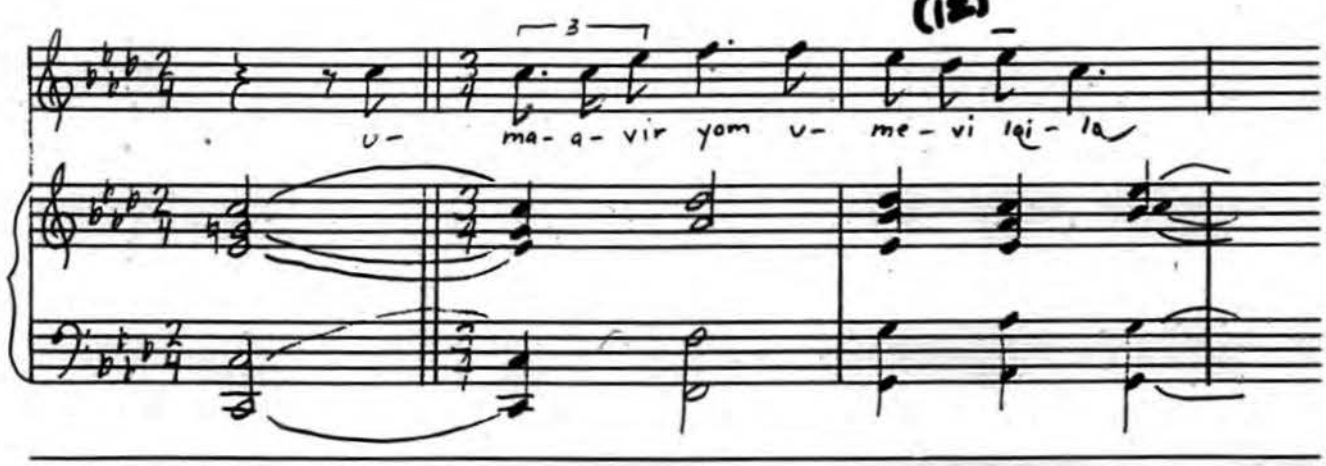
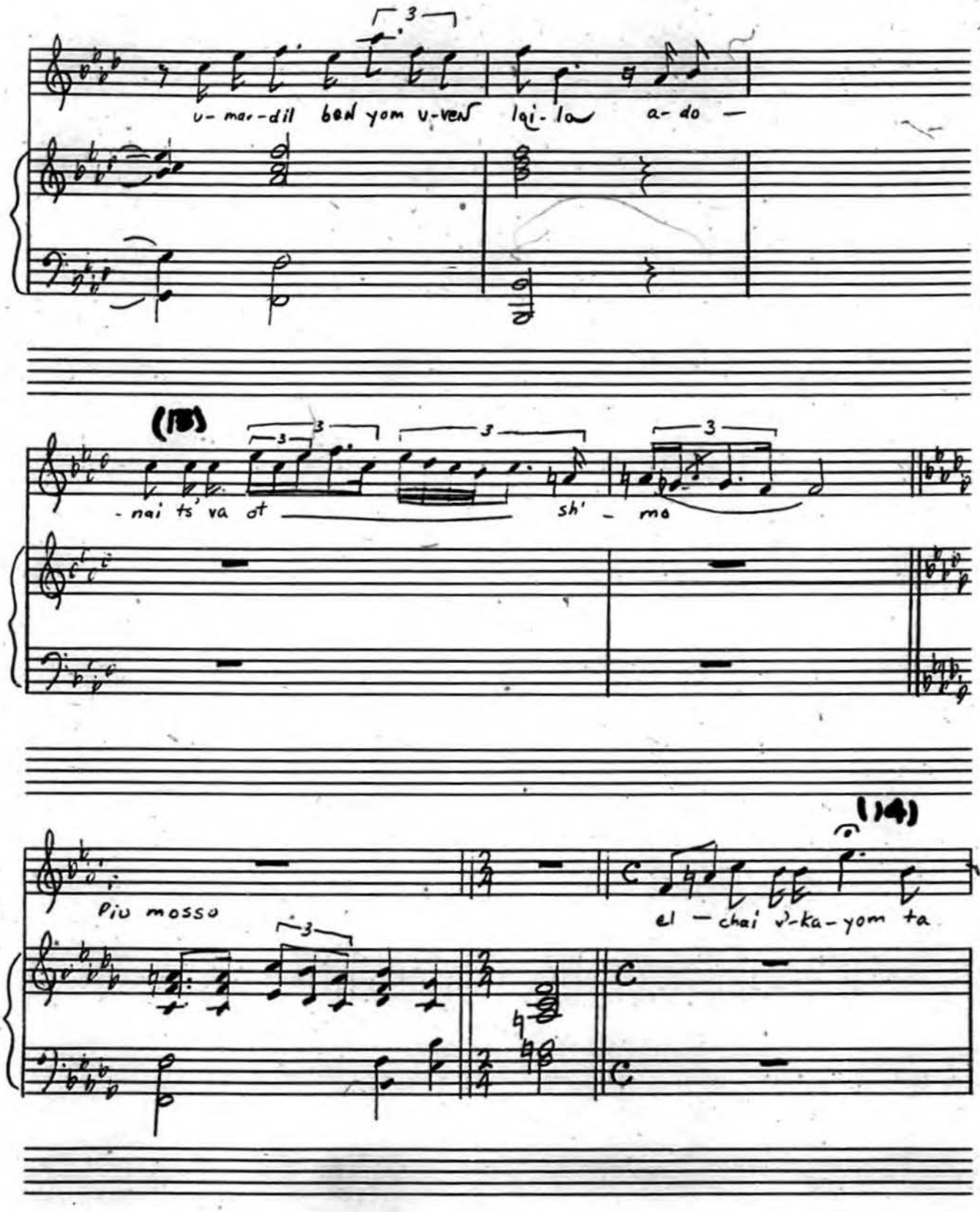
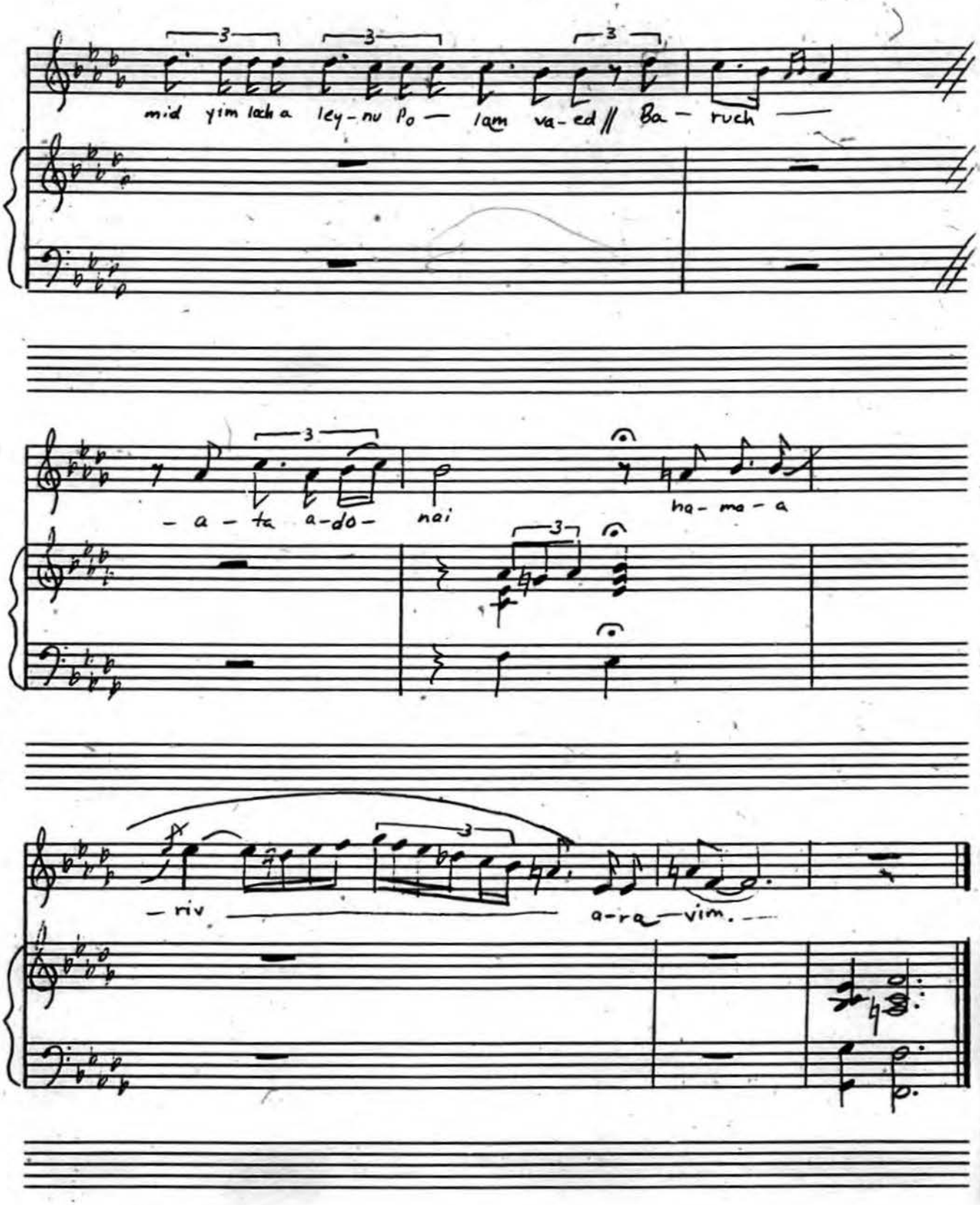


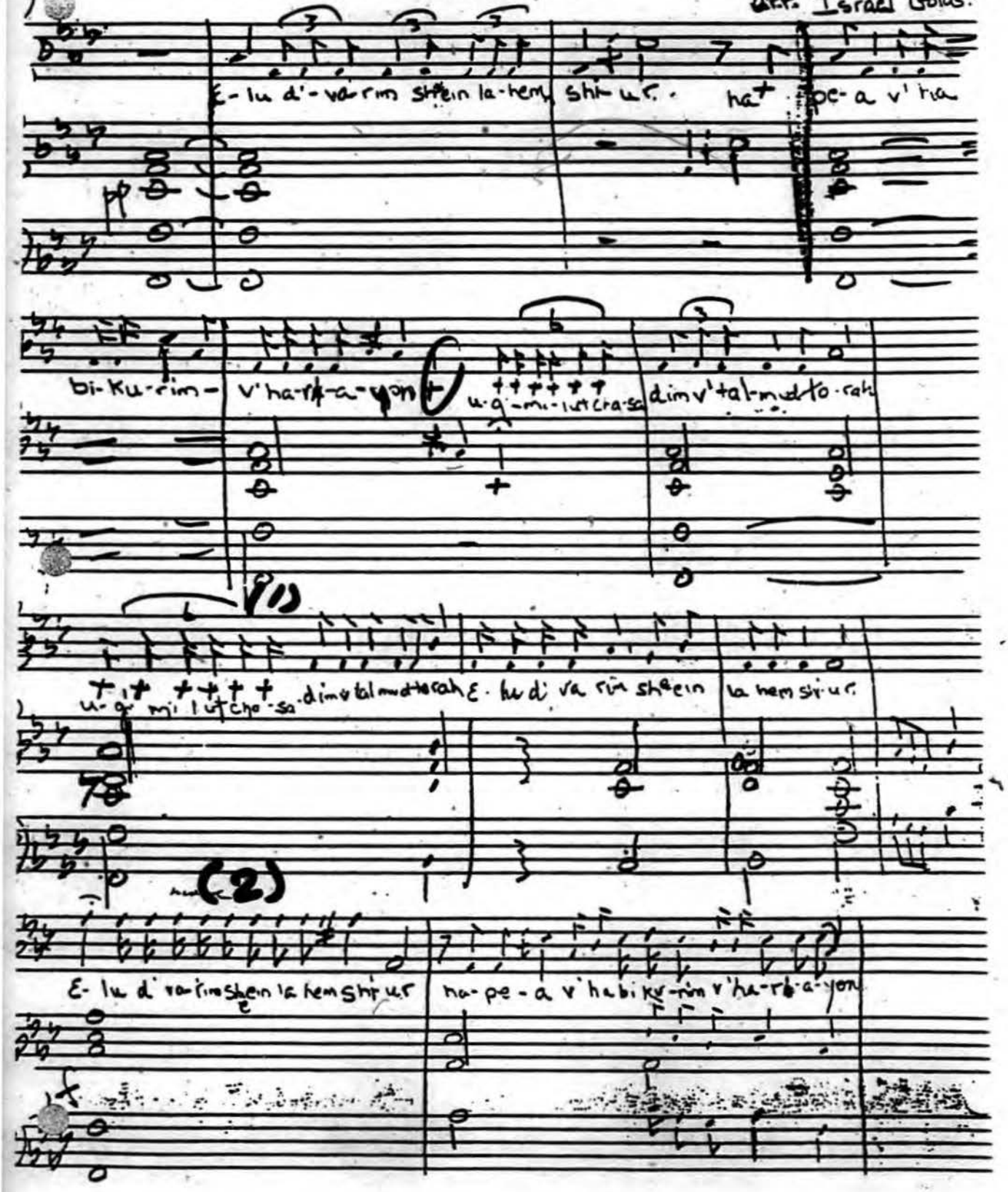


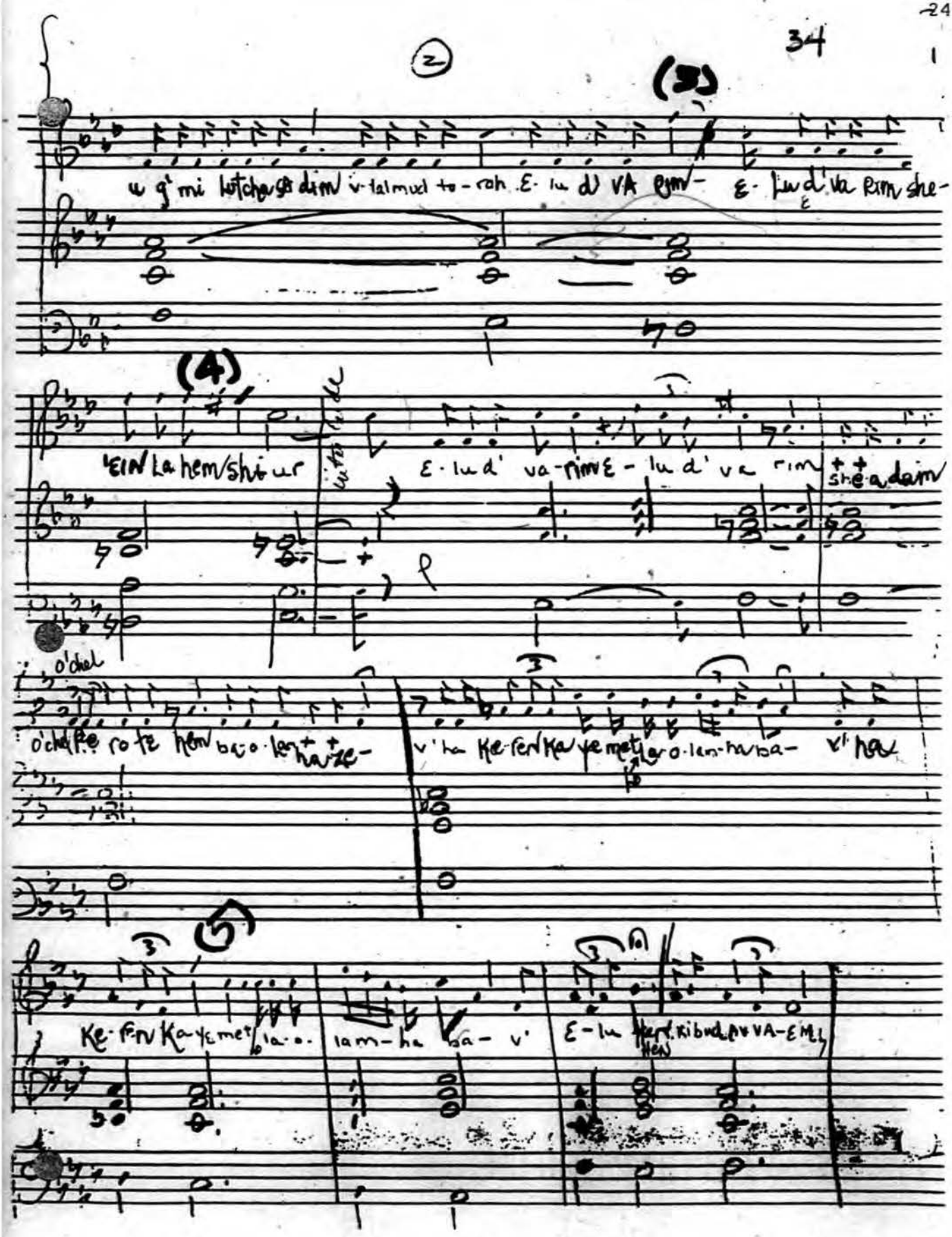


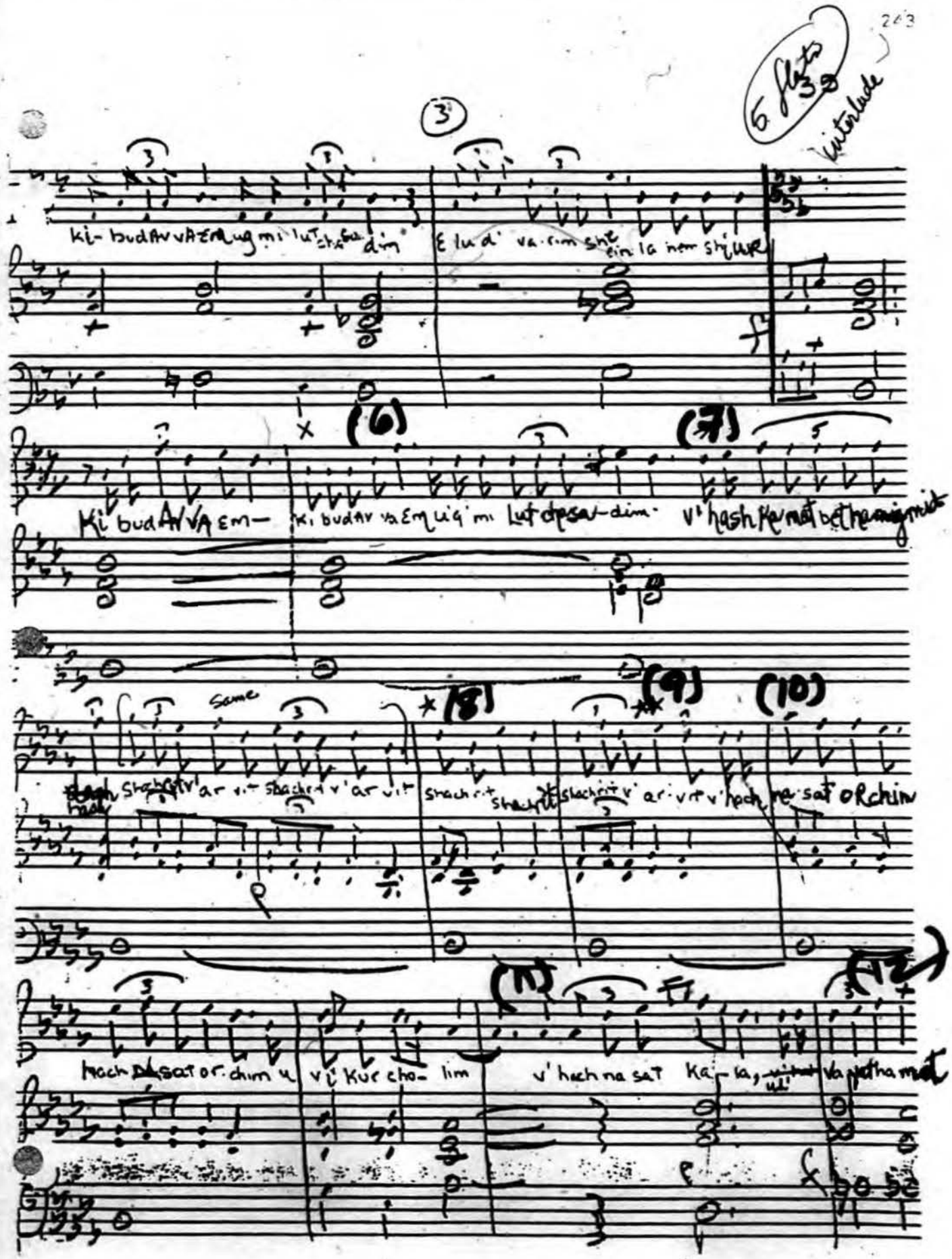
33

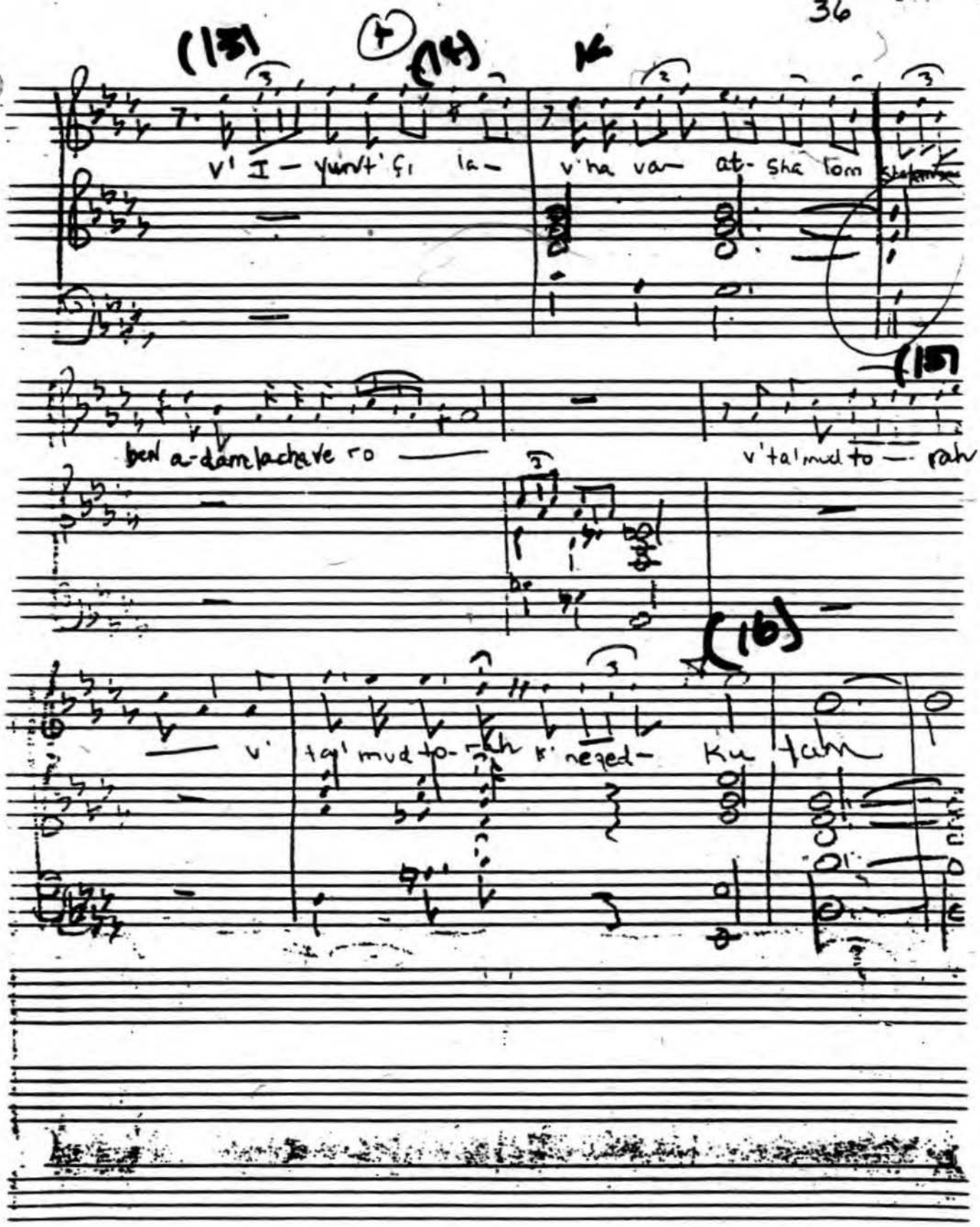
Eilu D'varim

Rappaport
arr. Israel Goldst




34
(2)
(3)
u g'mi lotcha dim/ v-talmud to-roh E-lu d' VA rim- E-lu d' va rim she-
(4)
EIN La hem/shi ur
E-lu d' va-rim E-lu d' va rim she a dam/
o'chel
o'chel le ro te hem ba o-lam ha ze-
v'ha Ke-fen Ka ye met la o-lam ha ba- v' ha
(5)
Ke-fen Ka-ye met la o-
lam-ha ba- v'
E-lu Ke-ri-bud AV VA-EM
Hen


6 flats
3
interlude
ki-budAr vAEm ug mi lut stA Ba dim
E lu di va rim she tin la nem shi LLER
Ki budAr vAEm—
ki budar vaEm ug'mi Lut dpsar-dim
v'hash Ke mat be the mig mit
Same
hash stach rit v'ar vit stach rit v'ar vit
stach rit stach rit
stach rit v'ar vit v'hach na sat or chim
hach na sat or dim u
vi Kur cha- lim
v'hach na sat Ka- ka,
va pa tha mat

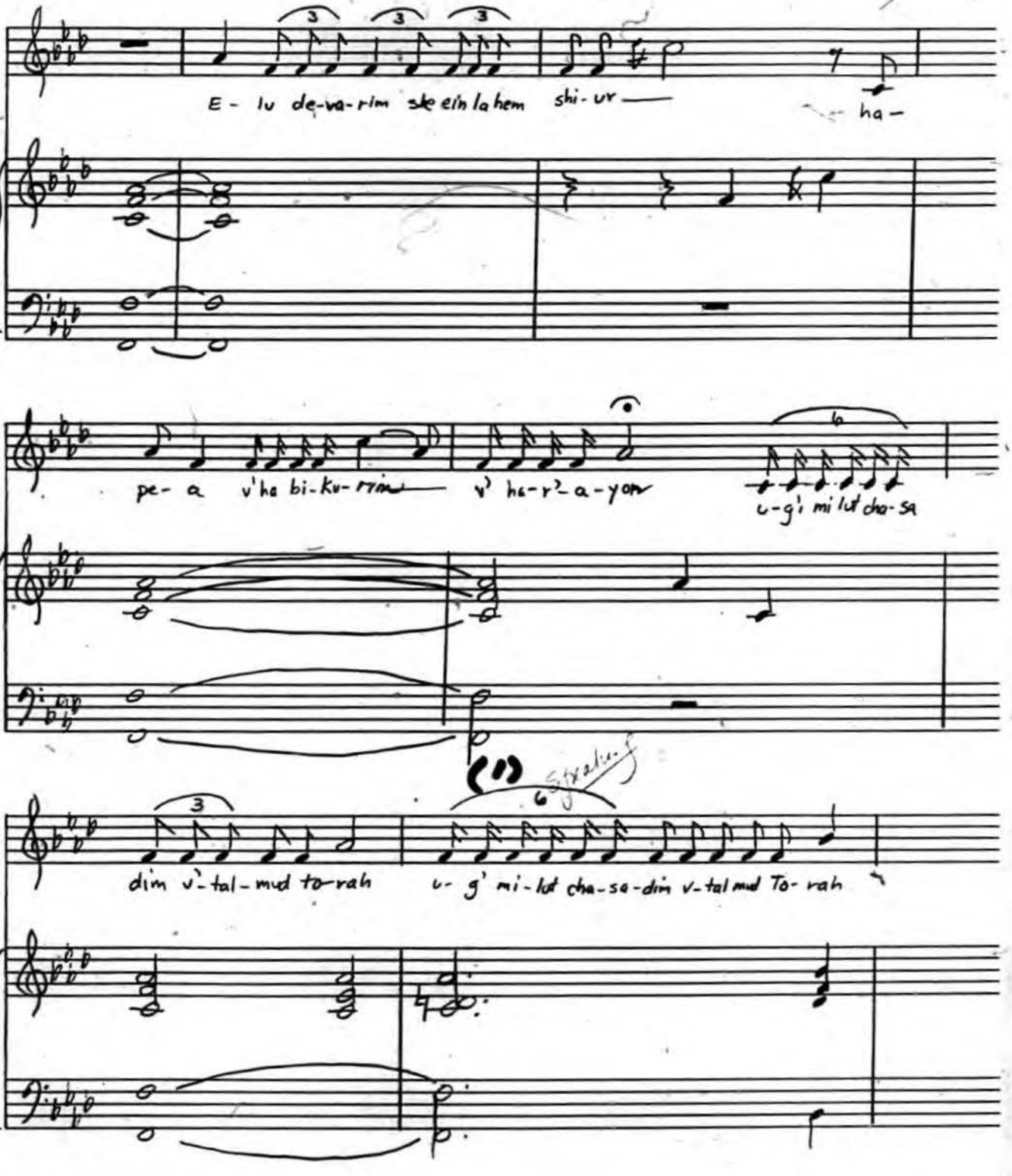

(13)
(14)
K
v' I – yuvr't' fi la–
v'ha var– at- sha tom
(15)
bed a-dam lachaye ro
v'tal mud to – rah
(16)
v'
tal mud to- rah
v' neged-
Ku
tah

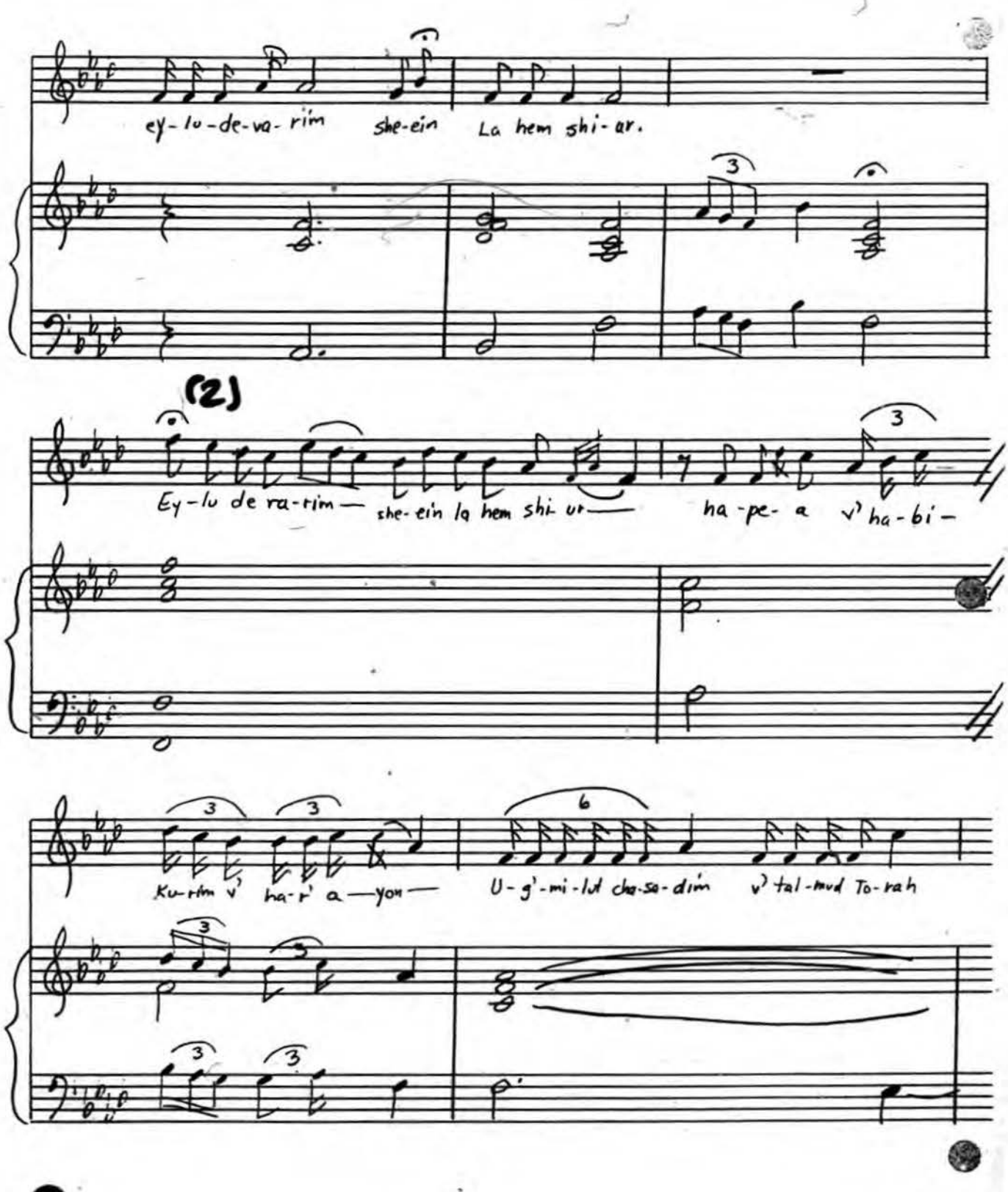
Piano acc. C Goldstein

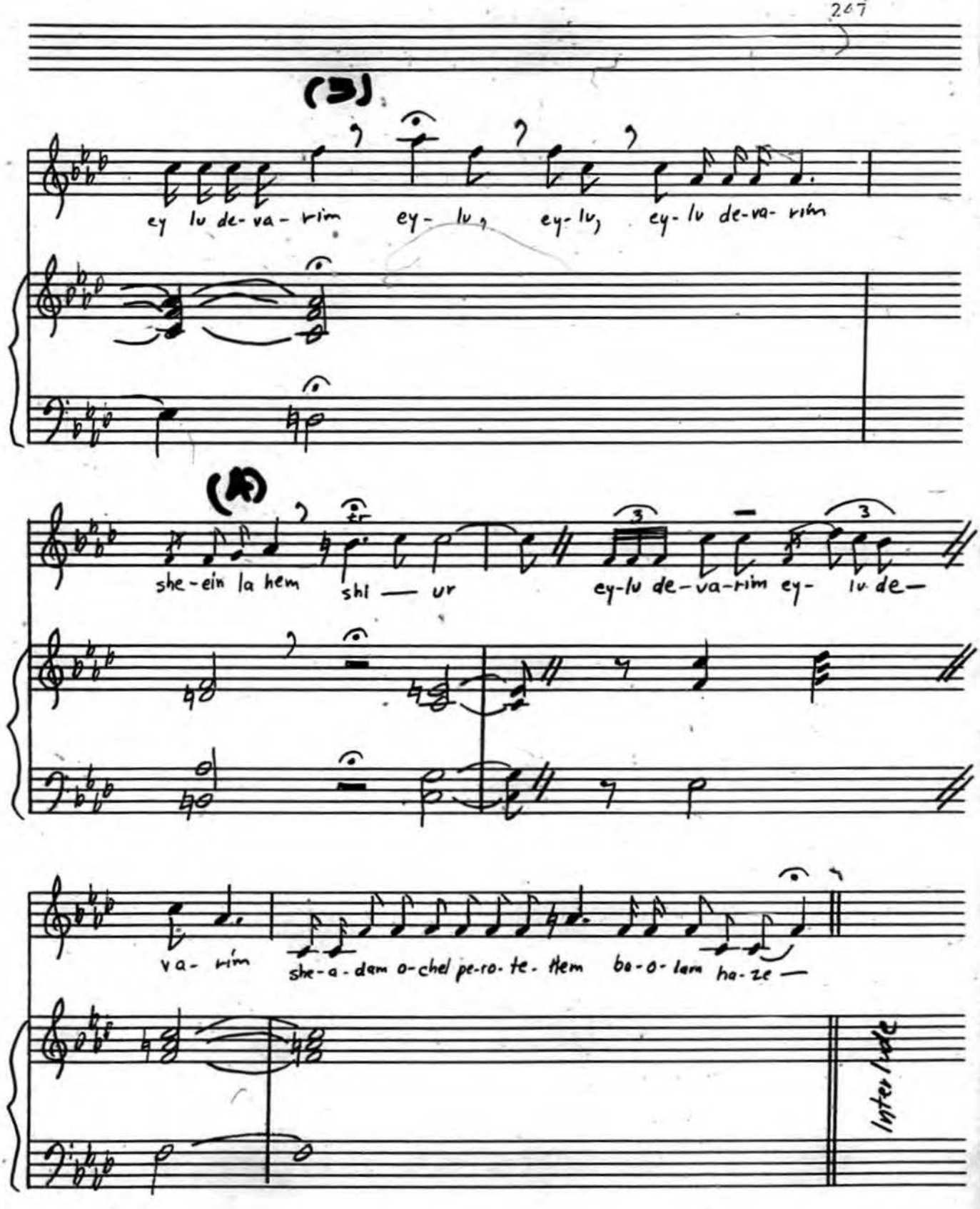
S. Rappaport

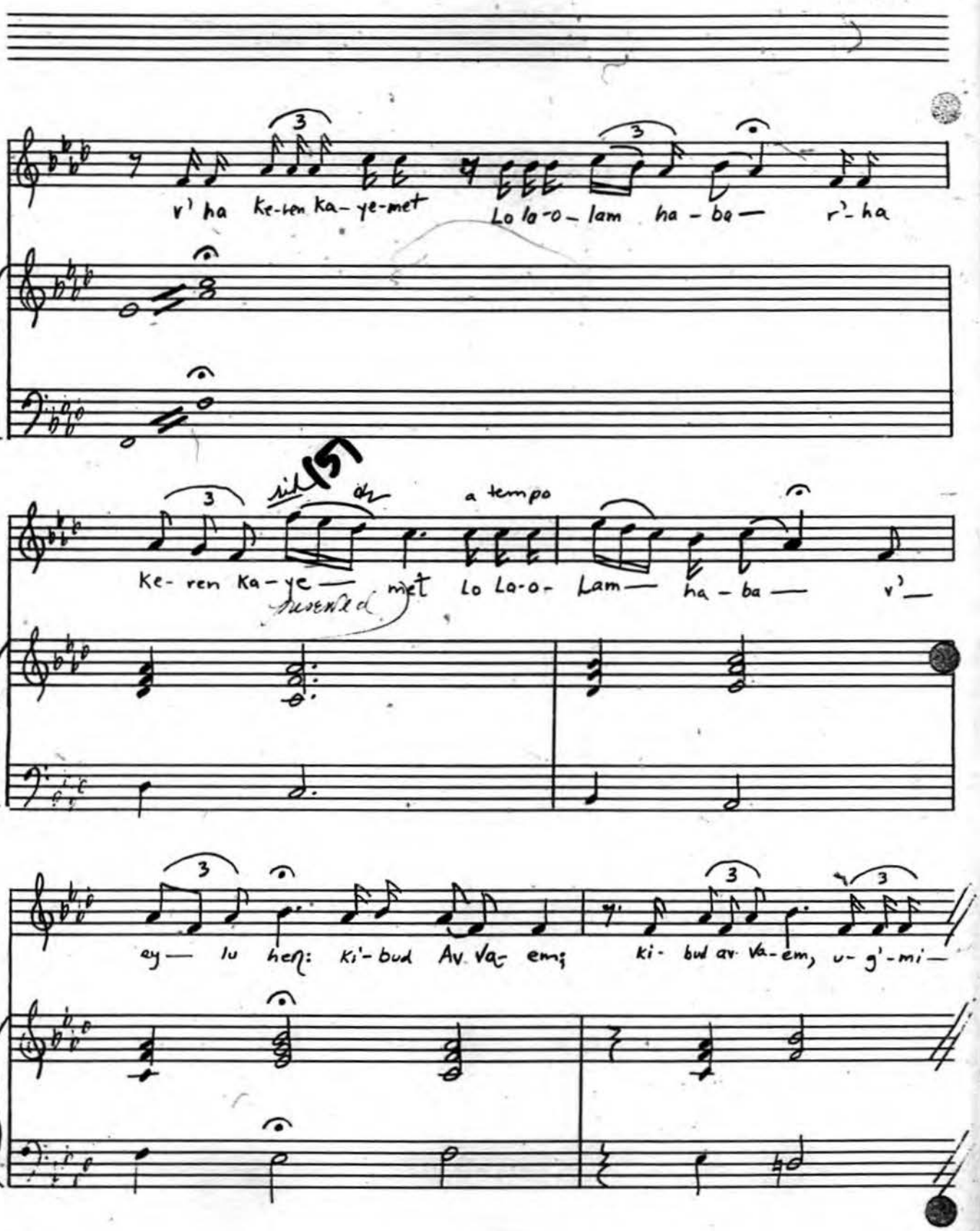
vocal arr. Pamela Kuhn

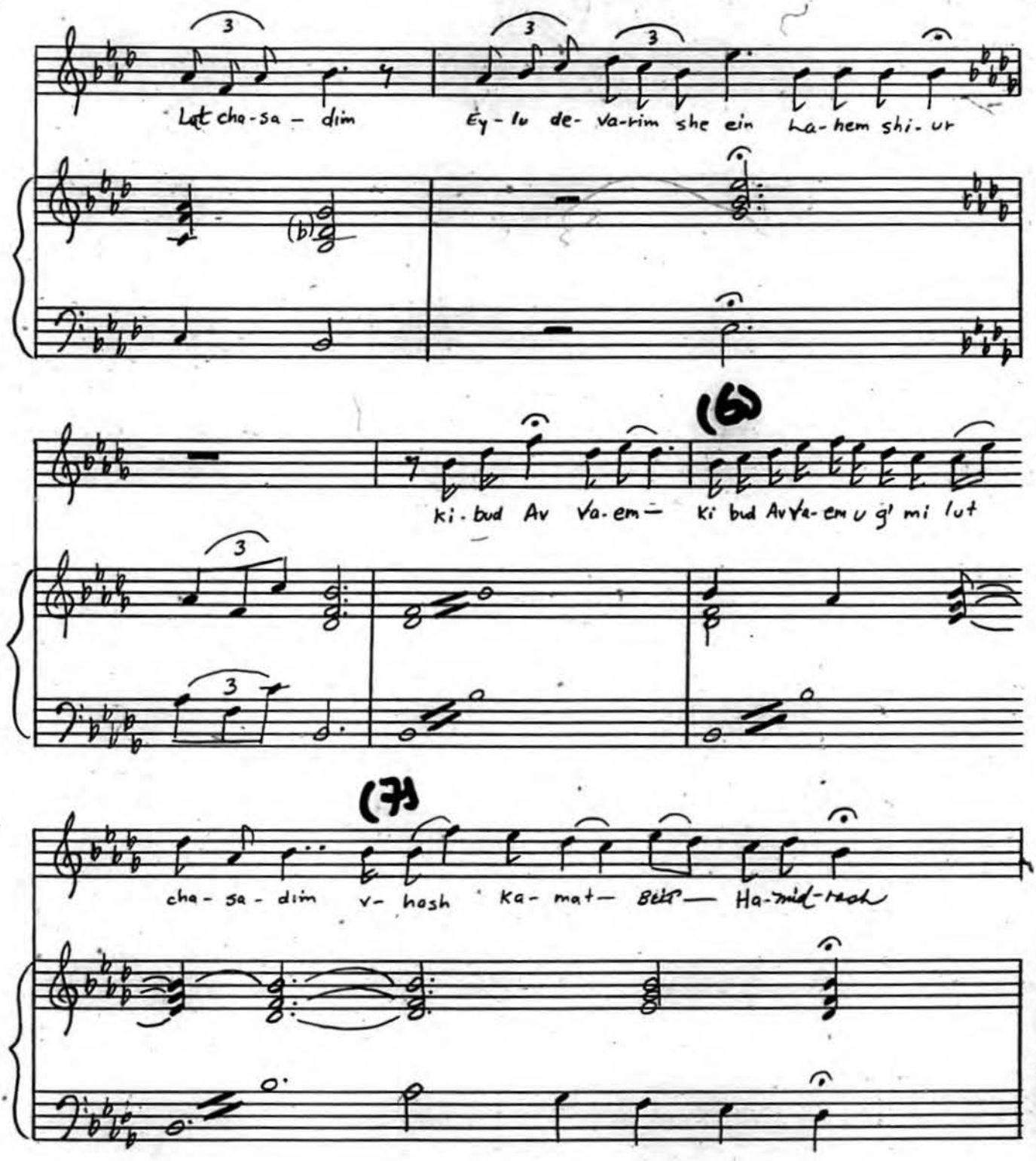
Eylu Devarim

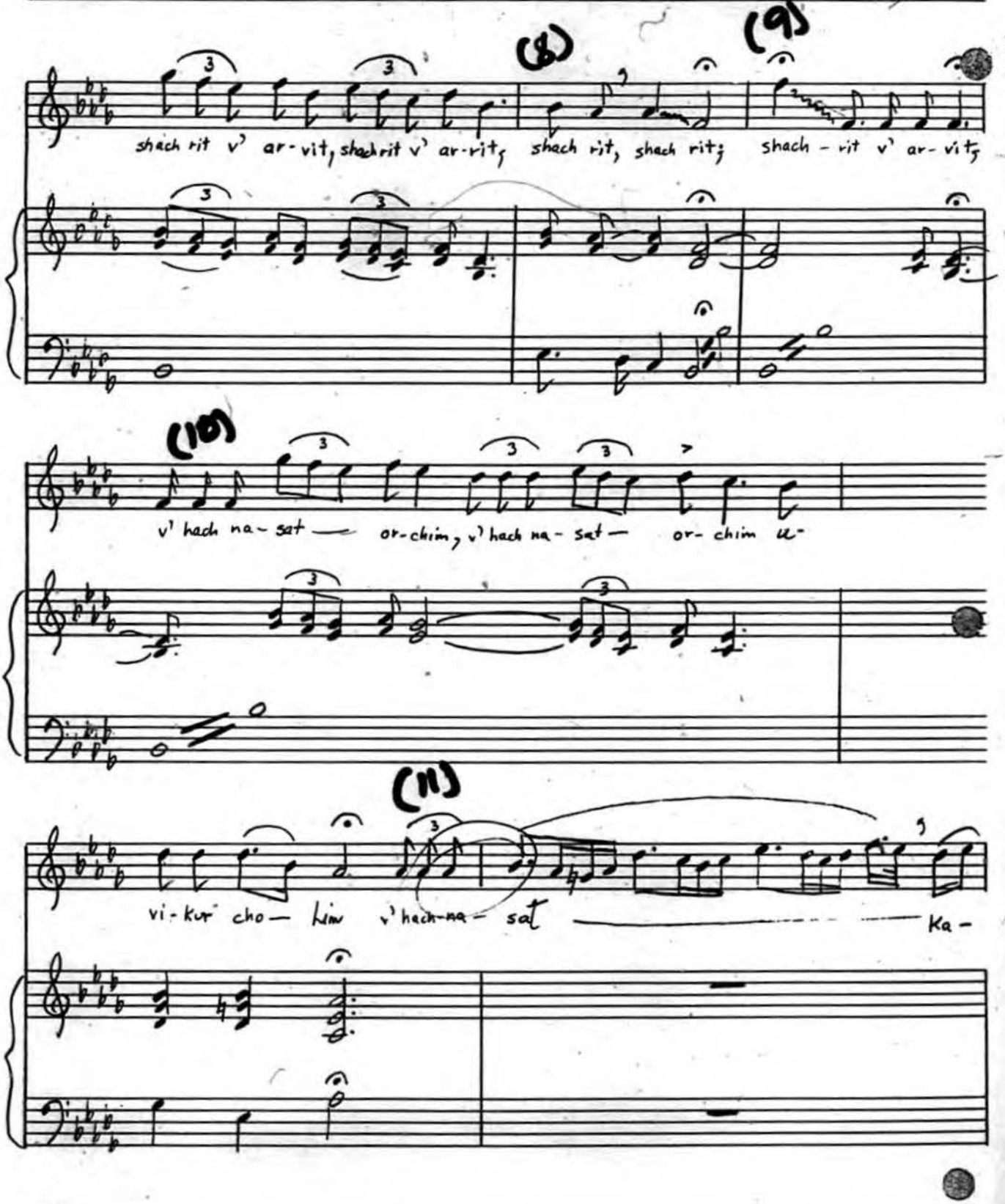


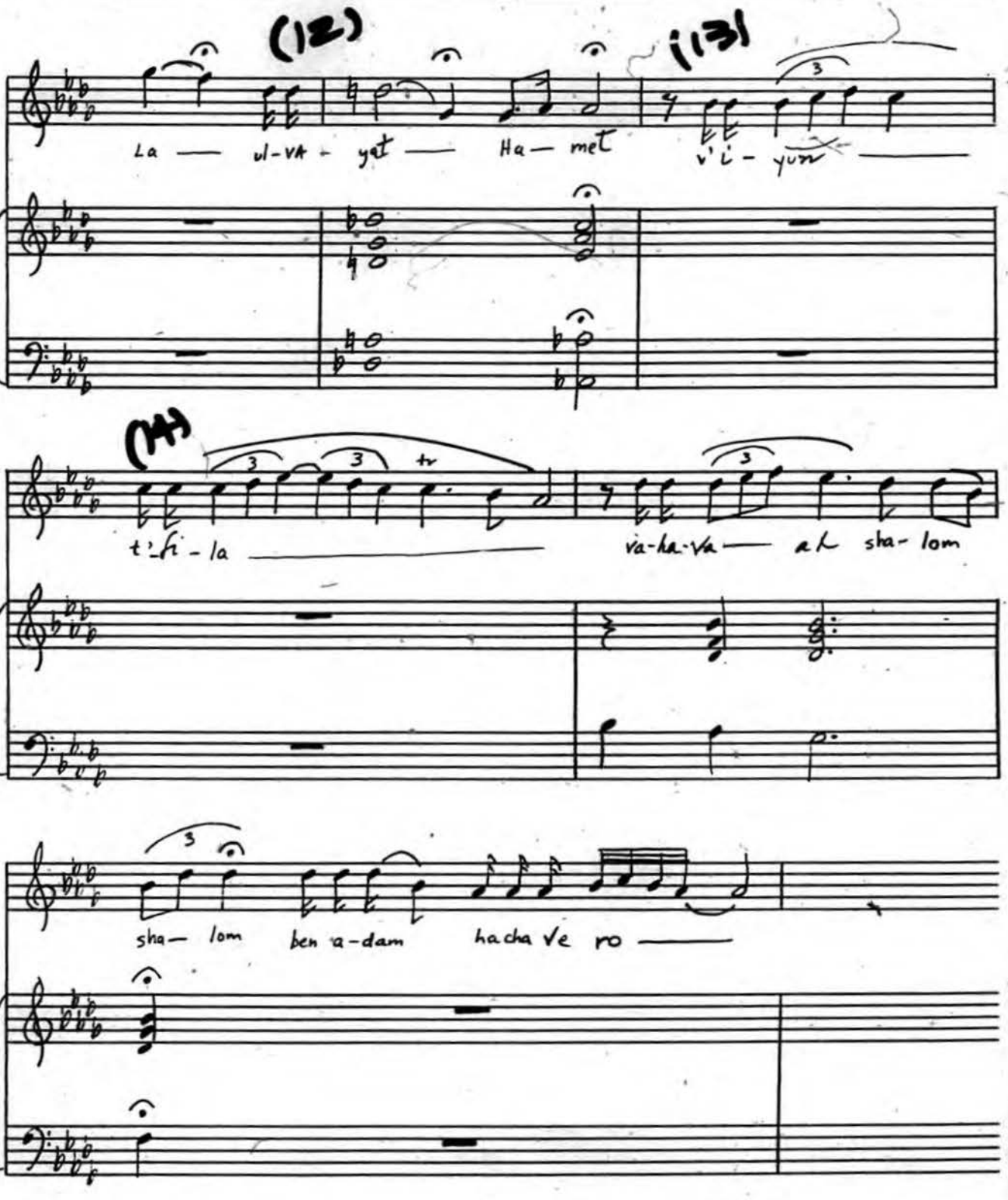

ey-lu-de-va-rim she-ein La hem shi-ar.
(2)
Ey-lu de ra-rim — she-ein la hem shi ur — ha-pe-a v' ha-bi-
Ku-rim v' ha-r' a — yon — U-g'-mi-lut cha-sa-dim v' tal-mud To-rah

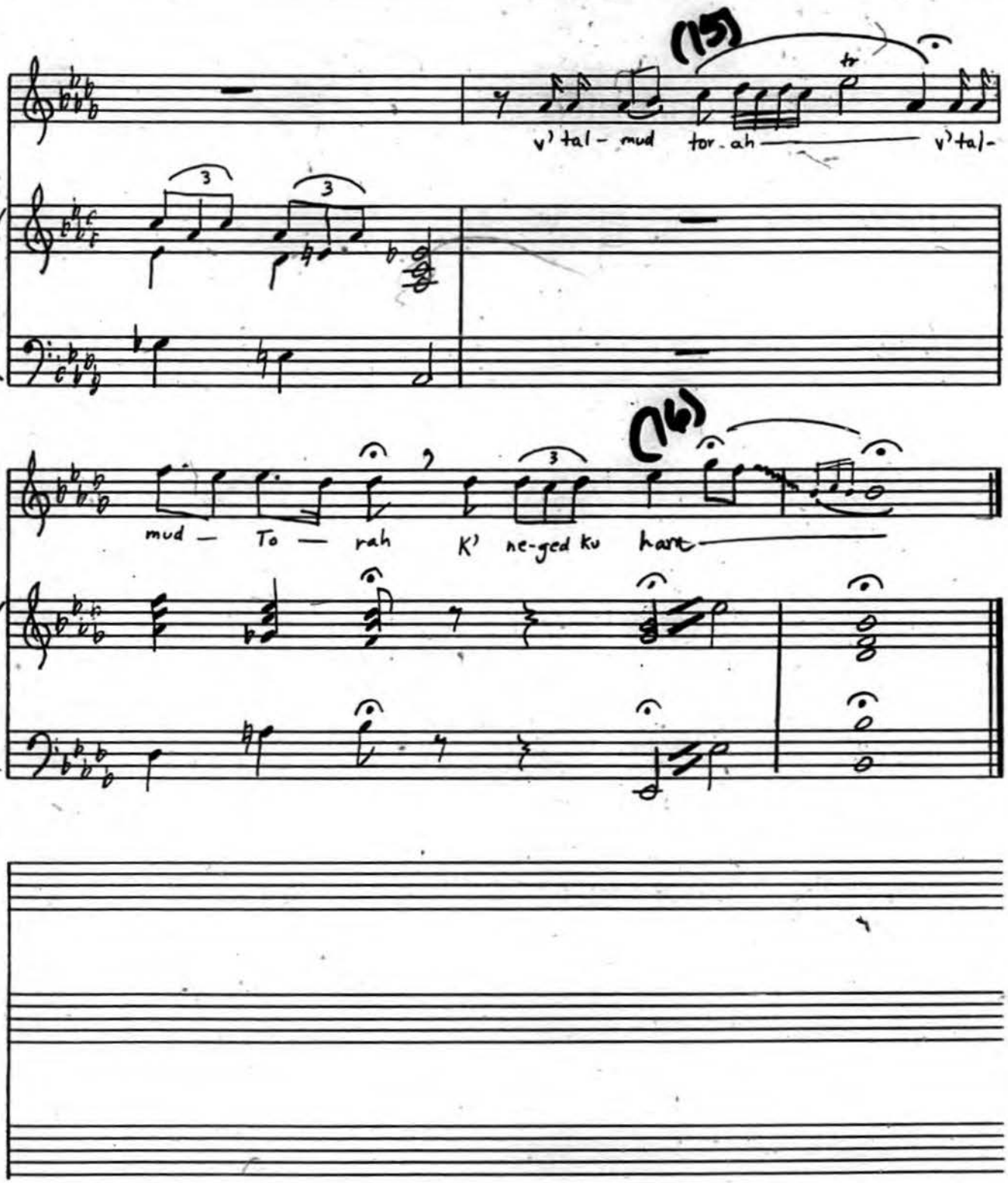

(3)
ey lu de-va-rim ey-lu, ey-lu, ey-lu de-va-rim
(4)
she-ein la hem shi — ur ey-lu de-va-rim ey- lu de-
va-rim she-a-dam o-chel pe-ro-te-hem bo-o-lam ha-ze —
Interlude


v' ha ke-ren ka-ye-met Lo lo-o-lam ha-ba— r'-ha
sul G
a tempo
Ke-ren ka-ye— met Lo Lo-o- Lam— ha-ba— v'—
suspended
ay— lu hen: Ki'-bud Av Va- em; ki- bud av va-em, u-g'-mi—


Lat cha-sa-dim
Ey-lu de-va-rim she ein ha-hem shi-ur
(6)
ki-bud Av va-em
ki bud Av va-em u g' mi lut
(7)
cha-sa-dim v- hash ka-mat
Ha-mid-rash


(8)
(9)
shach rit v' ar-vit, shachrit v' ar-rit, shach rit, shach rit; shach - rit v' ar- vit;
(10)
v' hach na- sat — or-chim, v' hach na- sat — or- chim u-
(11)
vi-kur' cho— lim v' hach-na- sat — Ka-


(12)
(13)
La — vi-va - yat — Ha— met
v'i - yum
(14)
t'fi - la
va-ha-va — al sha- lom
sha— lom ben a-dam ha cha ve ro —


(15)
tr
v'tal - mud tor - ah — v'tal -
3
3
(16)
mud — To — rah K' ne-ged ku hart —

To DAVID CHASMAN, Friend and Colleague

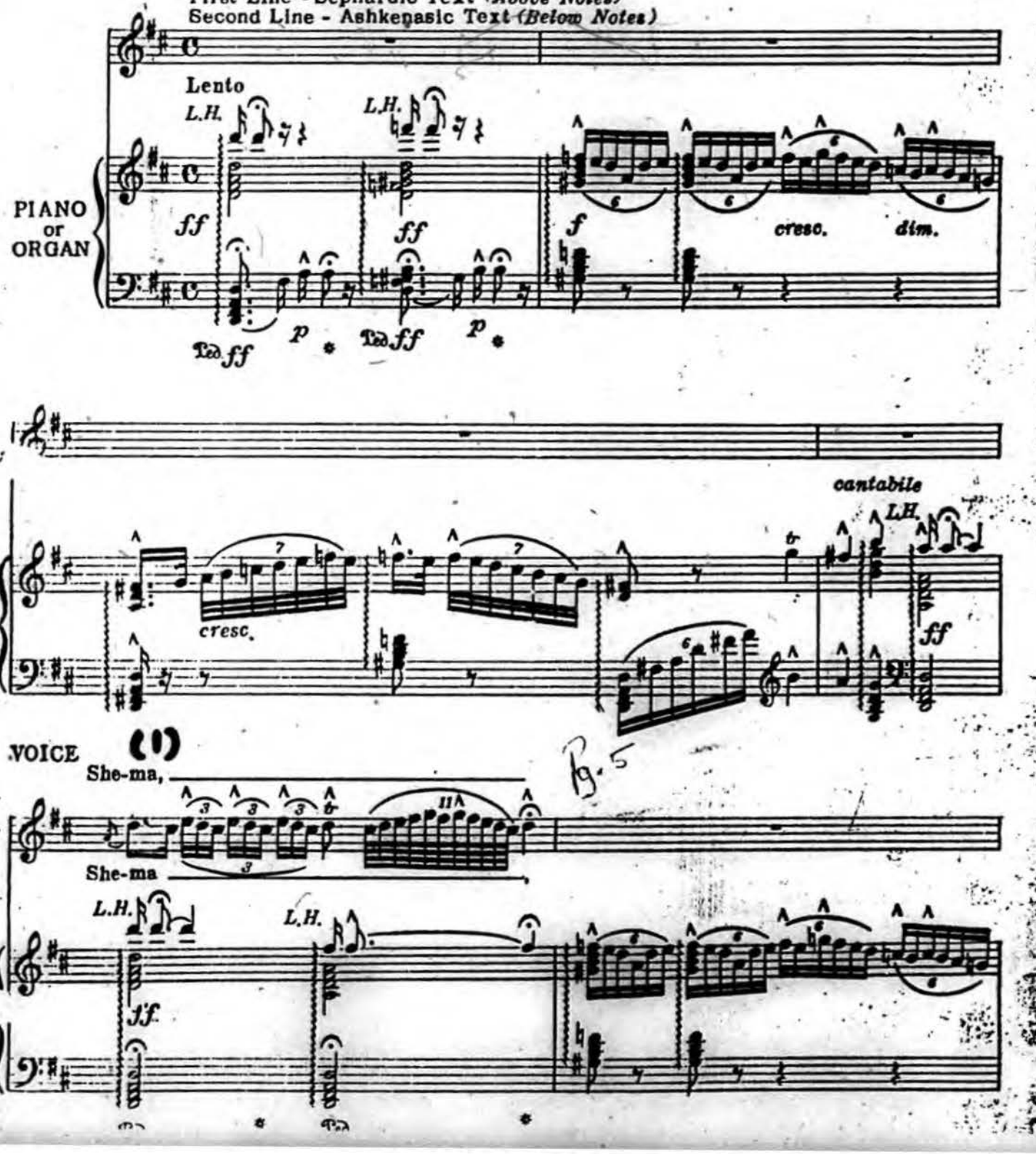
Shema Yisrael

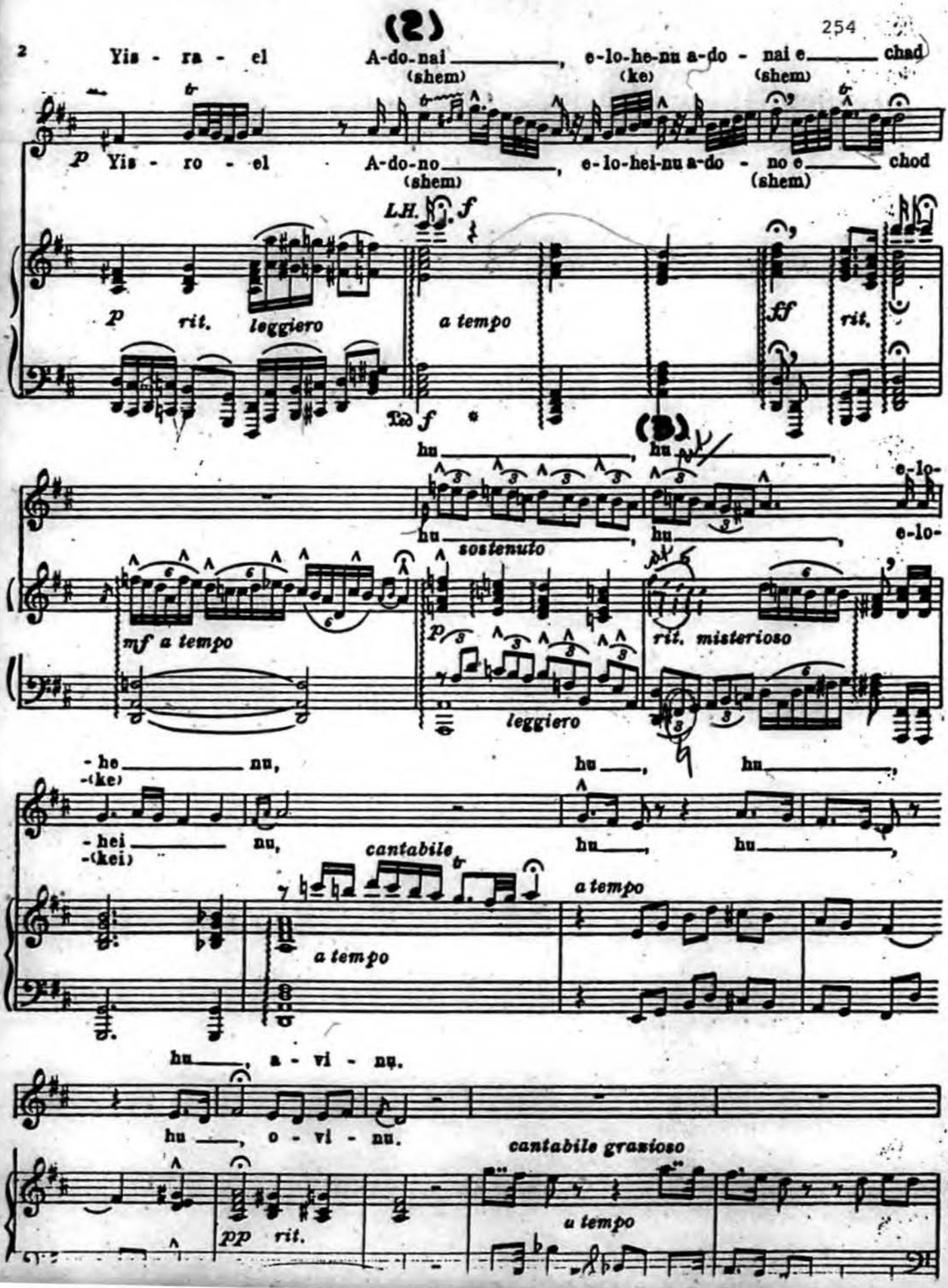
From "Naaritzcho" of Sabbath morning

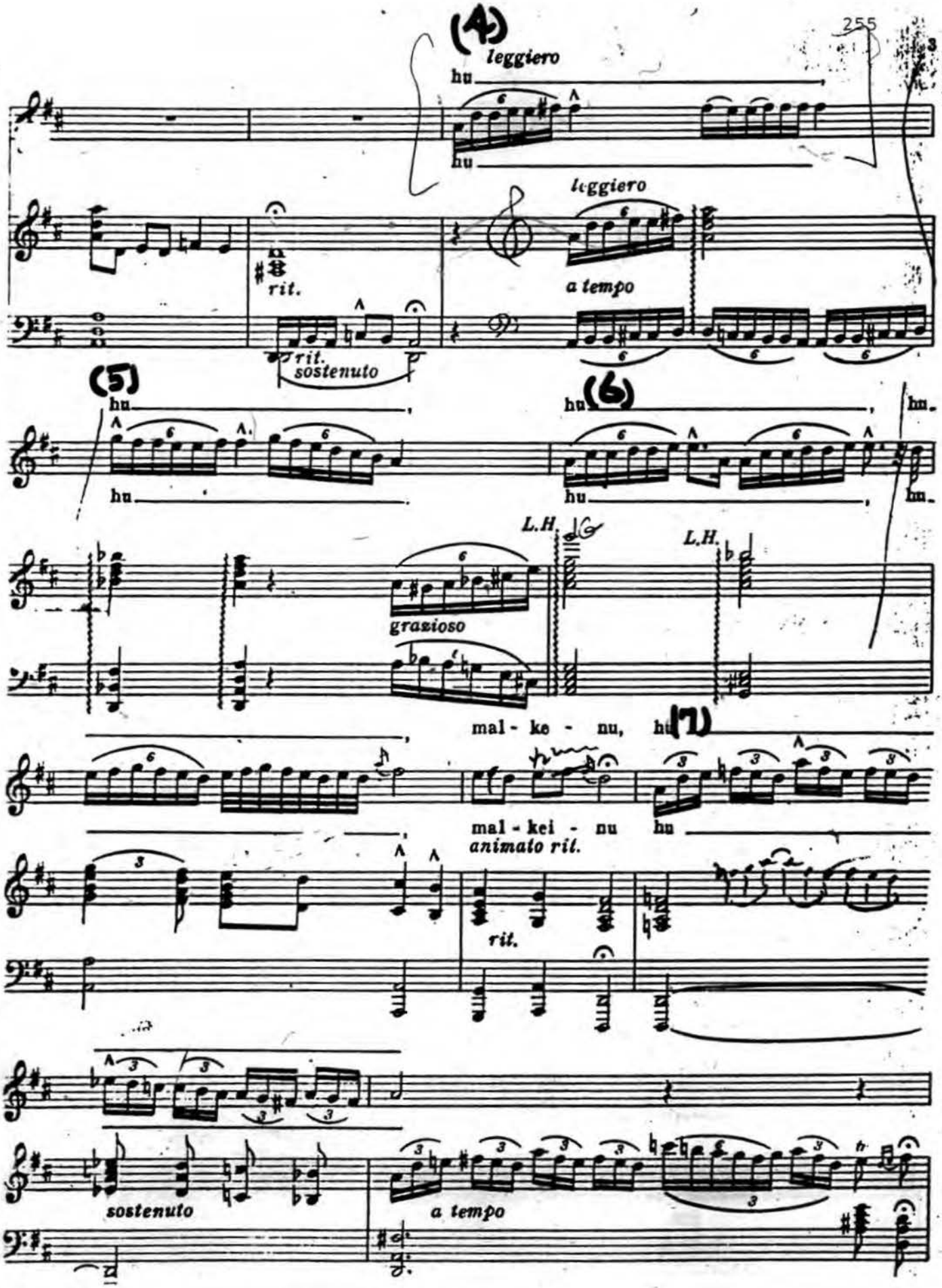
(For Voice and Piano or Organ)

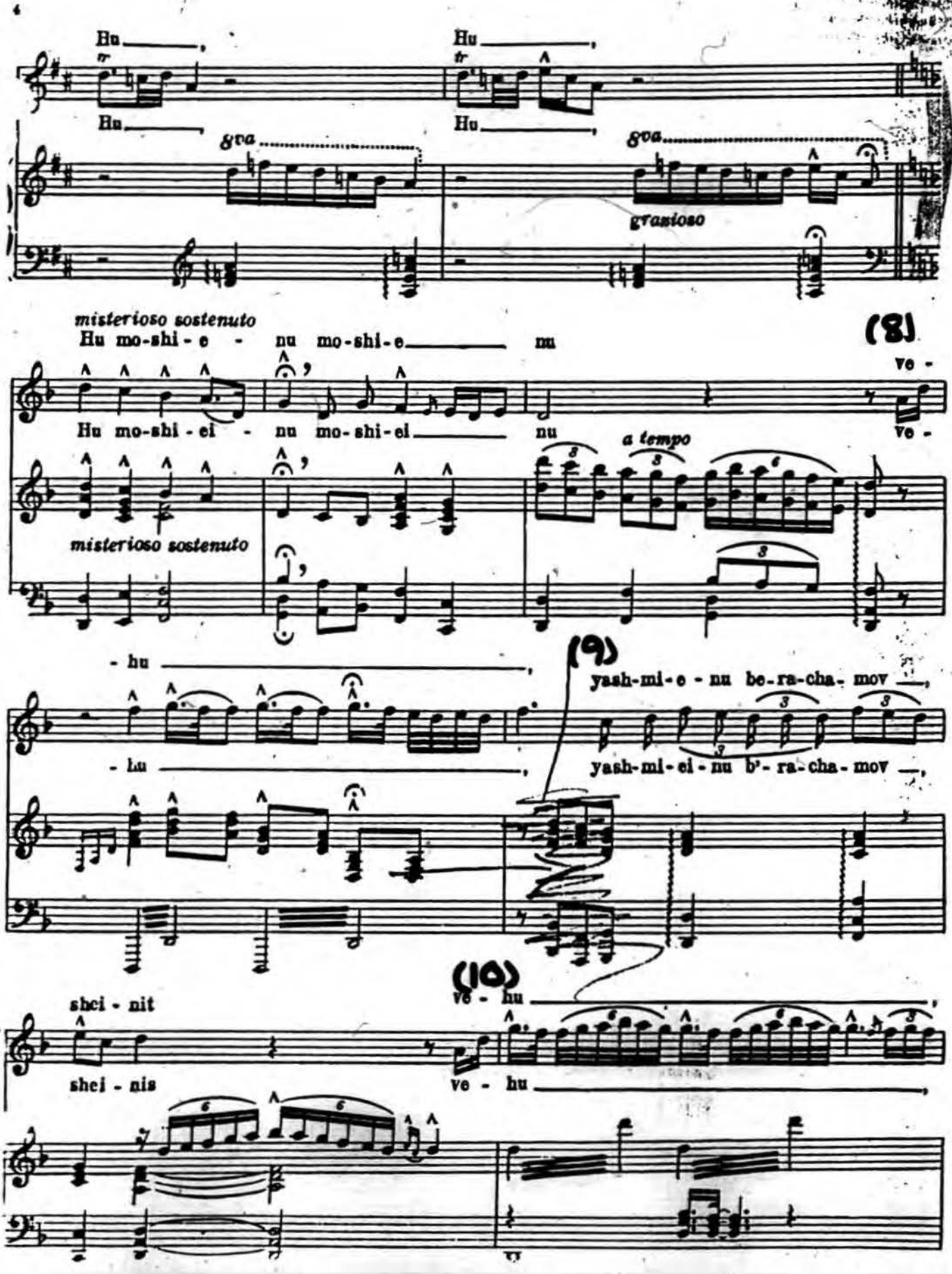
Music by
LEIB GLANTZ

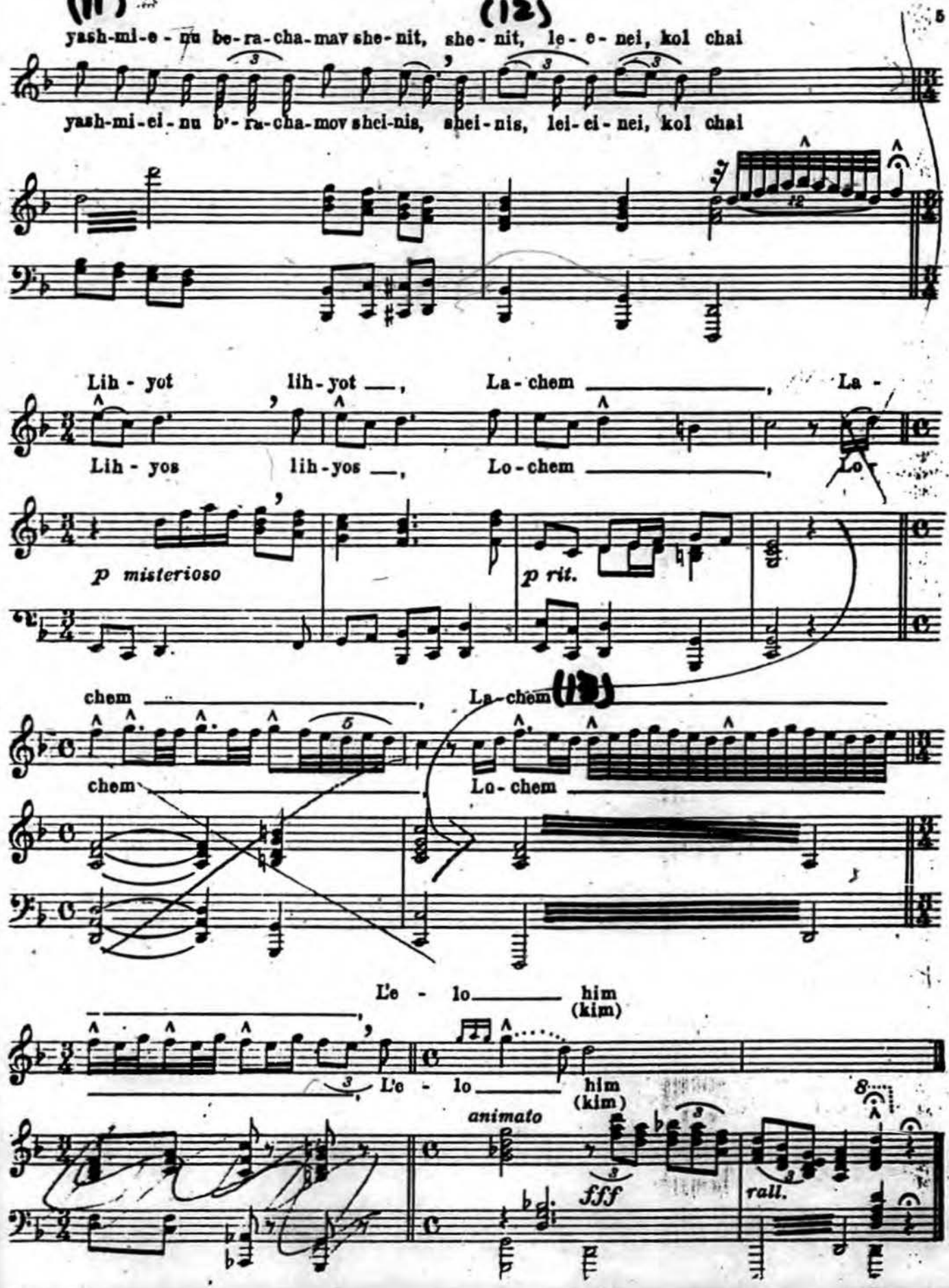
First Line - Sephardic Text *(Above Notes)*
Second Line - Ashkenasic Text *(Below Notes)*




(2)
2
Yis - ra - el
A-do-nai
(shem)
e-lo-he-nu a-do - nai e
(ke)
(shem)
chad
p Yis - ro - el
A-do-no
(shem)
e-lo-hei-nu a-do - no e
(shem)
chod
LH.
f
p rit. leggiero
a tempo
ff rit.
Led f
(3)
hu
hu
e-lo-
hu
sostenuto
hu
e-lo-
mf a tempo
p
rit. misterioso
leggiero
- he
-(ke)
nu,
hu
hu
- hei
-(kei)
nu,
cantabile
hu
hu
a tempo
a tempo
hu
a - vi - nu.
hu
o - vi - nu.
cantabile grazioso
pp rit.
a tempo

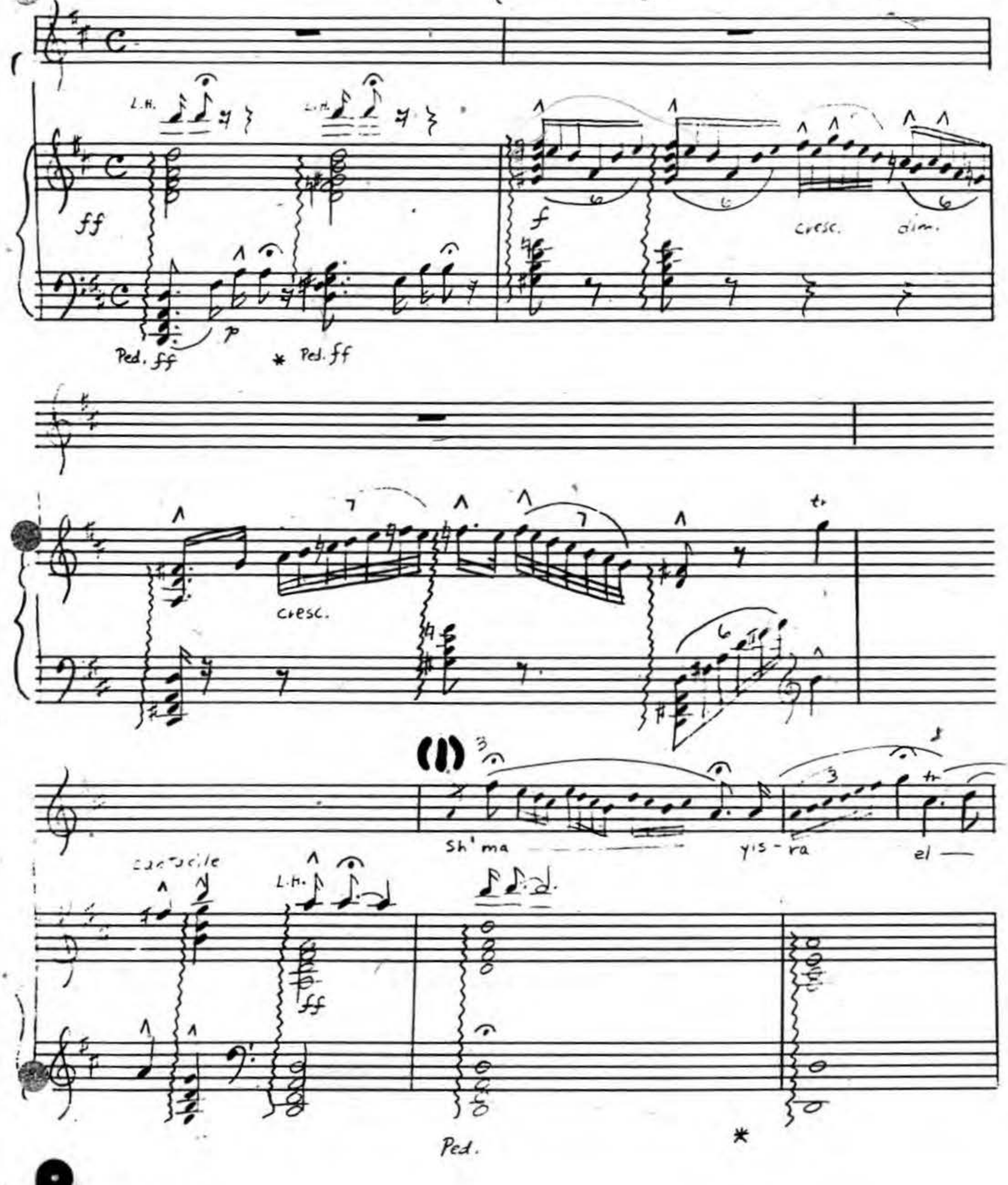

(4)
leggiero
hu
hu
leggiero
rit.
a tempo
rit.
sostenuto
(5)
hu
hu
(6)
hu
hu
hu
hu
L.H.
L.H.
grazioso
mal - ke - nu, hu
(7)
mal - kei - nu hu
animato rit.
rit.
sostenuto
a tempo

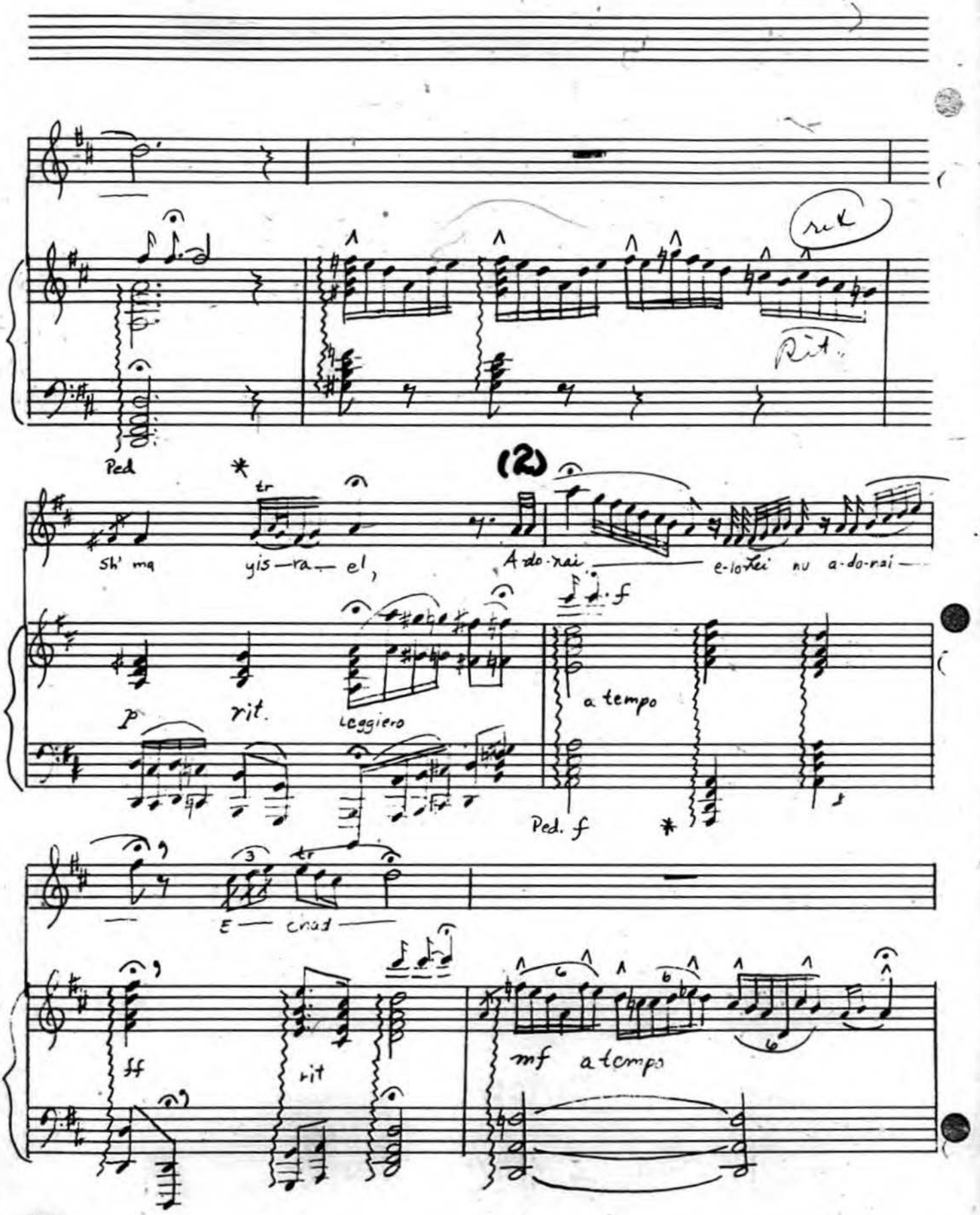

Hu
Hu
Hu
Hu
8va
8va
gracioso
misterioso sostenuto
Hu mo-shi-e - nu mo-shi-e nu
(8)
ve -
Hu mo-shi-ei - nu mo-shi-ei nu
ve -
a tempo
misterioso sostenuto
- hu
(9)
yash-mi-e - nu be-ra-cha- mov
- hu
yash-mi-ei - nu b'- ra-cha- mov
(10)
shei - nit
ve - hu
shei - nis
ve - hu

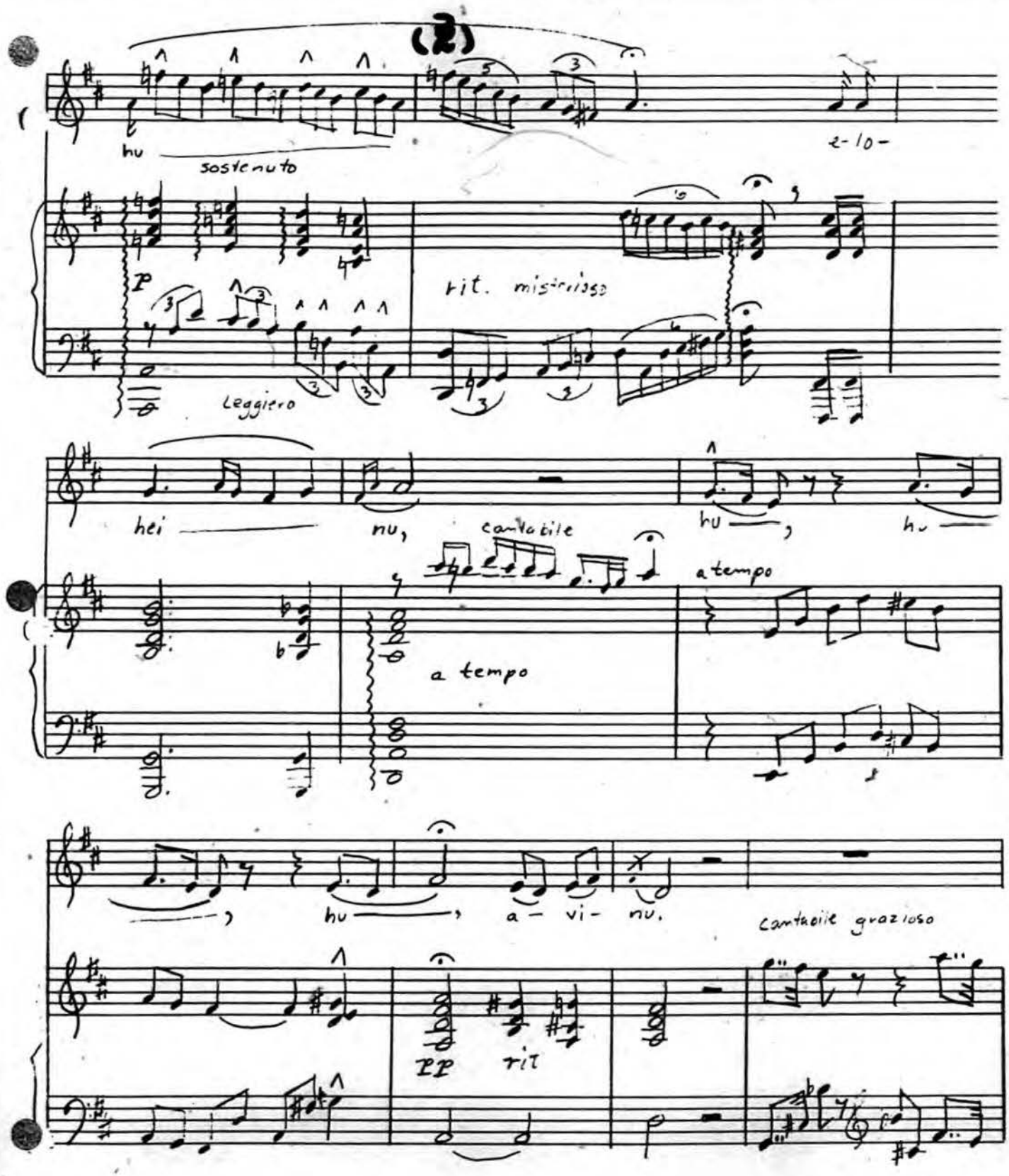

(11)
(12)
5
yash-mi-e - nu be-ra-cha-mav she-nit, she - nit, le - e - nei, kol chai
yash-mi-ei - nu b'- ra-cha-mov shei-nis, shei - nis, lei-ei - nei, kol chai
Lih - yot lih-yot —, La-chem —, La -
Lih - yos lih-yos —, Lo-chem —, Lo
p misterioso
p rit.
chem —, La-chem
(13)
chem —, Lo-chem
L'e - lo — him (kim)
L'e - lo — him (kim)
animato
fff
rall.

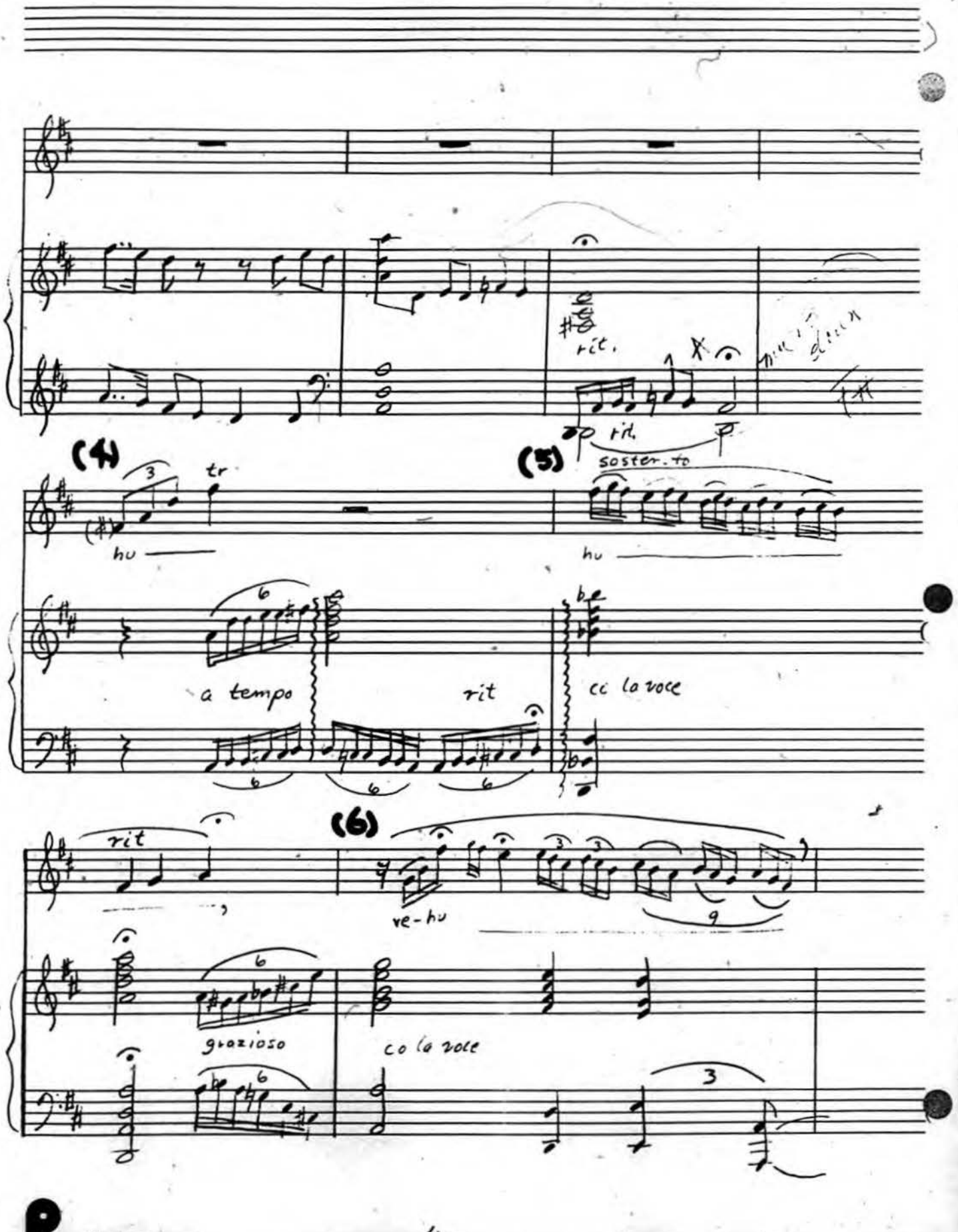
L. Glantz
vocal arr. Pamela Kordan

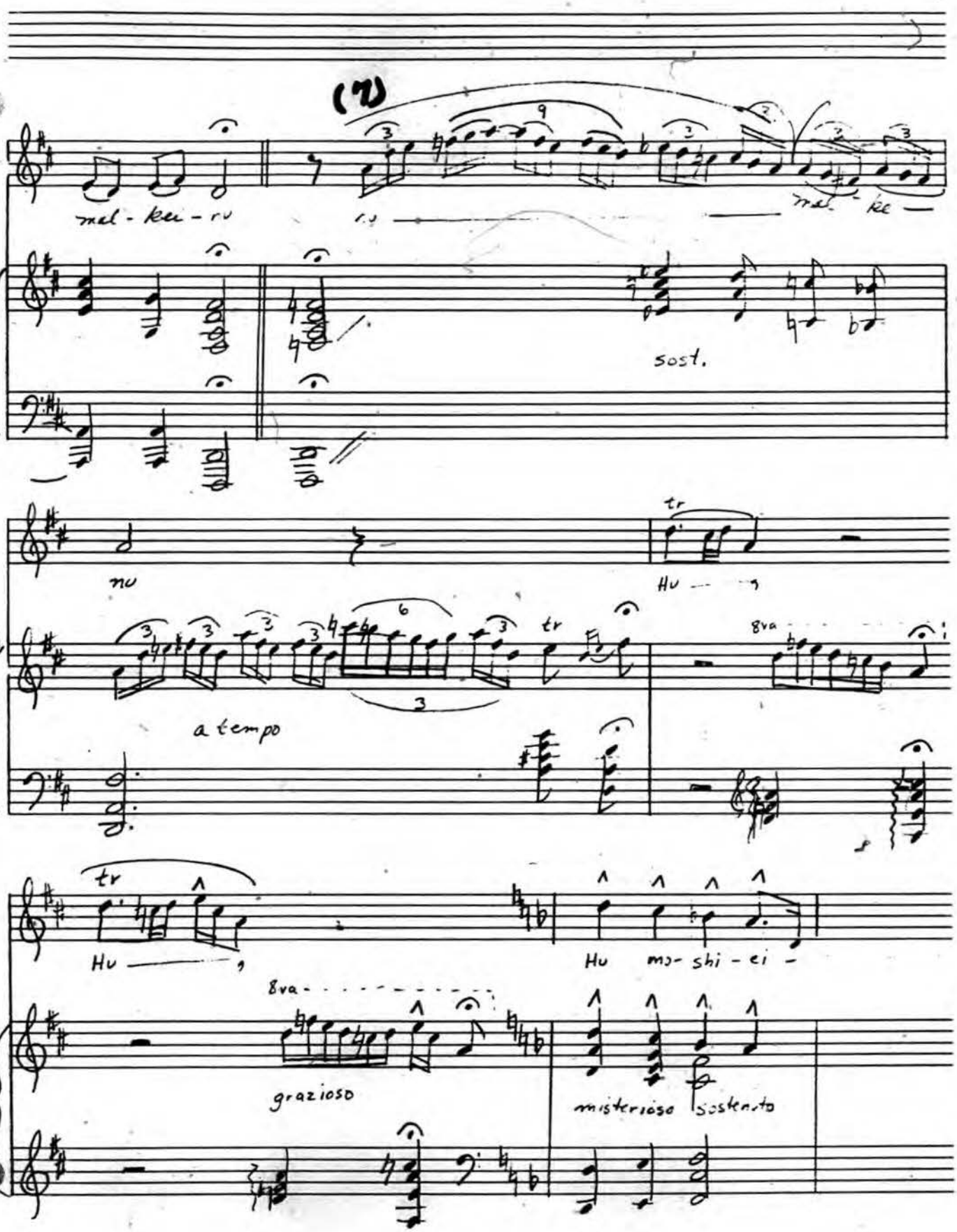
Sh'ma Yisrael
from "Naaritzcha" of Shabbat Morning

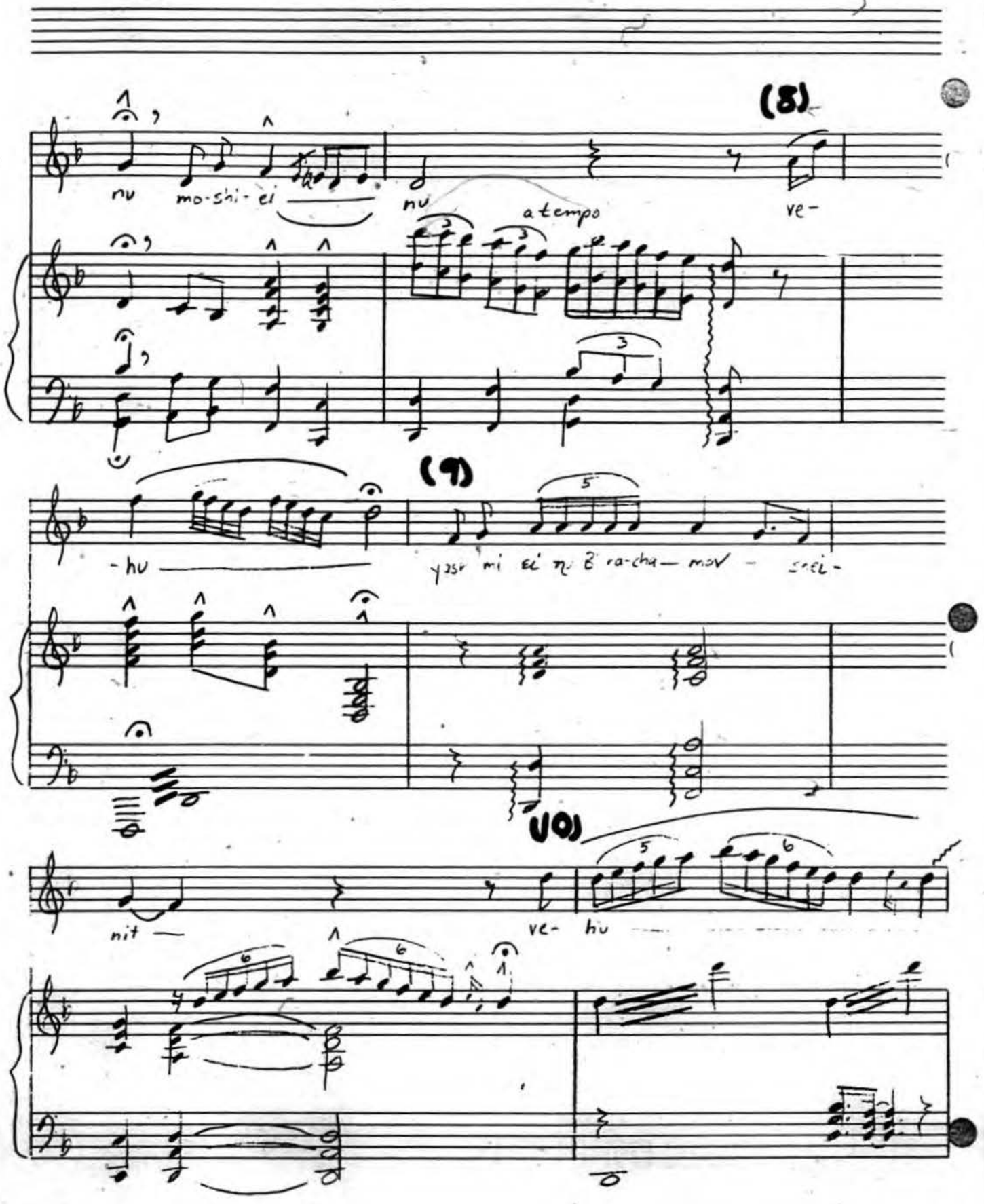


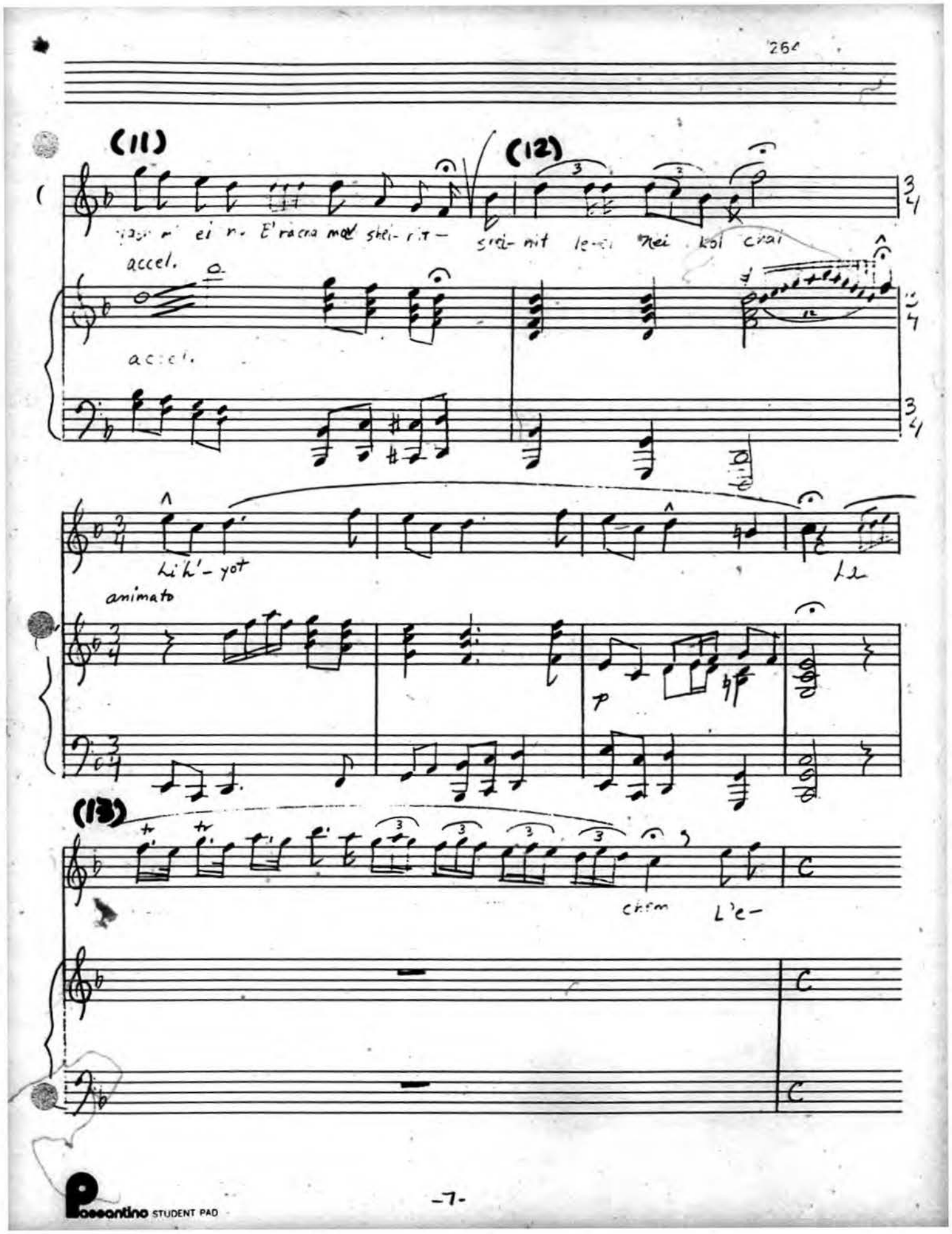

rit.
Ped
(2)
Sh' ma yis—ra— el,
A-do-rai
e-lo-hei nu a-do-rai
P
rit.
leggiero
a tempo
Ped. f
E— chad
ff
rit
mf a tempo

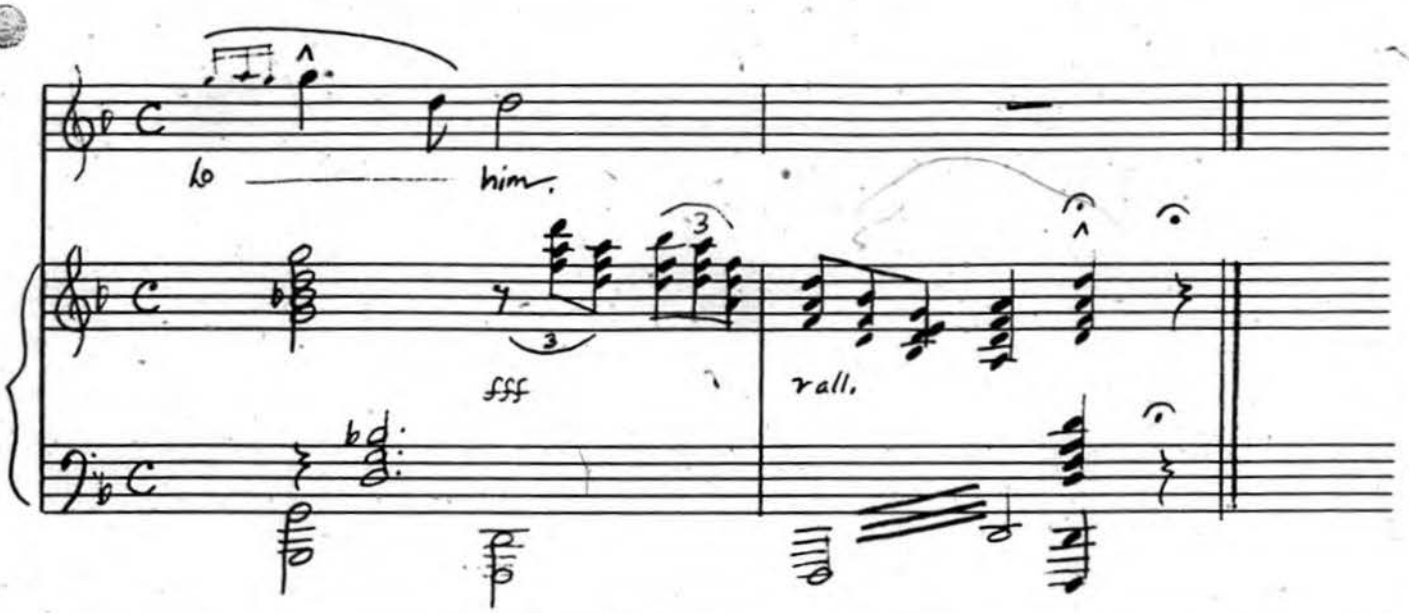


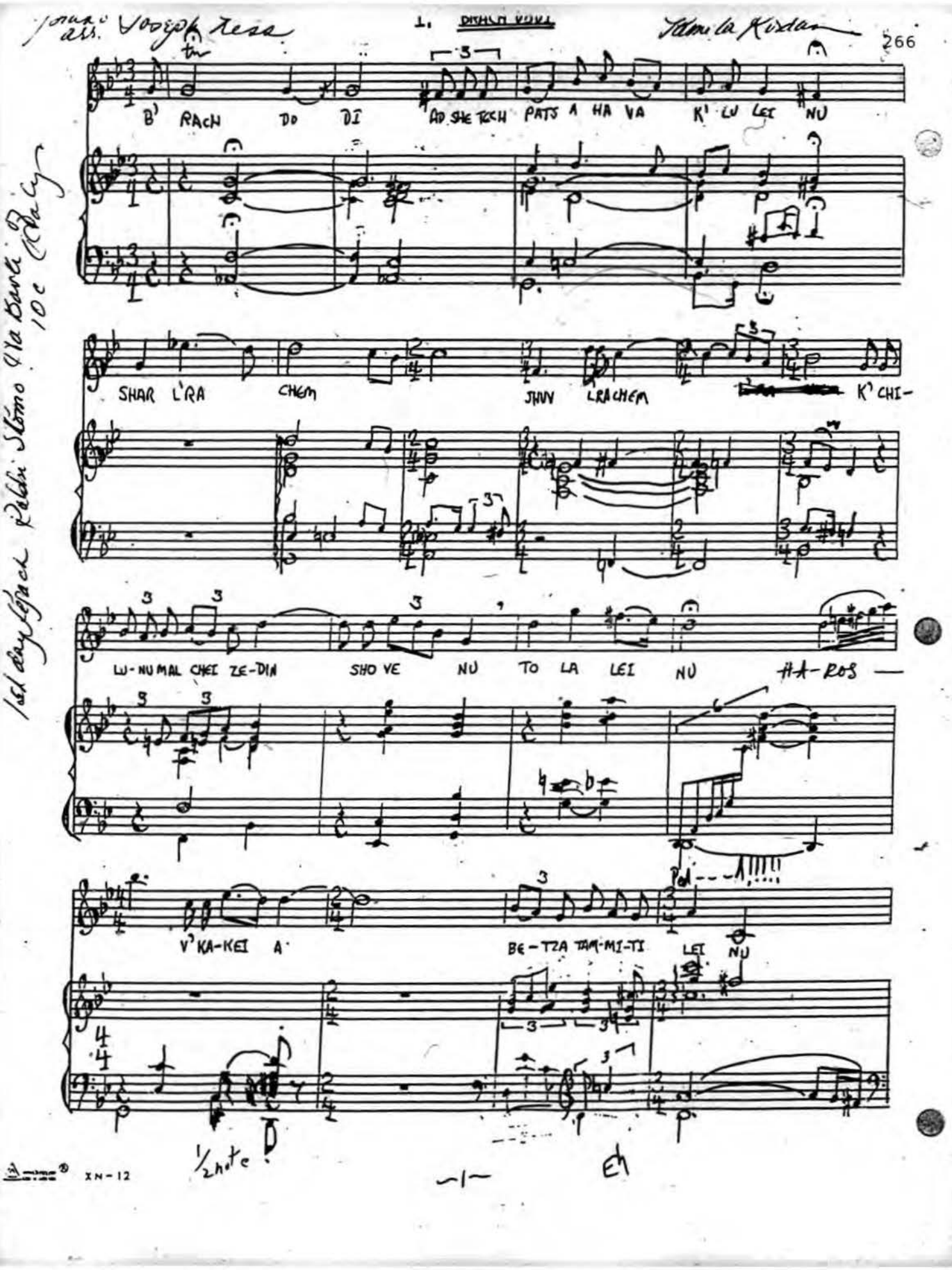

rit.
rit.
(4)
tr
hu
(5)
soster. to
hu
a tempo
rit
ci la voce
(6)
rit
re-hu
grazioso
co la voce




(8)
nu mo-shi-ei
nu
a tempo
ve-
(9)
-hu
yasr mi ei ni ẓ ra-cha— mov - sei-
(10)
nit —
ve- hu

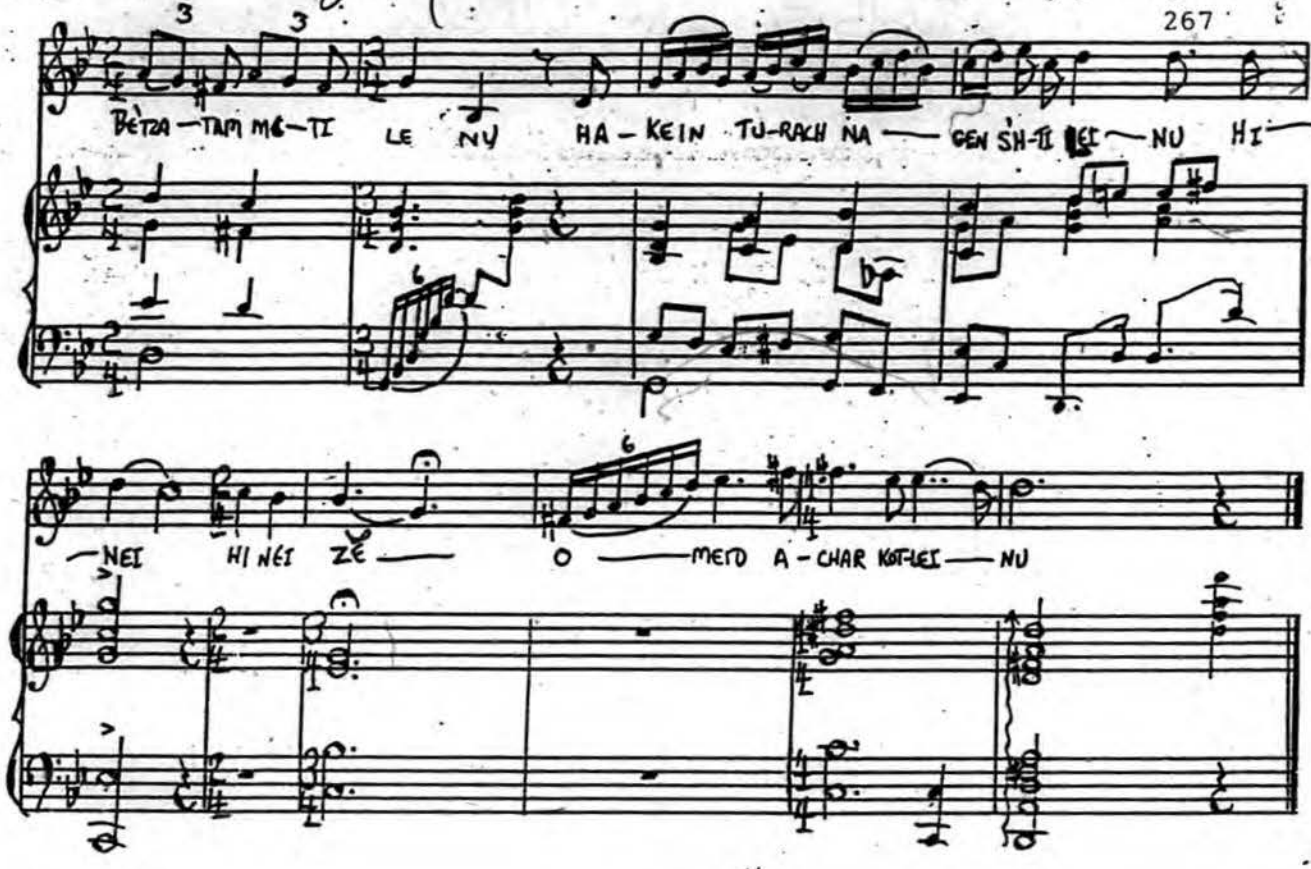





B' RACH DO DI AD SHE TSCH PATS A HA VA K' LU LEI NU
SHAR L'RA CHEM JHUV LRACHEM K' CHI-
LU-NU MAL CHEI ZE-DIN SHO VE NU TO LA LEI NU HA-ROS
V'KA-KEI A BE-TZA TAM-MI-TI LEI NU
1/2 note!

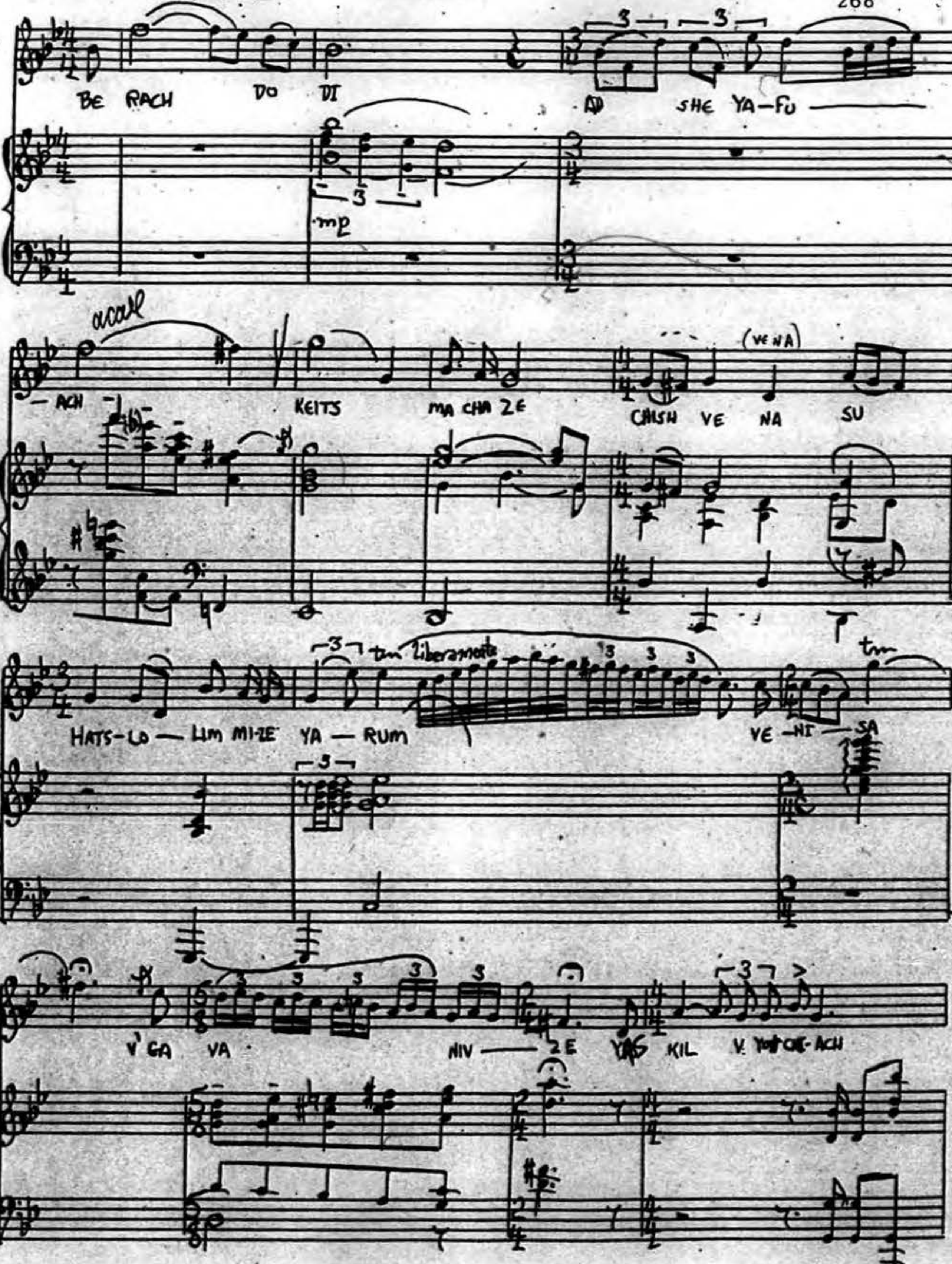
Piano arr. Dough Reed

Pamela Kosdan

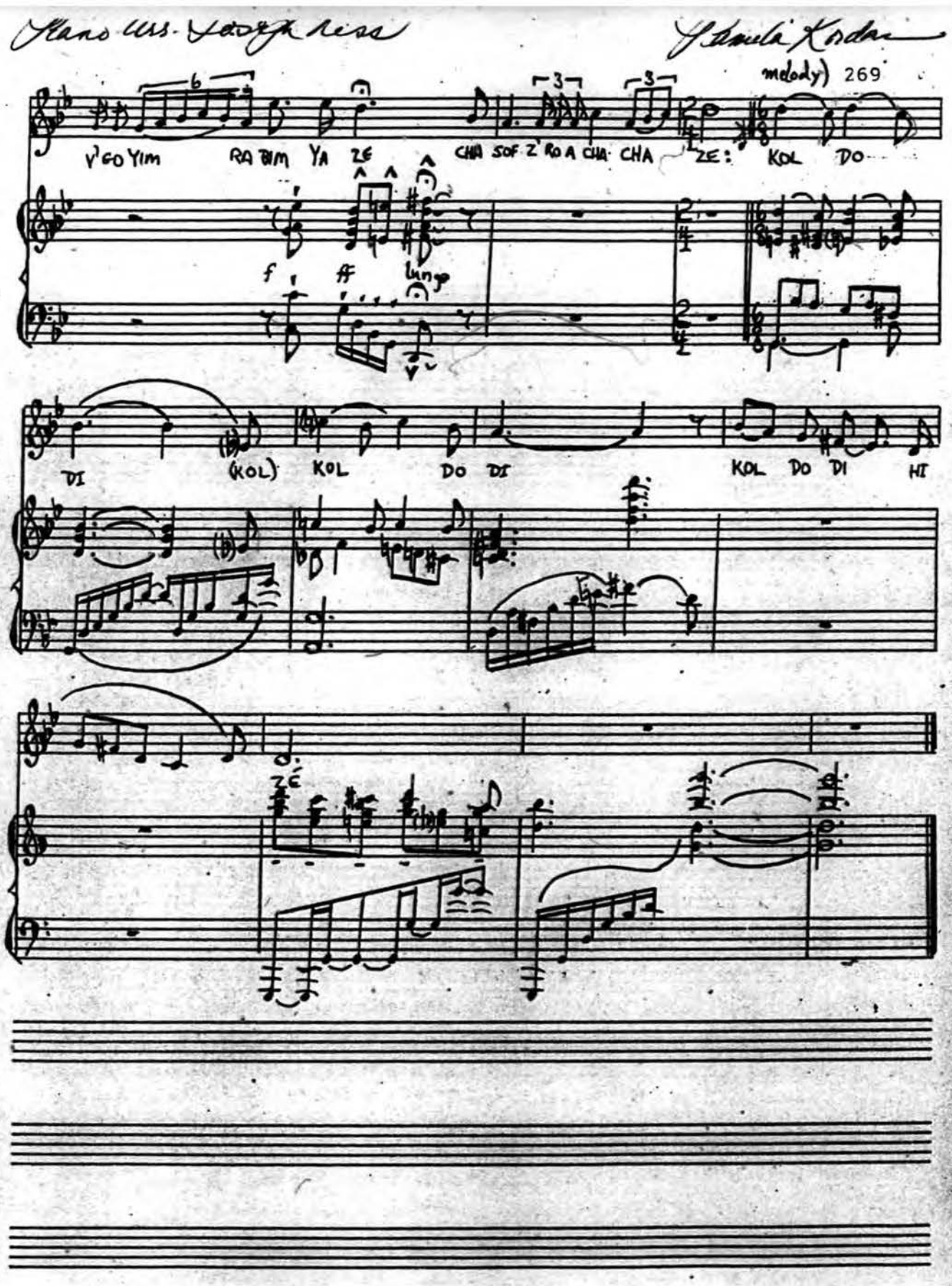


Piano Arr. Joseph Press

II. BRACH DODI



Remind par E♮ in first piece 2nd m from end of 1st page !!!

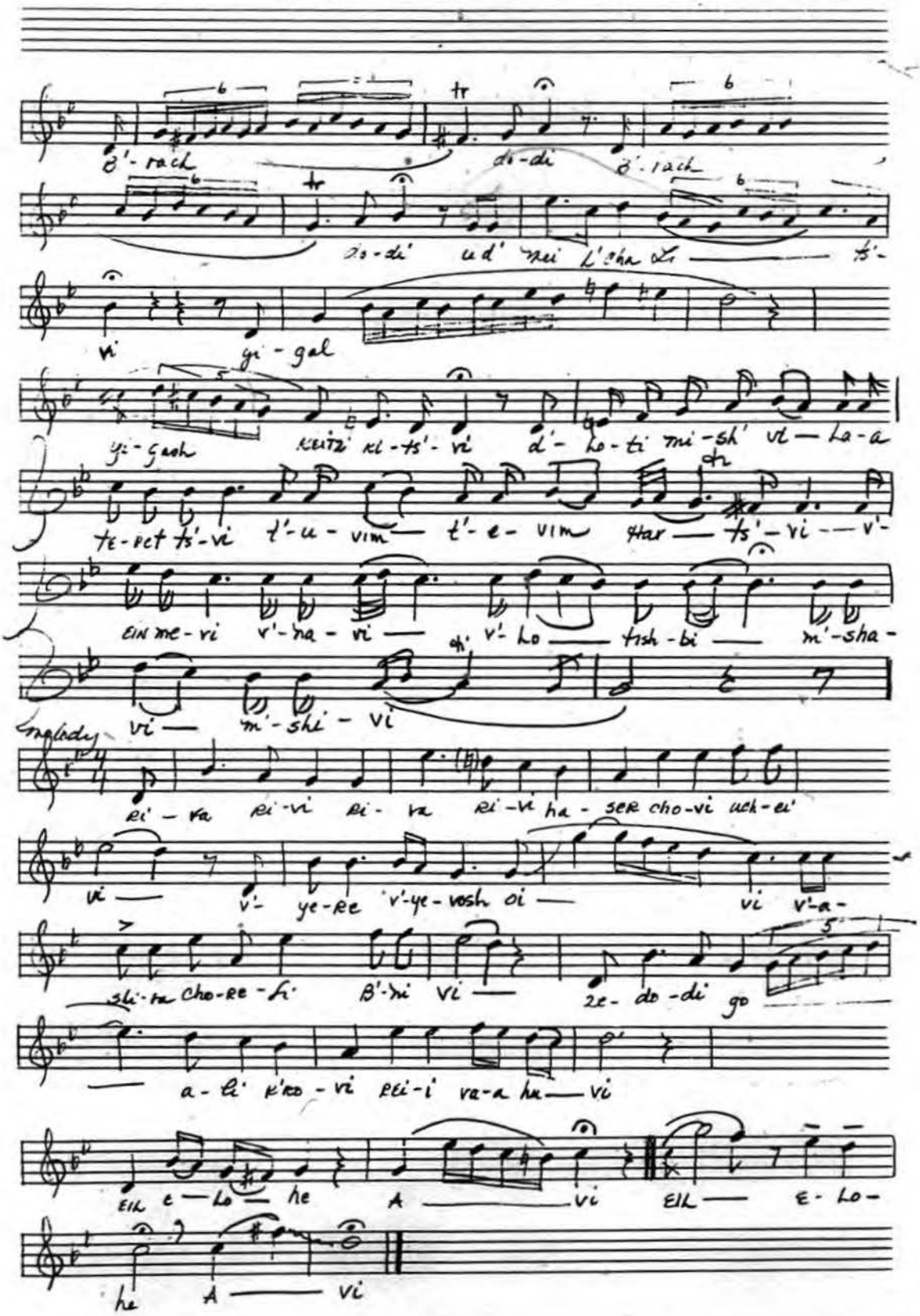

melody) 269
V'GO YIM RA BIM YA ZE CHA SOF Z'RO A CHA CHA ZE: KOL DO
f ff lunga
DI (KOL) KOL DO DI KOL DO DI HI
ZE

Piano arr. by
Joseph Hess

III

Black Dove

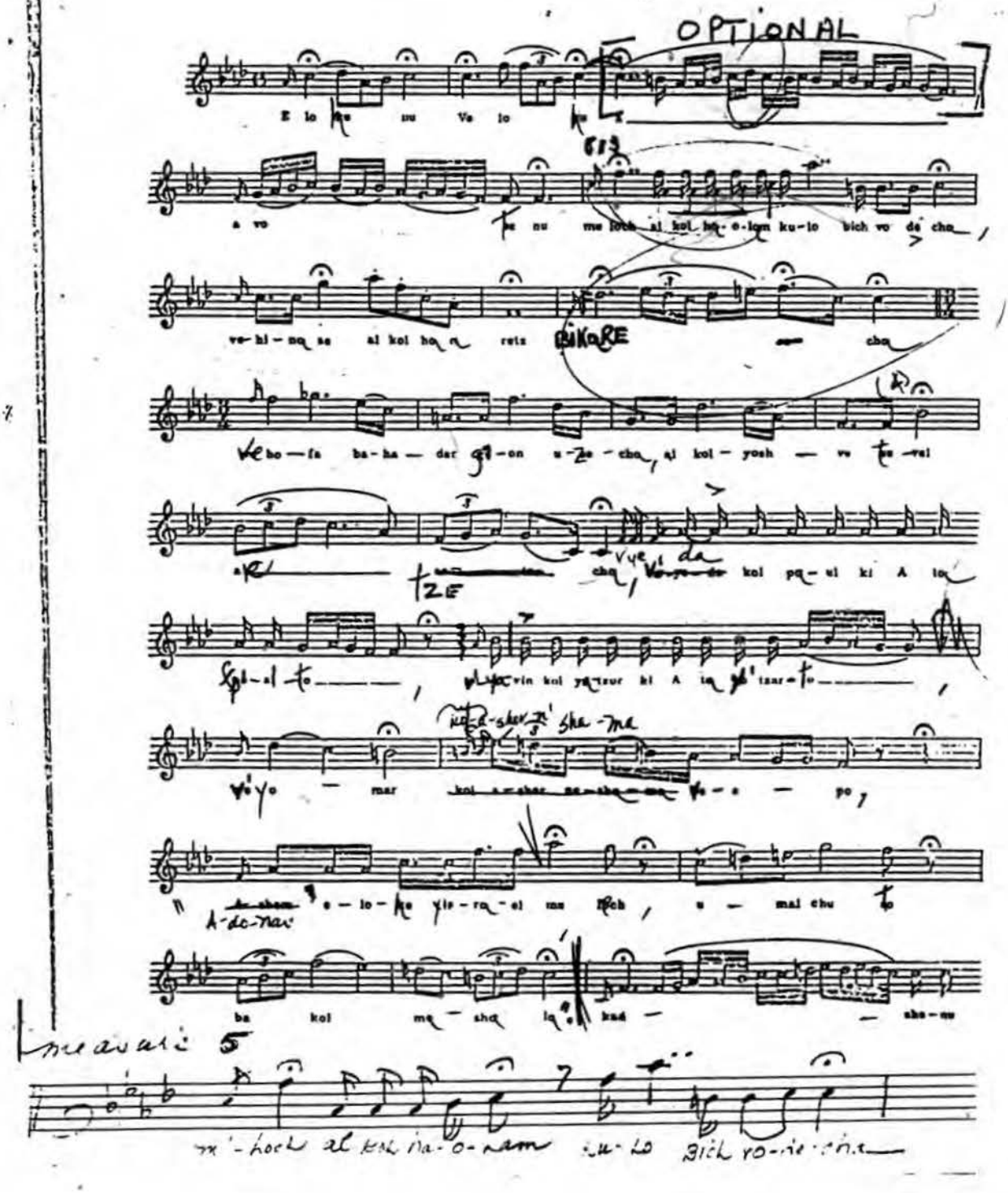
Pamela Hordes 2010

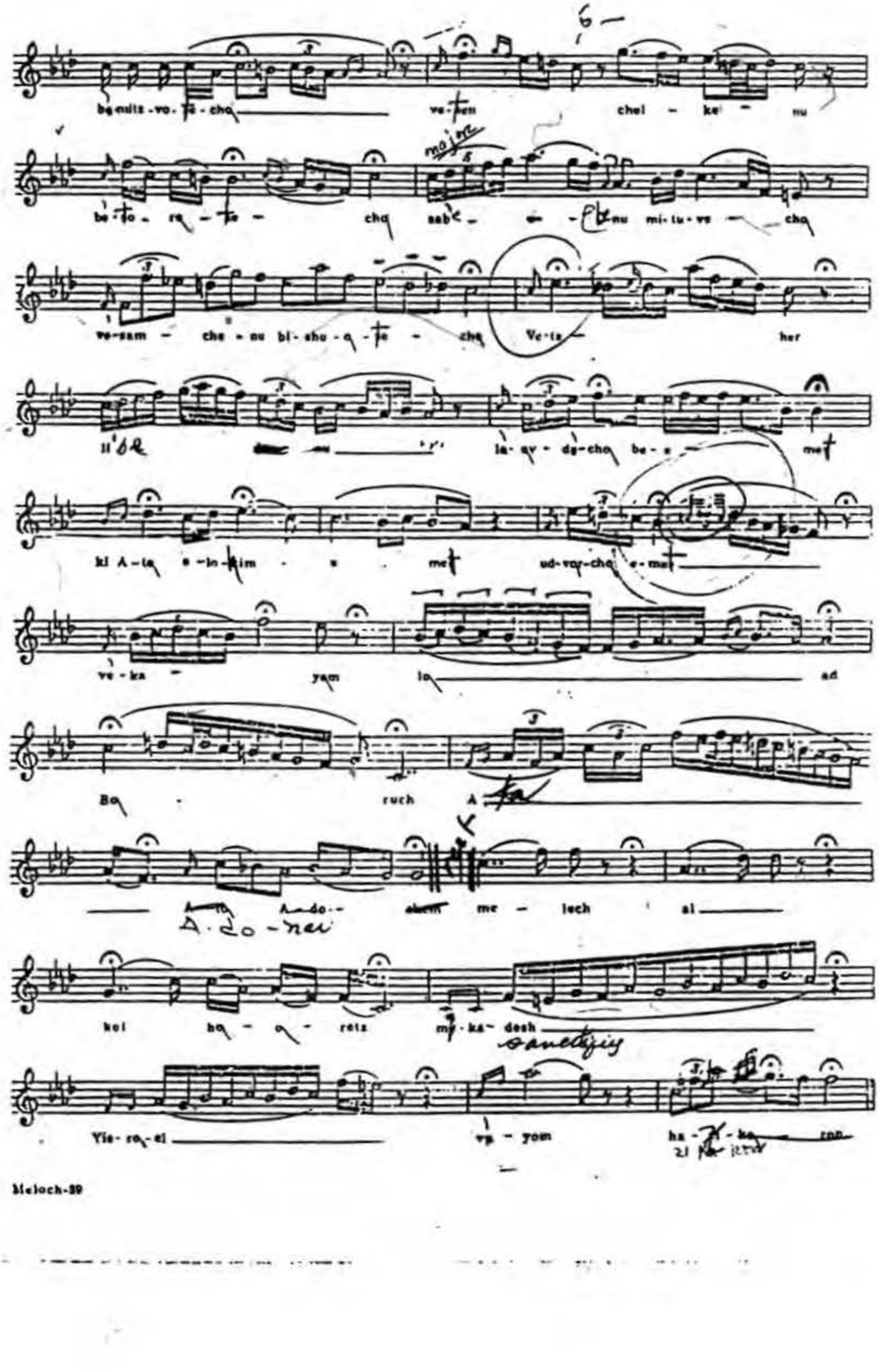


Yossele Rosenblatt

מֶלֶךְ

No. 24 MELOCH




ve-sam - che - nu bi - shu - o - te - cho Ve-te - her
la - ov - de - cho be - e - met
ki A - to e - lo - him - e - met ud-vo-cho e-met
ve - ka - yam lo ad
Bo - ruch A
A - do - me - lech al
kol ho - o - retz m - ka - desh
Yis - ro - el ve - yom

Meloch-39

FOOTNOTES

Introduction:

1) Sendrey, Alfred. Music in Ancient Israel. New York: Philosophical Library, 1969. pp. 526-27. Original quotation from PhiloTher, X, 79-80.
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