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By Otto Kinkeldey

THE question of music in the fifteenth-century book has a double aspect. There are books about music, and books which contain musical compositions. The former class differs in no respect from books on any other topic except, perhaps, in so far as the discussion of music often involves the use of specimens or passages of actual musical compositions to illustrate the writer's meaning. As we shall see presently, this need presented a special problem to the writers, and more particularly to the printers of books about music. The problem of printing musical notation proved even more serious for the makers of books containing large quantities of music destined for practical performance.

Let us consider first the question of the contents of books about music in the incunabula period. In discussing the character of these works we may naturally inquire into the place of such books in the general scheme of human knowledge or learning, as it had developed in the second half of the fifteenth century. What relation did the art of music bear to the other arts, to literature, and to intellectual activity in general?

The Middle Ages and the Renaissance had inherited from antiquity an attitude toward music which assigned to this art a definite and a not insignificant place in the scheme of education. The fondness of medieval writers for systems, particularly for systems based on the mystical number 7, will afford us a clear understanding of how they fitted music into their scheme of human knowledge or thought. Thus we find one grouping of

the "seven sciences" with music included in a very illustrious company. These sciences were mathematics, geometry, astronomy, music, ethics, physics, and metaphysics. Another classification, with its twofold division of trivium and quadrivium, was in vogue in the Middle Ages under the denomination of the "seven liberal arts." The trivium included grammar, dialectic, and rhetoric. The quadrivium embraced arithmetic, music, geometry, and astronomy.

It will be observed that in each of these two general classifications music is closely allied with mathematics. The student of the history of musical literature soon realizes that the authors on musical theory at any rate (and they constitute by far the greater number of those who wrote about this art), treat the subject as if it were a branch of mathematics. Following the example of the Greeks, for whom the whole subject was initiated by Pythagoras, the medieval writers generally give us lengthy, at times wholly mathematical, analyses of the theory of music. This is true of the sixth-century Boethius, who wrote on arithmetic, music, and geometry, and whose five books on music were regarded as a kind of musical Bible for at least ten centuries; and it is equally true of the late fifteenth-century Jacques Lefèbvre d'Étaples (Faber Stapulensis), who has likewise left us writings on arithmetic and on music. We meet with both these authors in our incunabula.

Of more direct interest than this general inquiry as to the place of music among the arts or the sciences is the question as to how many books on music we may expect to find among the incunabula, and what relation they bear to the general mass of printed books of the time. An attempt to answer this question was made some twenty-seven years ago by Robert Steele, whose work on *The earliest English music printing* (15)[1] is one of the most striking contributions to the splendid series of publications of the Bibliographical Society of England. To a series of articles on "What fifteenth century books are about" (16), published

from 1903 to 1907 in the London *Library*,[2] Steele prefixes a general statistical survey of the whole field, based on a count of the titles enumerated in Proctor's Index of the incunabula in the British Museum.

That the greater proportion of the fifteenth-century printed books lie in the fields of theology (including editions of the Bible), of the law, canon and civil, and of belles-lettres is well known. Steele's table informs us about the relative frequency of books in other fields, particularly in the sciences. His figures are shown in the accompanying tabulation. Books on music,

Medicine	247	Natural history	33
Occult sciences	93	Mathematics	24
Astronomy	81	Arms	19
Physics	77	Agriculture	18
Cosmography	76	Music	12
Calendars	71	Hunting	6
Encyclopedic	41	Navigation	1
Itineraria	39		

we see, occupy a comparatively modest place. To be sure, the twelve books on music counted by Steele in the British Museum do not include all books on this subject published in the fifteenth century. But the relative proportions are probably correct.

A more nearly complete census of incunabula about music is provided in the list given by Johannes Wolf as a supplement to his facsimile edition and translation into German of Francesco Caza's *Tractato vulgare de canto figurato* (Milan, 1492) (2). This facsimile was published in 1922. Wolf's census increases the number of books about music from Steele's twelve to one hundred and three, including fourteen undated items. The list embraces a number of works in which music forms only a portion of the subject matter, but it gives a clear idea of the nature and the contents of the works listed.

Some of the encyclopedic works, whose compilers are still under the influence of the ancient or the medieval classification

of knowledge or theory of education, make a special point of discussing the art of music, at any rate in its scientific, theoretic aspect. The early seventh-century *Etymologies* of Isidore of Seville, for example, are a mine of information for the student of medieval music. The first printed edition of the *Etymologies* appeared in Strasburg about 1472, and Wolf lists eight other editions before 1501. The very popular thirteenth-century encyclopedia of the Englishman, Bartholomaeus Anglicus, *De proprietatibus rerum*, likewise contains a brief section on music. Between *ca.* 1472 and 1501 at least twenty-two editions of this work were printed.

Bartholomew's book seeks to provide for the needs of the preacher and the teacher, who require information on the terms and allusions of the Bible for their general didactic purposes. The nineteenth and last "book" of the voluminous compilation concludes with fifteen chapters, some of them merely brief paragraphs, *de sonorum proprietatibus et differentiis*. Most of these chapters are devoted to descriptions of musical instruments, since many of them are mentioned in the Bible. Bartholomew's chief authority is Isidore.

Another old writer whose works were considered worthy of a printed edition in the fifteenth century was the fifth-century poet and scholar, Martianus Capella. His large work, *De nuptiis Philologiae et Mercurii*, is really an encyclopedia of the knowledge and culture of his time. The first two books are devoted to an allegorical description of the nuptials of Philology and Mercury. Each of the remaining seven books is a wedding gift of one of the seven arts to the learned couple. Book IX is the contribution of Music. It is characterized by long excerpts from the writings of a Greek musical theorist, Aristides Quintilianus, who lived in the first or second century of our era. The extracts deal with intervals, scales or modes, with the characteristics of melodies, and related questions. The work of Mar-

tianus was first printed in 1499 in Vicenza by Henricus de Sancto Urso.[3]

Two works by Theodorus Gresemundus treat of music as one of the seven arts. They are *Lucubraciuncule bonarum septem artium liberalium* (Mainz: Petrus Fridebergensis, 1494) and *In septem artium liberalium defensionem dialogus* (Deventer: Jacob de Breda, 1497). Another encyclopedia, the famous *Margarita philosophica* by Gregory Reisch, was first printed in 1495 or 1496. The woodcut which serves as a frontispiece to the section on music has often been reproduced.

If we deduct these encyclopedic works and some others in Wolf's bibliography, in which music is not the sole or main subject of the book, we find thirty-seven items which might be regarded as strictly musical. It is this smaller group which should be considered in making a comparison between the figures of Steele and of Wolf in order to estimate the rate of progress made by studies in this field. The thirty-seven may be divided roughly into two classes: first, those which deal with the subject in a strictly scientific way, treating music as a branch of mathematics and devoting themselves chiefly to a systematic and sometimes highly complicated discussion of the number ratios for all musical intervals and of the structure and mathematical foundation of ancient or medieval scales and modes, which were still in use during the incunabula period; and, second, those that had a more practical purpose, seeking to teach the method of singing, particularly the practice of plainsong, the orthodox Gregorian music of the Roman church, or attempting to explain the rules and practice of counterpoint and the complex system of notation which had grown up with the development of contrapuntal technique. The aesthetic speculation, the belletristic commentaries or guides for laymen, which bulk so large in the musical literature of the present day, are practically entirely absent. One might have expected that the works of the great Boethius, whose *ipse dixit* carried as much weight with medieval

musical writers as that of Aristotle did with the philosophers, would be among the earliest to be printed. But he comes rather late in the list of musical incunabula. The *editio princeps* of his *De musica* is dated 1492. It was printed by the brothers De Gregoriis in Venice.[4]

The earliest special work about music among the printed books now known is Conrad von Zabern's *Opusculum valde singulare et rarum, noviter cum magna diligentia collectum tractans de octo nota dignis usibus sive utilitatibus instrumenti musici dicti monochordum*, printed in Mainz by Fust and Schoeffer about 1462. The author was a preacher and professor of theology at the University of Heidelberg who also lectured on music. The little tract of twelve leaves belongs, as its title shows, to the mathematical group, for it discusses the use of the monochord, an instrument with one string running over a graduated scale, used for studying interval relationships and scale construction. The same writer is responsible for one of the practical treatises on plainsong. It is entitled *De modo bene cantandi choralem cantum in multitudine personarum opusculum rarissimum novissime collectum anno Domini M cccclxxiiij.*[5] Like the earlier work, it was printed by Fust and Schoeffer.

Our next author is one of the shining lights among the musical theorists of the Renaissance. Franchinus Gafurius (1451–1522) was professor of music in Verona, Naples, and Milan, choirmaster at the Cathedral of Milan, and, in 1498, lecturer on music at the University of Pavia. His writings, based on the teachings of Boethius, cover the whole field of musical theory, its mathematical aspect, the theory of notation, and the rules of counterpoint. In the list of incunabula he is represented by the *Theoricum opus armonice discipline* (Naples: Franciscus de Dino, 1480). Another version of this work was published under the title *Theorica musice* (Milan, 1492). His *Practica musice* was printed in Milan in 1496 by Guillaume Signerre, of Rouen. Other editions followed in 1497, 1502, and 1512. These books

were written in Latin, whereas the *Angelicum ac divinum opus musice* (Milan, 1496) is an exposition of his theories in Italian.

The greatest contemporary of Gafurius was the Spaniard, Bartolomeo Ramis de Pareja, who taught first in Salamanca, then from 1480 to 1482 in Bologna, and after that, at least until 1491, in Rome. The one authentic work of Ramis de Pareja, *Musica practica* (Bologna: Baltasar de Hiriberia, May 12 and again June 5, 1480), made a deep impression upon his contemporaries. Ramis, by his emphasis upon and special study of the proper interval ratios of the major and the minor third, laid the foundation for the modern theory of harmony.

The two great theorists of the period, Gafurius and Ramis de Pareja, never engaged in a direct polemical encounter, but certain utterances of the Spaniard, such as, for example, his proposal to replace the six-syllable hexachord system, developed by Guido of Arezzo in the eleventh century, by an eight-syllable octave division, aroused critical opposition.[6] In one printed fifteenth-century book this opposition took a very outspoken form, which is evident even in the title. In 1487 Nicolaus Burtius (Nicolo Burzio) of Parma published a work entitled *Musices opusculum incipit: cum defensione Guidonis Aretini: adversus quendam Hispanum, veritatis prevaricatorem* (Bologna: Ugo de Rugeriis).[7] Giovanni Spataro of Bologna, a pupil of Ramis, countered with *Musices ac Bartolomei Rami Pareie, ejus preceptoris, honesta defensio in Nicolo Burtii Parmens. opusculum* (Bologna: Plato de Benedictis, 1491). Gafurius himself entered the lists to ward off this attack with an *Apologia* against "Spataro and his musical accomplices in Bologna." The work was not printed until 1520 in Torino.

This lively tilting was, of course, only a small part of the activity of musical authors and publishers. The field first entered by Conrad of Zabern with his *De modo bene cantandi choralem cantum* (1474) was cultivated by others. We shall single out two little-known works from the Spanish literature

on the subject. Konrad Haebler includes, in his catalogue of Spanish incunabula, a work by Marcos Duran, printed in Seville in 1492 by *cuatro alemanos compañeros*. It bears the title *Ars cantus plani composita brevissimo compendio "Lux bella" nuncupata*. It consists of fourteen unnumbered leaves, and its *incipit* shows that it deals with the "octo toni artis musice a patre sanctissimo Gregorio ordinati et compositi qui quodam modo sunt claves musice artis." All the eight leaves of gathering *b* contain printed music, such as we shall discuss later. The music is printed on six staves of five lines each with the words below. Haebler does not explain the process by which the music was printed, but he believes that this is without doubt the first book printed in Spain that contains printed music.[8] The book received a commentary by Domingo Marcos Duran, apparently a son of the author of *Lux bella*, who is here called Juan Marcos Duran. The title of the commentary is *Glosa sobre "Lux bella,"* and it was printed in Salamanca in 1498 by the *segundo grupo gótico*. It consists of thirty-eight unnumbered leaves and also contains printed music.[9]

The remaining authors of theory books we shall list briefly, including in one list both the writers on plainsong and those who wrote about mensural music, the *cantus figuratus*.

1488 Spechtsart, Hugo, von Reutlingen. *Flores musice omnis cantus Gregoriani*. Strasburg: Johann Prüss.

1492 Caza, Francesco. *Tractato vulgare de canto figurato*. Milan: Leonard Pachel for Joanes Petrus de Lomacio.

1496 Keinspeck, Michael. *Lilium musice plane*. Basle: Michael Furter. Other edd.: Basle: Joh. Schäffer, 1497; Augsburg: Joh. Froschauer, 1498, and again 1500.

1500 Bonaventura de Brixia. *Regula musicae planae*. Milan: Leonard Pachel for Johannes de Legnano.

1501 Balthasar Prasbergius. *De musica chorali liber*. Basle: Michal Furter, 1501, also 1504, 1507.

Other authors wrote about the origin of music or made comments of a more general character on this art. Among them were:

1488 Tinctoris, Joannes. *De inventione et usu musicae.* Naples: Francesco del Tuppo.

1491 Jacobus de Reno. *Tractatus brevis . . . . in laudem musice artis et de eius utilitatibus.* Antwerp: Gerardus Leeu.

1495 Guillermo de Podio. *Ars musicorum sive commentarius musice facultatis.* Valencia: Peter Hagenbach and Leonard Hutz for Jacob de Villa.

1499 Anon. *Compendium musices.* Venice: Giovanni Battista Sessa.

1500 Bonaventura de Brixia. *Breviloquium musicale.* Brescia: Angelus Britannicus.

As the last item in this brief survey we mention a very useful and striking work, the earliest real dictionary of musical terms. Its author is the Fleming, Joannes Tinctoris, already cited as the writer of a tractate on the invention and the use of music, who was born in 1445 and died in 1511. He was sometime chapel master of Ferdinand of Aragon at Naples, and later a canon of the Cathedral of Nivelles. His *Terminorum musicae diffinitorium* was printed without a colophon and used to be assigned by musical scholars (Fetis and others) to the year 1475 or thereabouts. Later researches, however, seem to have fixed a date *ca.* 1495 and revealed the printer as Gerardus de Lisa at Treviso. Written in Latin, it defines about two hundred and eighty-eight different terms, but it appears that the work never became well known during the life of the author or immediately afterward.[10]

Music Printing in Incunabula

As was pointed out at the beginning of this article, the actual printing of musical notation presented a problem that puzzled the ingenuity of printers for nearly half a century after the invention of the art of printing. It is a striking fact that the first successful printer, Gutenberg, solved his problem completely. His best-known works did not lie in the domain of trial and experiment. For centuries after Gutenberg no fundamental change was made in the technique of printing. But the art of printing musical notation with type was a subject of experiment until well into the sixteenth century.

The reason for this is easily grasped. Words can be printed with a font of about twenty-six small letters and the same number of capitals, with a small number of additional characters and punctuation marks. Musical symbols are written on a staff of four or five continuous horizontal lines, and the characters for the notes must be placed accurately at varying heights, so that they fall exactly on the right line or in the right space. The difficulty is increased by the necessity of using variously shaped note heads to indicate different rhythmic or time values. For the printing of liturgical music, the plainsong of the church, a comparatively small number of different note shapes suffice; but for mensural music of the contrapuntal type in vogue during the incunabula period at least six or seven different shapes, and the same number of signs for rests, were required. This need, combined with the problem of printing the horizontal staff, would increase the number of characters in a font of type and the difficulties of typographical composition far beyond the exigencies of ordinary letterpress work. Added to this was a difficulty which arose from a peculiarity in the musical notation of this early period, by which several notes of different pitch, intended to be sung to one syllable of the text, were combined into one figure, involving the use of oblique lines across the staff. These combinations, called "ligatures," offered a particularly difficult problem for solution with movable type.

The writers on musical theory, particularly those who wrote about notation or the rules of counterpoint, needed actual illustrations in musical notation. Some of their printers avoided the difficulty by simply leaving blank spaces on the page, which were afterward filled in by hand, like the decorative initial capitals of many early printed books. This was the case with Gafurius' *Theoricum opus* (1480), with Ramis de Pareja's *Musica practica* (1482), and with Francesco Caza's *Tractato vulgare de canto figurato* (1492). Copies of some of these books exist in which the blank spaces were never filled in.

This procedure could, of course, never be satisfactory. It was absolutely necessary to find a method of getting music into print. The very earliest effort thus far known occurs in a work which is not specifically musical. In 1473 Conrad Fyner in Esslingen printed an edition of J. Charlier de Gerson's *Collectorium super Magnificat*, a commentary or mystical interpretation of the text of the "Song of Mary." The author, in one passage, makes a musical allusion involving the use of the syllables sol, fa, mi, re, ut. He intended to give his reader a picture of the five notes in a descending scale, but the printer could come no nearer a realization of this illustration than is given by a properly spaced descending row of five black squares preceded by a letter *f* as an F-clef. The lines of the staff were not printed. They were left for addition by hand. Riemann (10, p. 41) states that copies exist in which the whole space is left blank, and that the black squares were later added by the use of hand stamps. In the copies known to him, containing the black squares, the lines were variously added by hand in black or in red ink. Mantuani's (7) accurate measurements prove beyond doubt that the black squares were printed with type together with the letter text, and that the squares were probably produced by reversing the type of some capital letter. The same observation was made by Littleton (6, p. 5).[11]

A similar staffless method is adopted in the Latin grammar of Franciscus Niger, the *Grammatica brevis*, printed in Venice in 1480 by Theodorus Francus (Theodor von Würzburg).[12] The author illustrates the rhythms of five different poetic meters with the aid of musical notes. The five metrical types are: (1) *heroica gravis*, (2) *heroica bellica*, (3) *elegiaca*, (4) *sapphica*, (5) *lyrica*. The verses are selected from Virgil, Lucan, Ovid, and Horace. The musical notes are printed over the words with type made from well-cut dies in three species, the *longa*, the *brevis*, and the *semibrevis*, in the mensural forms current at that time. The vertical spacing of the note heads is so

carefully adjusted that it is a simple matter to draw staff lines through them and thus reveal the exact melodic line. It does not become clear whether the author actually intended these note combinations to represent true musical melodies. It is possible that he was concerned only with accurate rhythms and meant the higher and lower positions of the notes to show merely the rising and falling inflections of the voice in speaking the verses. The fact that a C-clef is printed before the rows of notes seems to imply a true musical notation. If they are really musical melodies, we have in this book the earliest-known specimens of type-printed secular music. But be that as it may, Niger's staffless notes cannot be regarded as a solution of the typographical problem.[13]

One other unusual attempt at inserting musical illustrations in a printed text might be cited here. Wynkyn de Worde, who in 1530 produced the first musical songbook in England, the beautifully executed *XX songs* of which only the bass part is known (facsimile in Steele [15], Fig. 6), made a very ingenious arrangement of rules, dashes, and black squares (raised quads or reversed capitals) to illustrate on a staff of eight lines the four consonances of Pythagoras mentioned in Ranulph Higden's *Policronicon* (Westminster, 1495).[14] But this, like the illustration in Gerson, could hardly be considered music printing.

It is evident from these examples that there were some printers who were really anxious to satisfy the needs of the musician, and were ready to make experiments, even if the results were not very promising. Other craftsmen resorted to a method which was not unknown to some of the earliest letterpress printers, and which had been used with success for the production of pictorial illustrations. The carved wood block, or perhaps even a metal block, was called into play.[15]

The block, so cut that the lines of the staff and the shapes of the notes stood out in relief, was locked in the form with the letterpress and the whole page was easily printed with one im-

pression. The earliest-known specimens of this character are found in Burtius' *Musices opusculum* (1487). The work of Burtius is divided into three parts. In the first part, which deals with the hexachord system, he provides three musical illustrations. The first is the hymn "Ut queant laxis" on five lines. The others are systematic arrangements of hexachords and of tetrachords on eleven lines. Part II deals with counterpoint, and provides the reader with a complete little composition in three voices. The last part deals with notation and presents specimens of note forms and of ligatures. All these illustrations are rather clumsily done on wood blocks.[16]

Another theoretical work which provides musical illustrations on wood blocks is the *Flores musice omnis cantus gregoriani* by Hugo Spechtsart von Reutlingen, printed by Johann Pryss in Strasburg in 1488. In several chapters, of which those *de modis* and *de tonis* occupy the greater part of the book, the whole practice of plainsong is discussed with copious musical illustrations. The melodies are noted on a five-line staff in the angular note forms known as Gothic neumes. Sixty-seven pages contain music, most of them full-page cuts. They are followed by a short illustration of the hexameter rhythm printed on four lines with mensural note forms—*semibreves* and *minims*. In quantity, at any rate, this was a respectable performance for an early printer.[17]

Other theoretical works in which wood (or metal?) blocks were used for music are: the second edition of Gafurius' *Theorica musice* (Milan, 1492); the first edition of the same author's *Practica musice* (Milan, 1496); Michael Keinspeck's *Lilium musice plane* (Basle, 1496);[18] and Gregory Reisch's *Margarita philosophica* (Heidelberg, 1496). In connection with these books we should bear in mind the works of the two Durans in Spain (see p. 96).

The last two pages of Marcellinus Verardus' *Historia Baetica*, a drama on the conquest of Granada, performed in Rome in

1492 (Rome: Eucharius Silber, 1493), contain a musical composition sung in the performance of the play, printed from wood blocks in mensural notes on a five-line staff. This seems to be the first secular music printed in Rome.[19]

The use of woodcut music in combination with a text printed with type was not abandoned as soon as a method of musical-type printing was invented. The little song- or hymnbooks made by Martin Luther for popular use from 1523 onward were in several cases provided with melodies cut on wood blocks. A piece of *de luxe* printing from wood may be seen in Benedictus de Opitiis' *Lofzangen te Eere van Keizer Maximilian* (Antwerp: Jan de Gheet, 1515), in which the text, a number of elaborate pictures, and several lengthy musical compositions (eighteen pages of music) are all printed from beautifully cut, large folio-sized wood blocks. A handsome facsimile of this work was published in 1925 by the house of Nijhoff in the Hague.

Liturgical Books

It is quite clear that the writer of a book about music was not in a very satisfactory position with regard to his musical illustrations during the incunabula period. The question naturally arises as to how the practical musician fared when it came to books made up entirely, or in large part, of musical compositions destined for practical performance. It may be stated that, generally speaking, this need for printed music-books was not really satisfied, with the exception of a special narrow field, until after the beginning of the sixteenth century. Before the year 1500 singers and players were constrained to read their music out of manuscript books, as they had been doing for centuries. But the art of printing was being applied to one type of book which had proved to be either an expensive necessity or perhaps a profitable article of commerce. Theological treatises and books on the law might be used by a reasonably large but nevertheless a naturally limited class of readers. But the

books containing the offices of the church were needed in large quantities. They had formed a large proportion of the books produced in the manuscript age, and among the manuscripts, the missals, containing the priestly portion of the celebration of the chief office of the church, and the books containing the music to be performed by others than the celebrant, or by the professional choir which was employed for more elaborate services, the graduals and antiphonaries, were often the objects of great elaboration and artistic effort on the part of scribes, rubricators, and illuminators.

As long as a practical way of printing music in large quantities remained unknown, graduals and antiphonaries could hardly become a field for successful publishing. But the missal was a practical necessity, and the musical performances of the priest were comparatively small as against the quantity of letter text devoted to prayers, lections, and rubrics. If a method could be devised by which a reasonable amount of music could be added to the large quantity of letter text, the commercial value of the books would be greatly increased. This would apply not merely to missals, but to all liturgical books in which there was much text and comparatively little music.

The first step toward providing such books was exactly the same as in the books on musical theory. The printer printed his text and left blank spaces for the later addition of manuscript music. The earliest document of this kind now known, and probably the earliest in fact, is the famous *Psalterium*, printed by Fust and Schoeffer in Mainz in 1457.[20] The colophon is printed in red, and the book is the earliest known example of two-color type printing. The use of this process, which, of course, merely followed the custom of writing the rubrics in manuscript liturgical books in red, was to have a special musical application, as we shall see presently.

The Psalter contains the words of the psalms as used chiefly in the vesper service and the minor offices of the Roman church.

In the liturgy they are associated with hymns and antiphones. For the first line of music of such hymns or antiphones, or for the opening phrase or a characteristic closing formula (*evovae*) of the tune or chant, the 1457 Mainz Psalter leaves a space at the head of the proper psalm. This first Mainz Psalter was followed by later editions, but not until 1490 did the printer, Peter Schoeffer, provide type-printed music for this book. Several editions later than 1490 are again without music. Other works printed by Schoeffer in the early nineties contain music, but he seems to have abandoned musical typework in his later publications. In one of his books, an undated *Agenda ecclesie moguntinensis*, Schoeffer actually resorts to coarse wooden-block printing to supply the music.[21]

The early practice of leaving blank spaces continued to be followed in liturgical books all over Europe, even after printed music had become common. Many copies still exist in which the blank spaces were never filled.

The next step toward providing the office books with music was not, as in the case of the theory books, the use of block printing. The printers sought to make the matter more convenient for the musical collaborator by providing him with a printed staff. A set of four or five lines without notes was printed with the aid of rules in the blank spaces destined for musical notation. Since the liturgical books had early adopted the two-color method (it spread rapidly after 1460), the printers again followed the practice of the medieval scribes, who had often ruled their musical staff lines on the vellum in red ink, for its decorative effect as much as for any other reason. This printed staff gave the book a more satisfactory appearance, even though the regularity and artistic appearance of the printed page was likely to be disturbed by the irregularity of the manuscript musical note heads and stems.

There was one advantage in printing a staff without the notes. Liturgical usage in matters of music was not nearly as uniform

in the church of the fifteenth century as it is today. Even the words of the offices were not as uniformly fixed as they were later. Each larger ecclesiastical center or diocese had its own peculiar "use" for parts of the service. The monastic establishments departed from the official form to an even greater extent. In the matter of musical melodies, the special "uses" varied still more. In the interest of a wider sale some printers preferred to omit printed melodies from their publications. One difficulty with these printed books in which manuscript additions were made was that the paper chosen for its printing qualities, its proper reaction to printer's ink, did not always so readily take the ink used on a pen. This disadvantage, added to the irregularity of written notes, inevitably led craftsmen who looked to the artistic effect of their handiwork to seek a satisfactory method of complete music printing.

The difficulties of music-type printing were set forth in our discussion of the theory books. The liturgical printers, however, had an advantage over other book printers in that they had early resorted to the practice of producing a book by a double impression for the sake of two colors. They utilized this fact to secure a complete musical addition to their liturgical text. Once the problem of the long red lines of the printed staff were solved, it required only a little more ingenuity and accurate adjustment to utilize the black printing for placing note forms exactly where they belonged on the lines and spaces of the red staff. Whether the red lines were printed first and the black printing followed, or vice versa, was immaterial. The liturgical printers also had an advantage over other music printers in that the liturgical melodies were all comparatively simple as against the contrapuntal choral music. Liturgical music notation is not deeply concerned with the rhythmic problem, and by simplifying the style and the system of notation used in the liturgical manuscripts the printers were able to re-

duce the number of various type forms to two or three. At times they printed with only one form of note.

The first printer to use this method, as far as our present knowledge goes, was Ulrich Han or Hahn (Udalricus Gallus), whose *Missale secundum consuetudinem curie romane*, completed in Rome on October 12, 1476, was a double-process product, in which the difficult problem of adjusting the exact positions of the notes is solved in an eminently satisfactory fashion. Han uses five clearly printed red lines running across each of his double columns. His melodies are noted, to a very large extent, in the single-note form known as the *virga* (or *longa*), a square black head with a stem at the right side. His music pages have a clean, regular, and not unpleasing appearance.[22] There are columns or pages in which the musical notation occupies but a portion of the page, the rest being filled with ordinary letter text. There are also complete pages of music which seem to have been printed separately, in one fascicle, laid in the book at the proper place between the regular printed leaves, and bound in like an extra letter of the register. The practice of laying in the music as an extra gathering was often followed by those who printed music in missals after Han, and this may explain why even the more recent bibliographers of incunabula are strangely silent about the musical illustrations, though they describe minutely the type, the initials, the woodcuts, the illuminations, and the smallest details of the register.

The missal of 1476 seems to have been Han's only musical production. He had printed a missal in Rome in 1475, which had blank spaces for the music, and he died in 1478. It seems that the existence of music in Han's missal had never been made the subject of comment or study until it was "discovered" in 1901 by the Benedictine P. Raphael Molitor (9, pp. 94 ff.), and then made the subject of an article by Riemann (11) in the same year. Riemann (12), writing in 1896, and Barclay Squire (14), writing in 1897, are still concerned with establishing the priority

claims of printers who came after Han. And all this in spite of the fact that the colophon of Han's musical missal, as printed by Hain (No. 11366) in 1838, contained this passage: ". . . . non calamo. ereove stilo: sed novo artis ac solerti industrie genere Rome conflatum impressumque unacum cantu: quod nunquam factum extitit."

Whether earlier office books with type-printed music ever come to light or not, this book and those which immediately followed it seem to establish fairly clearly the fact that music printing with movable type actually antedated the musical block printing which was used in the theory books, beginning with Burtius in 1487.

As matters stand at present, Han's nearest successor was Leonard Pachel in Milan, who, according to Molitor (9, p. 101), printed a *Missale Ambrosianum* in 1478. He was followed by Octavianus Scotus of Monza, who printed in Venice, and Jörg Reyser, who printed in Würzburg. Scotus finished a Roman missal on December 29, 1481, and a Dominican missal on December 24, 1482. Both works are unusual in that their format is decidedly smaller than the usual office-book form. Their size is such that they might be conveniently held in the hand, although the celebrant of the mass cannot always hold a book. The music printing of Scotus presents an attractively clean and dainty appearance.[23] Scotus, like Han, used the square black note form known as "Roman notation." In the earlier of the two Scotus missals a music gathering marked $\tau\tau$ is inserted between signatures *q* and *r* of the letter text.

Jörg Reyser's *Missale herbipolense* was printed in Würzburg in the same year as Scotus' Roman missal (1481). Reyser's book has no colophon, but it contains the privilege or patent granted to the printer by the Bishop of Würzburg. Now this privilege actually places a time limit upon the printing. It sets a date by which the work was to be completed, and this date is November 8, 1481. If Reyser lived up to his contract, his

book antedates Scotus' first music-book. Reyser's book contains twenty-one unnumbered pages of printed music, inserted between folios 110 and 111. It has a staff of four red lines running across the page. It seems to be the earliest-known musical office book that uses, not the square Roman notation found in the Italian works, but the peculiar angular and pointed Gothic note forms often called the "horseshoe-nail notation," which spread over all the northern countries after the thirteenth century.[24] This early book was followed by another Reyser musical office book within a few months, the *Agenda herbipolensis* (1482).[25]

From this time onward the number of missals and other liturgical books with music increases rapidly. They were printed by Stephan Planck in Rome, Georg Stuchs in Nuremberg, Johann Sensenschmidt with Johann Beckenhub in Bamberg, Johann Haman of Landau in Venice, and the firm of Michael Wenssler and Jacob de Kilchen in Basle. Many of their books are named or described by the authorities listed in our bibliography. We shall attempt to tabulate them briefly, but before presenting the list we shall offer a special comment on a small group of such incunabula in the possession of the Library of Congress in Washington. They were all printed in the last decade of the fifteenth century. Some of them have not yet been described by earlier writers.

The *Obsequiale ratisponense* printed in Nuremberg by G. Stuchs in 1491 has a staff of four red lines printed with rules. The rules were not always in one piece across the page. Joints are visible. The Gothic black notes are well adjusted on the lines. One hundred and eight pages contain music.

A *Missale romanum* printed in Venice by Johann Emerich of Speyer in 1493 is of interest because it resorts to the block-printing process. A staff of four black lines and square black notes are found on about forty-six pages, most of them full-page music printing.

A *Missale herbipolense* (Würzburg: Reyser, after October 1, 1493) contains thirty-six full pages of music. Four red lines are printed with rules that run across the whole page. The notes are in the Gothic style. In the same book the Good Friday office has blank spaces left for the music over the words *Oremus*, *Flectamus genu*, and *Levate*.

One of the most interesting items in the Washington collection is the *Processionarium ordinis praedicatorum* printed by Meynardus Ungut and Stanislaus Polonus in Seville in 1494. It is a fine specimen of clear printing with four red lines done by rule across the page and square black notes. The register is excellent. There is music on almost every page. Of the hundred and eighty-seven musical pages most are full-page music printing. Rafael Barris Muñoz (1) made the book the subject of a short essay in 1926, in which it is described as the first music-book printed in Spain. It is quite possible that it is the earliest Spanish type-printed music. But it is antedated by the music printed in Marcos Duran's *Lux bella* (Sevilla: Cuatro alemanes compañeros, 1492), which was mentioned in our discussion of the books on the theory of plainsong.[26]

Ratdolt's *Obsequiale brixinense* (Augsburg, *ca.* 1495) has four red lines printed, apparently with type, but the type blocks vary from about one-quarter of an inch in width to three inches or even more. The notes are black Gothic. The register is not as accurate as in most of the other musical books. There are about sixty pages of music.

The *Missale ordinis praedicatorum* printed in Venice in 1496 by Andreas Torresanus has four red lines in rules across each of the double columns and square black notes. About twenty pages show music.

Stephan Planck's *Liber pontificalis* (Rome, 1497) has five red lines running across each of the double columns with square black notes, mostly of the *virga* form. Music occurs on one hundred and seventy-nine pages.

A Salzburg *Missale* was printed in 1498 by Georg Stuchs in Nuremberg. The staff has each of its four lines printed with rule pieces of varying length. The black Gothic notes are almost all *puncta* (stemless black squares).

For the sake of comparison it might be mentioned that among the Washington incunabula a *Missale ordinis praedicatorum* printed by Antonius Zarotus in 1482 has blank spaces for manuscript music. Emerich von Speyer, whose block-printed music of the year 1493 has been cited above, produced a *Missale alme ecclesie strigonensis* in Venice in 1498, and in this book he prints a staff of four red lines with even type blocks about seven-eighths of an inch wide, leaving the notes to be supplied by hand. A *Missale insignis ecclesie leodiensis* printed in Paris by Johann Higman in 1499 has four red lines but no notes. The staff was printed with type about half an inch in width.

It will be observed in the list which follows that there are no specimens of actual music printing from France or from England. It is possible that a more careful search will disclose a French liturgical incunabulum with music which has hitherto escaped the notice of musical bibliographers. But we may be reasonably sure that no such work printed before 1500 is likely to come to light in England. Steele includes none in his essay on "The earliest English music printing." The *Missale ad usum Sarum* printed in Westminster in 1498 by Julian Notary and Jean Barbier for Wynkyn de Worde leaves blank spaces for the music. At least one of the Sarum missals printed in foreign countries contains music. It is the *Missale divinorum officiorum secundum usum ecclesiae Sarum anglicanae* printed in Venice in 1494 by Haman of Landau for Frederick Egmont. In all probability the demand for such books was not as great in France and England as it was in Italy and Germany.

Liturgical Incunabula with Printed Music

This list is by no means a complete bibliography. It is offered here as an aid to orientation in a field in which orientation

has hitherto been irritatingly difficult. I cannot even be sure of the accuracy of some of the entries. A number of them were drawn from dealers' catalogues and some from passing references in the works dealing with the subject. W. H. J. Weale's *Catalogus missalium ritus latini ab anno 1475* (London, 1856) will be of some aid in tracking down many of the works cited. Weale gives little information as to music, and Hain leaves us almost entirely in the lurch.

1476	Missale . . . . curie romane	Rome	U. Han (Gallus)
1478	Missale Ambrosianum	Milan	L. Pachel
1481	Missale . . . . romane ecclesie	Venice	O. Scotus
1481	Missale herbipolense	Würzburg	G. Reyser
1482	Ordo missalis . . . . romane curie	Venice	O. Scotus
1482	Missale . . . . fratrum praedicatorum	Venice	O. Scotus
1482	Missale moguntinensis	Würzburg	G. Reyser
1483 (*n.s.*)	Missale . . . . curie romane	Rome	S. Planck
1483 (*ca.*)	Missale . . . . cenobii melicensis	Nuremberg	G. Stuchs
1484	Missale herbipolense	Würzburg	G. Reyser
1485	Liber missalis . . . . ecclesie ratisponensis	Regensburg	J. Sensenschmidt & J. Beckenhaub
1487	Missale . . . . ecclesie frisingensis	Bamberg	J. Sensenschmidt
1487	Obsequiale augustense	Augsburg	E. Ratdolt
1488	Missale . . . . romane ecclesie	Venice	J. Hamann
1488	Liber missalis . . . . olomucensis	Bamberg	J. Sensenschmidt
1488	Graduale basileense*	Basle	M. Wenssler & J. de Kilchen
1488	Agenda parochialium ecclesiarum†	Basle	Wenssler & Kilchen
1490	Missale . . . . ecclesie bambergensis	Bamberg	J. Sensenschmidt & H. Petzensteiner
1491	Liber missalis . . . . augustensis	Augsburg	E. Ratdolt
1491	Agenda sive obsequiale . . . . bambergensis	Bamberg	L. Sensenschmidt, Pfeyl & Petzensteiner
1491	Obsequiale ratisponense	Nuremberg	G. Stuchs
1492	Missale . . . . ecclesie saltzpurgensis	Nuremberg	G. Stuchs
1492	Liber missalis . . . . ecclesie ratisponensis	Bamberg	H. Pfeyl & H. Petzensteiner
1493	Missale . . . . ecclesie romane	Venice	J. Hertzog de Landoia *for* O. Scotus
1493	Missale herbipolense	Würzburg	G. Reyser
1493	Missale . . . . curie romane	Venice	J. Emerich

* A facsimile is in Squire (14, p. 111).

† A facsimile, all black, is in Weale, *A descriptive catalog*, p. 67. See note 19.

1493	Missale .... romane ecclesie	Venice	J. Hamann (Hertzog) *for* Nicolaus de Franckfordia
1494	Missale .... ecclesie Sarum anglicane	Venice	J. Hamann *for* F. Egmont
1494	Processionarium ordinis praedicatorum	Seville	M. Ungut & Stanislaus Polonus
1494	Processionarium fratrum praedicatorum	Venice	J. Emèrich *for* Lucantonio Giunta
1495 (*ca.*)	Obsequiale brixinense	Augsburg	E. Ratdolt
1496	Missale ordinis praedicatorum	Venice	A. Torresanus
1497	Missale	Paris	U. Gering & B. Rembolt
1497	Missale curiense	Augsburg	E. Ratdolt
1497	Liber pontificalis	Rome	S. Planck
1498	Missale salisburgense	Nuremberg	G. Stuchs
1499	Missale babenbergense	Bamberg	J. Pfeyl

In connection with the works listed above it should be remembered that they are almost all double-process products. The lines and the notes were done by separate impressions. It is interesting to observe that while some printers preferred to print the staff with rules that ran straight across the page or the column, others experimented with type for the staff also. They produced their staff in segments, more or less skilfully joined. The type segments varied in length from about one-quarter of an inch to about one inch in width, although in Ratdolt's *Obsequiale brixinense* (Augsburg, *ca.* 1495) we seem to run across type blocks as long as three inches. The number of plainsong note forms varies from one to four. There are plainsong books in which the note heads alone are printed without stems (Sensenschmidt, Petri, Stuchs, Pforzheim), which, as Riemann (10, p. 680) remarks, give the page a less satisfactory, uneasy appearance, less helpful to the eye in reading. The Wenssler and Kilchen *Gradual* (1488) uses four plainsong note forms and in addition borrows from the mensural note forms the stemmed lozenge, the *minima*.[27]

This, then, was the style of musical-type printing which was in use during the last quarter of the fifteenth century. With the

exception of such incomplete experiments as we found in Francesco Niger's *Grammatica brevis*, it was restricted entirely to liturgical books, that is, to plainsong music.

It remained for Ottaviano dei Petrucci da Fossombrone to solve the problem of applying the process to the more complicated and hence more difficult task of printing mensural music, and thus opening up to the printing industry the ever expanding field of polyphonic choral music, and especially the field of secular music. Petrucci solved his problem with such brilliant éclat that for many years he was regarded as the actual inventor of the art of printing music with movable type.[28] The comparatively recent study of the printed plainsong books has deprived him of that proud title. As early as 1868 Fetis (*Biographie universelle des musiciens*, 2d ed.) remarked that plainsong printing with movable type had been accomplished before Petrucci's time. But the Italian's merits, even thus, are so noteworthy that he will probably remain the greatest figure in the history of music printing.

Petrucci's patent or privilege for "the printing of mensural music with movable type" was granted him on May 25, 1498, by the Signory of Venice for a period of twenty years. The first known work from his press did not appear until 1501. It was entitled *Harmonice musices Odhecaton A.* The book did not contain, as the title might lead us to suppose, one hundred pieces, but ninety-six: forty-nine compositions for three voices and forty-seven for four. By far the greater number of the compositions are French *chansons*, but in this publication the words of the songs are not printed in full as in later books. Only the initial words of each song are given. The famous composers of the day, Okeghem Obrecht, Compere, Tinctoris, Pierre de la Rue, Agricola, Isaac, Josquin, Busnois, Brumel, and others are included. More than fifty later publications are credited to Petrucci.

Petrucci's method was, like that of the plainsong printers, a

double process. The staff in black, as in ordinary music-books, was done in one impression, the notes in another. It has been suggested that in some of his books he resorted to a third impression for the words of the text. But this seems uncertain. In fact, Petrucci's whole procedure seems to have remained something of a mystery up to the present day. It seems almost incredible that at that early period, with only the experience of the plainsong printers to profit by, any craftsman should have been able to arrive at the precision of adjustment which characterizes Petrucci's presswork. The accuracy of the position of the notes on the lines and in the spaces leaves nothing to be desired. And this printer's books were much smaller than the office books of the church. They were meant to be held in the hand of the singer. The notes and the staff are as small or smaller than in the ordinary sheet music of the present day.

Added to the accuracy of the register we find a clear-cut type; graceful, dainty, well-spaced note forms; evenness of inking; cleanliness of impression; excellent paper—in a word, masterpieces of the printer's art. The astounding perfection of Petrucci's craft was soon lost by his immediate successors, and not equaled for centuries.

But Petrucci's printing must have been a rather expensive operation. The practical utility of music printing could not be assured until the double process was replaced by a single operation. The first reasonably successful attempts in this direction were made in France by Pierre Haultin (or Hautin). Fournier (4) assigns Hautin's invention to the year 1525. Hautin was a type-cutter and a printer. His type seems to have been first used by the Paris music printer and publisher, Pierre Attaingnant, from whose press no work dated earlier than 1528 is now known. Hautin's dies were, for the most part, narrow vertical segments of the staff with the note head and the proper stem cut right on the body with the five-staff lines. At times, however, Hautin broke his vertical segments into several parts,

so that it was possible for him to set up such a segment including several note heads in a vertical arrangement, thus enabling him to print, not a single line of notes as sung in a vocal part, but whole chords as played by the right and the left hand on a keyboard instrument. This process was used in 1530 by Attaingnant in his collection, *Dix neuf chansons en tablature des orgues, espinettes, manicordions* and in later collections.[29]

The music of the present day is largely printed from engraved plates by the offset process. But for books which contain much letter text, like popular songbooks or hymnbooks, a very complicated method of type composition is still used. The interposition of a stereotype process between the type form and the printed sheet makes it possible to remove all traces of type and line junctions, so that these books have the even, continuous appearance of engraved music.

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3. Chrysander, Friedrich. "A sketch of the history of music printing," *Musical Times* (London, 1877), XVIII, 265–68, 324–26, 375–78, 470–75, 584–87.

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5. Kuhn, Max. "Die Ausstellung der Geschichte des Musikdruckes," *Musikhandel und Musikpflege*, November 1, 1902.

6. Littleton, Alfred H. *A catalogue of one hundred works illustrating the history of music printing from the fifteenth to the end of the seventeenth century in the library of Alfred H. Littleton.* London: privately printed (Novello), 1911.

7. Mantuani, Josef. *Ueber den Beginn des Notendruckes.* Wien, 1901. ("Vorträge und Abhandlungen herausgegeben von der Leo-Gesellschaft," No. 16.)

8. Molitor, Raphael. *Deutsche Choral-Wiegendrucke.* Regensburg, 1904.

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11. ———. "Ulrich Hahn, der Erfinder des Notentypendruckes," *Musikalisches Wochenblatt* Jahrg. XXXII (1901), p. 327.

12. Springer, Hermann. "Die musikalischen Blockdrucke des 15. und 16. Jahrhunderts," *Internationale Musikgesellschaft. Basler Kongressbericht* (Leipzig, 1907), pp. 37–47.

13. ———. "Zur Musiktypographie in der Inkunabelzeit," *Beiträge zur Bücherkunde und Philologie August Wilmanns . . . . gewidmet* (Leipzig, 1903), pp. 173–80.

14. Squire, W. Barclay. "Notes on early music printing," *Bibliographica* (London, 1897), II, 99–122.

15. Steele, Robert. *The earliest English music printing.* London, 1903. ("Bibliographical Society illustrated monographs," No. 11.)

16. ———. "What fifteenth century books are about." *Library* (London, 1903–7), N.S., IV, 337–54; V, 337–58; VI, 137–55; VIII, 225–38.

17. Vogel, Emil. "Der erste mit beweglichen Metalltypen hergestellte Notendruck für Figuralmusik," *Jahrbuch der Musikbibliothek Peters für 1895*, pp. 47–60.

18. Wendel, Carl. "Aus der Wiegenzeit des Notendruckes," *Centralblatt für Bibliothekswesen* (Leipzig, 1902), XIX, 569–81.

An excellent survey of the literature on the subject up to the year 1902.

Notes

1. The figures in parentheses refer to the bibliography given on pp. 115–16.

2. My thanks are due to my friend and colleague, Mr. Victor H. Paltsits, for having brought this interesting study to my notice.

3. The early Strasburg *Etymologies* of Isidor, a Lyons, 1482, edition of *De proprietatibus rerum*, as well as a Modena, 1500, edition of the *Opera* of Martianus Capella, were

shown in the exhibition arranged by the Newberry Library for the 1930 midwinter meeting of the Bibliographical Society of America.

4. A copy of Boethius' *Opera* (Venice, 1497) was shown in the Newberry Library exhibit.

5. Extracts from both works and commentary by Martin Vogeleis are in *Monatshefte für Musikgeschichte*, XX, 41, 95, and 152.

6. The work of Ramis is easily accessible in the modern edition of Johannes Wolf (*Publikationen der Internationalen Musikgesellschaft* [Leipzig, 1901], Beihefte II), which contains, in an Appendix, copious extracts from the opponents of Ramis. See also the excellent bibliographical study by Albano Sorbelli, "Le due edizioni della *Musica practica* di Bartolomé Ramis de Pareja," *Gutenberg Jahrbuch*, 1930, pp. 104–14. The printer has been identified as Baldassare Strucci da Rubiera.

7. A copy was shown in the Newberry Library exhibition.

8. A facsimile is in Georg Kinsky, *Geschichte der Musik in Bildern* (Eng. ed. under the title, *A History of music in pictures*), p. 61.

9. See Haebler, *Bibliografía ibérica del siglo XV* (Leipzig, 1903), [I], 108–9.

10. Tinctoris' dictionary remained practically unknown until the time of Padre Martini, Burney, and Forkel. The last-named author reprinted the whole dictionary in his *Allgemeine Litteratur der Musik* (Leipzig, 1792), pp. 204–16. According to Riemann (*Musiklexikon*, 11th ed.), it was reprinted again, edited by Bishop, as a supplement to the second edition of James Alexander Hamilton's *New theoretical musical grammar*. I have not been able to locate a copy of such an edition. The *Catalogue of the London Library: Supplement, 1920–1928*, p. 413, contains this entry under Hamilton: "Dict.; explan. of 3500 Ital., French, German, Eng. &c musical terms &c. With reprint of John Tinctor's 'Terminorum music. diffinitorium.' Ed. J. Bishop. [47th ed.] n.d." Coussemaker reproduces it in the fourth volume of his *Scriptores* (Paris, 1876), and finally the whole Latin text with a German translation by Heinrich Bellerman was published in Chrysander's *Jahrbuch für die musikalische Wissenschaft*, I (1863), 55–114.

11. For a facsimile and a translation by G. F. Barwick of the passage of Gerson's text see Littleton (6, pp. 5–6); another facsimile is in Riemann (10, Tafel 8) and Steele (15, Fig. 1); also in Kinsky, *op. cit.* (also in the Eng. ed.), p. 61. A copy of the original in the Library of Congress has no lines.

12. This edition and an edition printed in Basle in 1485 are in the Library of Congress.

13. A facsimile of a page from Niger's grammar is in Littleton (6, p. 15). According to Littleton, a Basle, 1500, edition of this work has the staff printed.

14. A facsimile is in Steele (15, Fig. 1) and Littleton (6, p. 26). A copy of the original was shown in the Newberry Library exhibit.

15. On the question of the use of metal-block printing for music see Riemann (10, pp. 45–46 and Tafel 11).

16. A facsimile of the hymn is given by Barclay Squire (14, p. 114); by Steele (15, Fig. 3); and by Kinsky, *op. cit.* (also in the Eng. ed.), p. 61. The contrapuntal piece from Part II has often been reproduced in facsimile. See Grove's *Dictionary*, *s.v.* "Printing of music," and Littleton (6, p. 17). T. F. Dibdin in his *Bibliotheca Spenceriana*, III, 233–36, devotes four pages to a description of this book. He reproduces in facsimile the *tenor* and *contra* of the mensural piece and the cut from Part III, illustrating ligatures.

17. A modern edition by Carl Beck, with the music transcribed into modern notation, may be found in the *Bibliothek des Litterarischen Vereins in Stuttgart* (Stuttgart, 1868), Vol. LXXXIX.

18. A facsimile of wood-block music from a Keinspeck *Lilium* printed in Ulm by Johann Schäffler in 1497 is in Molitor (8, p. 7).

19. See W. H. J. Weale, *A descriptive catalogue of rare manuscripts and printed works, chiefly liturgical* (Historical Music Loan Exhibition, Albert Hall, London, January–October, 1885; London, 1886), p. 176; also Riemann (10, p. 42) and Littleton (6, p. 18).

20. A leaf of this Psalter with manuscript music was included in the Newberry Library exhibition. A handsome colored facsimile, likewise with music, from the 1459 edition may be seen in the *Catalogue of manuscripts and early printed books . . . . Library of J. Pierpont Morgan*, I, opp. 10.

21. On Schoeffer as a music printer see Springer (13, p. 177).

22. A copy of this missal was displayed in the Newberry Library exhibition. A facsimile is in Molitor (8, Tafel 1).

23. A facsimile from the Dominican missal is in Riemann (10, Tafel 14).

24. A facsimile is in Riemann (10, Tafel 17). Two facsimiles from different editions of the same missal are in Molitor (8, Tafeln 3 and 4). See also G. Kinsky, *op. cit.* (likewise in the Eng. ed.), p. 61.

25. For comments on this and several other Reyser music-books not known to earlier bibliographers see Springer (13, pp. 174–75). A facsimile in black only is in *Veröffentlichungen der Gesellschaft für Typenkunde*, Tafel 1141. Another slightly different facsimile in two colors is in Joseph Baer & Co.'s *Antiquariatskatalog 769* (Frankfurt-am-Main, 1930), opp. p. 64, item 911.

26. My attention was first drawn to this by a note penciled inside the cover of the copy in the Music Division of the Library of Congress quoting a passage from Konrad Haebler's *Geschichte des spanischen Frühdrucks* (1923), p. 364, in which Duran's work is cited as probably the oldest book containing Spanish music printing. For details on *Lux bella* see p. 96 of this article.

27. On the use of mensural notation in manuscript plainsong books see Springer (13, pp. 176–77).

28. The earliest books on Petrucci were Anton Schmid, *Ottaviano dei Petrucci da Fossombrone, der erste Erfinder des Musiknotendruckes mit beweglichen Metalltypen* (Wien, 1845); Augusto Vernarecci, *Ottaviano de' Petrucci, inventore dei tipi mobili metallici fusi della musica* (Fossombrone, 1881; 2d ed., with unchanged title, Bologna, 1882).

29. A facsimile of two pages of the vocal music is in H. Expert, *Les maitres musiciens de la renaissance française* (Paris, 1897), [Vol. V]. Facsimiles of complete Attaingnant booklets with organ music have been edited by E. Bernoulli (München, 1914) and by Yvonne Rokseth (Paris, 1925).