

**The Body Animal and Human as a *simile*: Aristotelian and Galenic Anatomy in Late Medieval Books of Music Theory and Practice, ca. 1200-1350\***

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**Abstract**

Music theorists of the thirteenth and fourteenth centuries borrowed concepts, terminology, and illustrations from tracts on anatomy, surgery, dissection, and treatment used at the medical schools in Paris, Bologna, and Padua. Arranged hierarchically according to function, location, and level of performance, internal organs, fluids, and systems were used in cleverly constructed parallels to clarify the meaning of music theory concepts for a readership that would have been quite familiar with contemporary medical lore.

Thus Perseus and Petrus discoursed on the brain, skull, the heart, and the arterial system to explain the structure of the medieval hexachord; Johannes Grocheio (Grocheo) dwelled on the respective functions of the heart, liver, and brain when prescribing composition rules for motets and *organa*; and Marchetto of Padua went to extreme interpretive lengths when describing the anatomy of the heart to clarify the role of *proprietas* in mensural notation.

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*The subject of medical science is the human body:  
this distinguishes it from such sciences  
as astronomy and music,  
which deal with the disposition of the  
heavenly bodies and with harmony, respectively.*  
**Taddeo Alderotti**, *Commentary on Johannitius's Isagoge*<sup>1</sup>

*[M]agis est credendum Galieno quam Aristoteli.*  
**Mondino de' Liuzzi**, *Commentary on Galen's Tegni*<sup>1</sup>

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\* In memory of Michael S. Wells, a musician; and my father, a physician.

<sup>1</sup> In Nancy G. Siraisi, *Taddeo Alderotti and His Pupils: Two Generations of Italian Medical Learning* (Princeton, NJ: Princeton University Press, 1981), 122.

Andreas Vesalius's famous anatomy text, *De humani corporis fabrica libri septem*, was printed in Basel in 1543, while Vesalius was a lecturer at Padua. It included one hundred and seventy one strikingly realistic drawings of the human body and its organs, executed under the direction of the author by Jan Stephan van Calcar (Calkar) and one or more artists associated with the school of Titian.<sup>2</sup> Some of the anatomical *figures* in this book were based on sketches by Vesalius himself; all of the *figure* reflected a precise knowledge of the body, which in turn was based on the autopsies Vesalius had performed. Furthermore, for the first time in the recorded history of anatomy, Vesalius assembled human bones to form complete, upright skeletal structures – one of which can still be seen at the Institute of Anatomy of the University of Basel.<sup>3</sup>

In the early 1960s Edward Lowinsky, the noted music historian, drew the following analogy between the state of sixteenth-century anatomy, of which Vesalius was a foremost representative, and the state

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<sup>1</sup> Ibid., 193, n. 125.

<sup>2</sup> Andreas Vesalius, *Andrae Vesalii Brvxellensis, scholae medicorum Patauiniae professoris, de Humani corporis fabrica Libri septem* (Basileae: Ex officina Ioannes Oporini, Anno salutis reparatae MDXLIII, Mense Iunio). Later editions, some with compressed material, followed shortly during the anatomist's lifetime: for instance Basileae, per Ioannem Oporinum, 1555 (an edition revised by Vesalius himself); and Parisiis, Apud Andream Wechelum, 1560; for posthumous editions see, for instance, Amstelodami, Apud Joannem Janssonium, 1642 (cum annotationibus Nicolai Fontani); Lugduni Batavorum, Joahhem du Vivie et Joan. & Herm. Verbeek, 1725 (with the seven books of *De Humani corporis* edited by Herman Boerhaave and Siegfried Bernhard Albinus); and so on. For an English translation, see Andreas Vesalius, *On the Fabric of the Human Body. Book I, The Bones and Cartilages*, transl. William Frank Richardson and John Burd Carman, Norman Anatomy Series 1 (San Francisco: Norman Publishers, 1998) and *On the Fabric of the Human Body. Book II, The Ligaments and Muscles*, transl. W. F. Richardson and J. B. Carman, Norman Anatomy Series 2 (San Francisco: Norman Publishers, 1999). An English translation of Book I in electronic format is found as Andreas Vesalius, *On the Fabric of the Human Body: An Annotated Translation of the 1543 and 1555 Editions of Andreas Vesalius' De Humani Corporis Fabrica*, transl. Daniel Garrison and Malcolm Hast, with a Historical introduction by Vivian Nutton (Evanston, IL: Northwestern University, released March 19, 2003): <http://vesalius.northwestern.edu/flash.html>

<sup>3</sup> Gunther van Hagens, "Anatomy and Plastination," in *Anatomy Art – Fascination Behind the Surface* (Heidelberg: Institute for Plastination, 2000), 13. I wish to express my thanks to Bill Gross, who brought this information to my attention.

of contemporary musical composition and theory as chiefly represented in the works of Josquin and Isaac among the composers, and Lampadius among the theorists:

For the score, laying bare the structure and texture of a piece of music, was the equivalent of anatomy and exactly contemporary with it. Josquin and Isaac, “inventors” of the score, are contemporaries of Leonardo da Vinci, author of the first comprehensive anatomic representations, perfectly drawn, precisely observed, and done according to scale by means of the new science of perspective. Lampadius was a contemporary of Vesalius, author of the first work on anatomy. [...] both anatomists and musical analysts ... were motivated by a new understanding of the body – human or musical – as a completely integrated, unified entity.<sup>1</sup>

Some three hundred years before Vesalius and the composers and theorists named by Lowinsky, authors and rubricators, scribes and illuminators (many of whom remain anonymous) of thirteenth and fourteenth century music theory works had created an analogous territory in both their and their readers’ mind by using anatomy, both human and animal, to clarify musical terminology. There was a landscape of verbal and visual analogies where terminology and graphic icons lifted from the medical idiom were adapted to fit the mould of music theory, or of composition and performance as described in theoretical works.

Verbal constructions associating animal and human organs with the theory or practice of music were extremely fascinating and worked well – understandably so: those who comprised the readership of these treatises or those whose musical compositions supplied material for theoretical commentaries spent their entire lives in their bodies. Even when the knowledge of one’s body was dim, inaccurate, or schematic, even when references to the body were couched in language that made full understanding problematic, musicians could nevertheless relate quite easily to descriptions of bodies or body parts – just like the rest of their contemporaries could and did. Similar reasons made drawings of human bodies appealing in the eyes of those who authored or read music tracts of a more practical bent, such as books of instructions and recommendations for choir singers. No doubt the body was man’s closest – and most lasting – companion.

Other factors, such as specific intellectual climates associated with particular places during the period under examination were equally

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<sup>1</sup> Edward Lowinsky, “Early Scores in Manuscript,” *Journal of the American Musicological Society* 13 (1960): 126-73, at 153.

responsible for the widespread use of analogies, both medical and otherwise, in theoretical discourse in more than one discipline. Those who wrote about music, whether from a theoretical standpoint or with a practical scope in mind perceived, understood, and emulated these climates and reacted to them in their writings in a variety of ways.

This paper will examine one of these ways – namely, the manipulation, both verbal and visual, of the body and its individual members and organs to construct parallels and metaphors that were intelligible, eloquent, and functional.

## I. The Context And The Sources

*Wel knew he th'olde Esculapius,  
And Deuscorides and eek Rufus,  
Old Ypocras, Haly, and Galyen,  
Avverois, Demascien, and Constantyn,  
Bernard, and Gatesden, and Gilbertyn.*

**Chaucer**, *The Canterbury Tales*, General Prologue 429-434

Material to draw from was found in abundance, for medieval medical books contained as a matter of course discussions of the human body, its organs and their function, as well as addressing maladies and treatments. Cornelius O'Boyle has shown that, by the end of the thirteenth- and beginning of the fourteenth centuries, the basic medical texts studied at the universities of Paris, Montpellier, and Bologna were Avicenna's *Canon*, translated by Gerard of Cremona around 1170; a collection known as *Ars medicine*, which most probably originated in the medical milieu of Salerno and, from the thirteenth century on, traveled with its companion, the *Ars commentata*, comprised of commentaries on the texts found in the *Ars medicine*; the "New Galen," comprised of nine works newly translated and available for the first time in Latin, and a plethora of commentaries on them; in addition, the major medical writings of Rasis, Mesue, and Averroes were diligently perused.<sup>1</sup>

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<sup>1</sup> See Cornelius O'Boyle, *The Art of Medicine: Medical Teaching at the University of Paris, 1250-1400* (Leiden: Brill, 1998), 5-7: Avicenna's work had been known in Latin translation in the twelfth and thirteenth centuries, but became one of the fundamental books of medicine studied in European universities only at the turn of the thirteenth century. The newly translated works of Galen were *De morbo et accidenti*, *De complexionibus*, *De simplici medicina*, *De crisi*, *De creticis diebus*, *De ingenio sanitatis*, *De iuvamentis membrorum*, *De virtutibus naturalis*, and *De malitia complexionis diverse*. A detailed discussion

Galen's anatomy, widely known and further propagated through the teachings of physicians whose appointments took them from one European *studium* to another, was retained *in nuce* in *compendia* that were either translated into vernacular languages or written directly in them, such as the thirteenth-century Provençal *Anothomya de las proprietatz de tot lo cors de dins e de fora la cal adordenet un saui mege que auia nom Galian*.<sup>1</sup>

The fact that Galen's *De usu partium*,<sup>2</sup> his most important work on functional anatomy, which had been circulating in a Latin translation

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of the *Ars medicine* is in *ibid.*, 82-127, followed by a discussion of the *Ars commentata* on 128-57. Appendix 1 (*ibid.*, 271-3) gives the core texts that formed the collection known as *Ars medicine*: it included works by Johannitius (*Isagoge*), Hippocrates (*Prognostics*, *De regimine acutorum*), Theophilus (*Urines*), Philaretus (*Pulses*), Galen (*Tegni*, *Anatomy*), Isaac Judeus (*Universal Diets*, *Particular Diets*, *Fevers I-V*), Giles of Corbeil (*Verses on Urines*, *Verses on Pulses*, *Versus de cognitione quarundam medicinarum*, also known as *Versus de simplicibus aromaticis*), John Damascene (*Aphorisms*), Nicholas (*Antidotary*), Isaac (*Viaticum*), and Constantine (*De stomachi affectionibus*). The structure and arrangement of the *Ars commentata* are printed in Appendix 2 (*ibid.*, 274-6).

<sup>1</sup> See Karl Sudhoff, *Ein Beitrag zur Geschichte der Anatomie im Mittelalter speziell der anatomischen Graphik nach Handschriften des 9. bis 15. Jahrhunderts* (Leipzig: J. A. Barth, 1908; reprint, Hildesheim: Olms, 1964), 11-23. The short chapter reprising Galen's enumeration of the principal members runs as follows (*ibid.*, 14): "Aras digam dels membres de tot lo cors//(A)ras direm especial dels membres de tot lo cors e dels manens. mais deues saber que alcus membres son principals so es assaber lo ceruel. el cor. el fege. els ronhors. los autres no son principals mais hieison aixi coma neruis e uenas ... (Now let us talk about the members of the entire body//Now we will talk especially about the members of the entire body and of the rest. But you must know that some members are principal, that is to wit the brain, the heart, the liver, the kidneys. The others are not principal but come out, such as the nerves and veins...)." I wish to thank Kathleen Stewart and David Spafford for helping me with the translation.

<sup>2</sup> A nineteenth-century edition is in Galen, *De usu partium corporis humani libri XVII*, Klaudiou Galenou Apanta/Claudii Galeni Opera omnia, 20 vols., ed. Karl Gottlob (C. G.) Kühn (Lipsiae: prostat in officina libraria Car. Cnoblochii; reprint ed., Medicorum Graecorum opera quae exstant 1-20, [Hildesheim: Olms, 1964-65]), 3. For an early twentieth-century edition see Galen, *De usu partium libri XVII*, ed. Georg Helmreich (Leipzig: Teubner, 1907-9; reprint ed., Bibliotheca scriptorum Graecorum et Romanorum Teubneriana, Amsterdam: Hakkert, 1968). An English translation based on Helmreich's edition is in Galen, *On the Usefulness of the Parts of the Body*, 2 vols., transl. Margaret Tallmadge May (Ithaca, NY: Cornell University Press, 1968). All subsequent quotations in English in this paper are from May's translation.

made from the Greek sometime in the early part of the fourteenth century, was regarded by Vesalius as “Galen’s most comprehensive treatment of these subjects [i.e., anatomy and physiology]” was amply discussed by both Nancy Siraisi and Roger French.<sup>1</sup> Vesalius used Galen’s *opus* extensively (albeit critically and from a quasi-adversarial standpoint) in his own mid-sixteenth-century anatomic discourse and accompanying atlas of human anatomy, the *De humani corporis fabrica*, mentioned at the beginning of this paper. *De usu partium* provided the major source of reference and commentary for the *Fabrica*,<sup>2</sup> and the influence of Galen’s anatomy was quite strongly felt in Vesalius’s sketches published in 1538 as the *Tabulae anatomice sex*.<sup>3</sup>

During the period under examination in the present paper, however, direct observation of the arrangement and function of internal organs was secondary to the study of theoretical works – although not to the extent presumed until some twenty years ago, as will be shown below:

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Two musicological studies of the late 1990s refer to Galen’s theories of conception (which include descriptions of the shape and function of sexual organs): Laura Macy (“Speaking of Sex: Metaphor and Performance in the Italian Madrigal,” *The Journal of Musicology* 14 [1996]: 1-34, at 2-3) examines the Cinquecento theories of sex and their “metaphorization” in the Italian Madrigal; Wendy Heller (“Reforming Achilles: Gender, ‘opera seria’ and the Rhetoric of the Enlightened Hero,” *Early Music* 26 [1998]: 562-81, at 572) refers to Galenic theory as one of the factors that shaped the seventeenth-century’s operatic uses of gender.

<sup>1</sup> Nanci G. Siraisi, “Vesalius and the Reading of Galen’s Teleology,” *Medicine in Italian Universities, 1250-1600* (Leiden: Brill, 2001): 253-86, at 256 (originally published in *Renaissance Quarterly* 50 [1997]: 1-38); and Roger French, “*De Juvamentis Membrorum* and the Reception of Galenic Physiological Anatomy,” *Ancients and Moderns in the Medical Science*, Variorum Collected Studies (Aldershot: Ashgate, 2000), II (originally published in *Isis* 70 [1979]: 96-109).

<sup>2</sup> Siraisi, “Vesalius,” 254-6; and Roger French, “*De Juvamentis Membrorum*,” 96-7.

<sup>3</sup> See Andreas Vesalius, *Tabulae anatomicae sex* (Venetiis: B. Vitalis Venetus sumptibus Ioannis Stephani Calcarensis, 1538), *figura* 1 in a series of six plates, where the sketch of the vascular system shows a five-lobed liver belonging in Galenic anatomy (in David Weston, comp., *The Body Revealed: Renaissance and Baroque Anatomical Illustration From William Hunter’s Library: An Exhibition held in the Special Collections Department, University of Glasgow, February to May 1996*, adapted for the web in September 2002 by Sonny Maley, <http://special.lib.gla.ac.uk/anatomy/vesalius.html>).

Dissections performed on cadavers were not explicitly forbidden by the Catholic Church,<sup>1</sup> but warnings against practices that involved dismembering the human body after death are clearly documented. In the context of thirteenth-century crusades, Pope Boniface VIII (1294-1303) excommunicated all who dared offend the bodies of the defunct by boiling them in water to separate flesh from bones, so that these bones could be returned to consecrated land to be buried.<sup>2</sup> This ban limited to a certain extent the level of objective knowledge of human anatomy, especially the anatomy of the bones – although modern scholarship maintains that the bull was not a general ban on dissection<sup>3</sup> and that the structure of the bones could be – in fact, was – observed on skeletons extricated from ossuaries.<sup>4</sup>

In the late thirteenth- and early fourteenth centuries there were instances when cutting the body apart was allowed, even desirable: for one thing, autopsy was performed on both humans and animals in cases of epidemics to determine the causes of death; Katharine Park has noted that it was by reason of such an epidemic that the first recorded Italian autopsy took place in Cremona in 1286.<sup>5</sup> Furthermore, the opening of corpses during the rampant stages of bubonic plague was expressly permitted by the Holy See in the fourteenth century,<sup>6</sup> and following the death of Pope Alexander V in 1410 in Bologna, an autopsy was ordered and performed to determine whether there was any reason to suspect causes other than natural for his passing.

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<sup>1</sup> See Danielle Jacquart, “Medical Scholasticism,” in *Western Medical Thought from Antiquity to the Middle Ages*, ed. Mirko D. Grmek and Bernardo Fantini, transl. Anthony Shugaar (Cambridge, Mass.: Harvard University Press, 1998): 197-240, at 224.

<sup>2</sup> “De sepulturis,” given in Lateran on 12 Kal. Mart. (18 February) of the sixth year of his pontificate (1300). For edification, I am giving the title of the only chapter of the decree: “Corpora defunctorum exenterantes et ea immaniter decoquentes: ut ossa a carnibus separata ferant sepelienda in terram suam ipso facto sunt excommunicati Capitulum vnicum;” see *Extravagantes communes ad proprios titulos applicate: prepositis singulatim sumarijs et multis additionibus adiectis, cum Interpretis Joannis monachi varijs in locis annexis*, Liber tertius (Ticini: ex arte & industria solertis viri Jacob Paucidrapesis de Burgofracco, 1517), f. 22r-v.

<sup>3</sup> Hagens, “Anatomy and Plastination,” 13.

<sup>4</sup> Jacquart, “Medical Scholasticism,” 225.

<sup>5</sup> Katharine Park, “The Criminal and the Saintly Body: Autopsy and Dissection in Renaissance Italy,” *Renaissance Quarterly* 47 (1994): 1-33, especially 1-8.

<sup>6</sup> Hagens, “Anatomy and Plastination,” 18.

Bartolomeo da Varignana (d. after 1321), one of Taddeo Alderotti's students in Bologna and, later, a *socius* of Taddeo, performed some of the earliest recorded autopsies for the City of Bologna and wrote reports on these autopsies between 1302-1310.<sup>1</sup> Still at Bologna, dissections of human cadavers for instructional purposes were performed by and under the supervision of Mondino de' Liuzzi (Mundinus Bononiensis), another former student of Taddeo, who, in 1316 or 1317 wrote an *Anatomia* intended to be read aloud as the dissection was in progress.<sup>2</sup> References to autopsies performed by Mondino on both animal and human cadavers appear everywhere in his *Anatomia*, and for the next two centuries his book remained the most authoritative source for teaching anatomy in an academic setting.<sup>3</sup> More importantly, Mondino's most frequently employed quotations were excerpted from Galen's *De iuvamentis membrorum* – a Latin translation, probably made in the twelfth century from an incomplete Arabic version, of the *De usu partium*.<sup>4</sup>

The physician Guy de Chauliac (1300-1368) wrote in his *Cyurgia*<sup>5</sup> that Master Bertuccio, a pupil of Mondino, had devised a

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<sup>1</sup> Siraisi, *Taddeo Alderotti*, 26, 47, and 47 n. 99. For Alderotti's written pieces of practical advice to individual patients – a widespread medical practice similar to the writing of pieces of advice for individual clients by contemporary bolognese lawyers – see his *Consilia*, ed. Piero P. Giorgi, Gian Franco Pasini, and Albertina Cavazza, *Opere dei maestri* 8 (Bologna: Istituto per la storia dell'Università di Bologna, 1997).

<sup>2</sup> For a modern edition, see Mondino de' Liuzzi, *Anothomia di Mondino de' Liuzzi da Bologna, XIV secolo*, ed. Piero P. Giorgi, Gian Franco Pasini, and Albertina Cavazza, *Opere dei maestri* 5 (Bologna: Istituto per la storia dell'Università di Bologna, 1992).

<sup>3</sup> See, for instance, his description of the woman he “anatomized” in January 1315, whom he found to have an uterus twice the size of the woman “anatomized,” still by him, in March of the same year; or his reference to the saw he “anatomized” in 1316 and that was pregnant with thirteen little pigs; the Latin quotation and its English translation are printed in Ludwig Choulant, “Mondino de' Luzzi [*sic*],” *History and Bibliography of Anatomic Illustration*, transl. and annotated by Mortimer Frank, with further essays by Fielding H. Garrison, Mortimer Frank, and Edward C. Streeter and a new historical essay by Charles Singer (New York: Hafner Publishing, 1945; reprint, New York: Hafner Publishing, 1962): 88-96, at 90-91.

<sup>4</sup> French, “*De Iuvamentis Membrorum*,” 107.

<sup>5</sup> See *Inventarium sive chirurgia magna*, ed. Michael R. McVaugh, 2 vols. (Leiden: Brill, 1997-[vol. 2 in progress]). Chauliac's work as a surgeon and medical writer was widely known in contemporary European medical and



system of four lectures (which he gave over a fresh cadaver) to examine the digestive system, liver, and veins – all of which were known as *membra putritiva*; the heart and the arterial system, known together as the *membra spiritualia*; the brain and the nervous system, known as the *membra animalia*; and the extremities, known as *extremitates*.<sup>1</sup>

Embalming, too, required evisceration, as in the case of Chiara de Montefalco, abbess of an Umbrian monastery, who died in August 1308, and whose heart, following dissection, was found to have hosted “a cross, or the image of the crucified Christ,” and, upon further investigation, “the crown of thorns, the whip and column, the rod and sponge, and tiny nails” – something that made her a serious candidate for canonization.<sup>2</sup> Regardless of the aura of naive but militant mysticism with which this particular case – or the sisters’ narration of it – was surrounded, Katharine Park argued that the event “coincided with the emergence of autopsy and dissection as a regular and integral part of both legal practice and medical training in the cities of northern and central Italy.”<sup>3</sup>

Anatomical drawings were yet another source of information for the constituent organs of the body, their arrangement, and their functions. Such illustrations abounded in tracts on general medicine or surgery, such as the illuminated Apocalypse Manuscript in the Wellcome Library<sup>4</sup> or the *Chirurgia*, written ca. 1306-1320 by Henri de Mondeville, physician

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university circles, as attested by the circulation of his *Chirurgia* in vernacular translations, with or without commentary; for one of these, see *An Interpolated Middle English Version of The Anatomy of Guy de Chauliac*, 2 vols., ed. Björn Wallner (Lund: Lund University Press, 1995-6).

<sup>1</sup> Siraisi, *Taddeo Alderotti*, 110-12.

<sup>2</sup> Park, “The Criminal and the Sainly Body,” 2.

<sup>3</sup> *Ibid.*

<sup>4</sup> London, The Wellcome Library for the History and Understanding of Medicine, MS 49, is a fifteenth-century *Ars medica* written and illustrated in Germany and including, in addition to simplified medical texts, theological and literary allegories; see Peter Murray Jones, *Medieval medicine in illuminated manuscripts*, rev. ed. (London: British Library, 1998), 33; and Robert S. Gottfried, *Doctors and Medicine in Medieval England, 1340-1530* (Princeton, NJ: Princeton University Press, 1986), 186.

to Philip the Fair;<sup>1</sup> but they were found in other scientific works as well – for instance, the optical works of Roger Bacon.<sup>2</sup>

Some of these illustrations were schematic and many of them were incorrect, but this should not be taken as a fault: achieving perfect likeness with real organs was by no means a goal for the illuminator, for diagrams and schematic representations served a different, yet not less important purpose – and did so quite well, as will be shown below:

The first of the two *figure* for the stomach and liver appearing on f. 36v of the Apocalypse manuscript represents the stomach as a diagram illustrating the digestive function by means of brief explanations inscribed within the main chamber of a double-edged circle. A more naturalistic – although by no means anatomically or physiologically correct – illustration is found on the same page, where the two drawings of the liver contain five lobes;<sup>3</sup> these *figure*, and similar ones such as the *figura eparis* drawn in a late- fourteenth-century copy of Mondeville's *Chirurgia*<sup>4</sup> were therefore based on Galen's description – something that would have been clearly perceived by a medieval viewer acquainted with the pertinent medical doctrine.<sup>5</sup>

The *figure* representing the anatomy and physiology of the eye were equally schematic – or, rather, diagrammatic: illustrations made for teaching purposes in the fourteenth century, such as the one found in MS Vatican, Biblioteca Apostolica Vaticana, Codex Urbinus 246 (a composite manuscript including the *Anatomia* of Mondino de' Liuzzi)

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<sup>1</sup> For Mondeville and the structure of his *Chirurgie*, see Gottfried, *Doctors and Medicine*, 218-19.

<sup>2</sup> Jones (*Medieval medicine*) prints, on pp. 36 and 37, the *figure* for the brain and eyes coming from London, British Library, MS Royal 7FVIII, f. 54v (a late thirteenth-century copy of the optical works of Roger Bacon) and London, British Library, MS Sloane 981, f. 68r (a late fourteenth- or early fifteenth-century “book of Macharias on the eye”). It is worth stressing, first, that Bacon's prolific output includes the treatise *De artibus liberalibus*, where music occupies the place of honor among the arts of the *quadrivium*; second, that his *Opus tertium* includes discussions of music based on the Greek and Latin classics, the Church Fathers, and the Arab writers. Nan Cook Carpenter, *Music in Medieval and Renaissance Universities* (Norman, OK: University of Oklahoma Press, 1953), 82) includes the following authors cited by Bacon: Ptolemy, Euclid, St. Augustine, Cassiodorus, Martianus Capella, Boethius, and al-Farabi.

<sup>3</sup> For all of these, see Jones, *Medieval medicine*, 33, fig. 20 and fig. 21.

<sup>4</sup> Erfurt, Royal Library, Amploniana, MS Quart No. 210; see Sudhoff, *Ein Beitrag zur Geschichte der Anatomie*, plate XXIV.

<sup>5</sup> See Jones, *Medieval medicine*, 33, for *figure* and commentary.

consistently employed a series of concentric circles to represent the eyeball and its tunics, and the position of the eye within the human skull (*figura oculi in capite homini*); these circles were then inscribed with anatomic terms for edification (for example, *humor cristallinus*, *tunica aranea*, *humor albugineus*, *tunica uvea*, *tunica cornea*, and *tunica conjunctiva* for the anterior half of the eye).<sup>1</sup> On this account Peter M. Jones<sup>2</sup> has rightly observed that such illustrations “grew directly out of geometry rather than medicine,” for their scope was to “provide an understanding [of] how the eye was constructed,” and certainly not to produce a likeness of it.<sup>3</sup>

In the twelfth century five distinct classes of anatomic icons, called *figure incisionis*, emerged and were reproduced time and again to

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<sup>1</sup> Three such *figure* from manuscripts copied and illustrated in the fourteenth century were reprised from Karl Sudhoff's *Tradition und Naturbeobachtung in den Illustrationen medizinischer Handschriften und Frühdrucke vornehmlich des 15. Jahrhunderts* (Leipzig, 1907, 21-6) by Mortimer Frank, “Manuscript Anatomic Illustrations of the Pre-Vasalian Period;” see Ludwig Choulant, *History and Bibliography of Anatomic Illustration*, transl. Mortimer Frank: 49-87, at 75-7. The illustrations come from London, British Museum, MS Sloane 420 and MS Sloane 981, and from Codex Urbinus 246.

<sup>2</sup> *Medieval medicine*, 36-7.

<sup>3</sup> Verbal descriptions of the eye, however incomplete or erroneous, were rich by comparison; I am giving for edification an excerpt from *Anatomia Porci (Cophonis)* [*The Anatomy of the Pig*, attributed to Copho of Salerno], a tract possibly composed in the very early 1100s and repeatedly printed from the sixteenth century on – often as a Galenic text: “In oculis est tunica quae appellatur coniunctiva et apparet alba; quae est iuxta eam, aliquantulum est subnigra, et dicitur cornea; quae sub illa magis est nigra et minor, et dicitur uvea. Tunc incide per medium; et humor qui prius exhibit, dicitur albugineus; qui post eum est, et coagulatus in modum crystalli, dicitur crystallinus; et qui ultimo est, ipse vitreus appellatur. Nervus qui ab interioribus venit ad oculum, qui est albus, et angustus, ipse dicitur opticus, et qui venit ad aures, dicitur auditorius nervus (In the eyes there is a tunic called conjunctiva, which appears white. Next to it is the cornea, which is rather grayish; the layer under that is black and slight; it is called uvea. Next cut the eye through the center. The first humor which appears is called *albugineus*, the next is coagulated like a crystal and is called *crystallinus*, and the last is called vitreous. The nerve which comes from the interior to the eye, which is white and slender, is called *opticus*, and that which goes to the ears is called the auditory nerve);” both the Latin and the English translation are in George W. Corner, *Anatomical Texts of the Earlier Middle Ages: A Study in the Transmission of Culture* (Washington, DC: The Carnegie Institution of Washington, 1927), 50 and 53, respectively.

show the system of arteries; of veins; of bones; of nerves; and of muscles. To these, another four were added slightly later for the genitalia; for the stomach, liver, and viscera; for the matrix (womb); and for the brain and eyes.<sup>1</sup> In addition to these, a most popular image was the Wound Man, an illustration representing the body pierced by swords and daggers to indicate the locations of the more common wounds, and including instructions for treating these wounds. A typical drawing of the Wound Man would depict the major internal organs as well: the heart and the liver.<sup>2</sup>

Linking the known, inferred, or imagined human anatomy, physiology, and pathology to fields other than the medical was not the prerogative of music theory texts. As suggested above, tracts composed on other subjects, too, lead to a better comprehension of pertinent concepts through analogous discourse involving the human body, taken wholly or partially. Medical writers themselves chose, when supporting one philosophical tenet or another, to speak in analogies in order to facilitate comprehension: Pietro Torrigiano de' Torrigiani (d. ca. 1320), a pupil of Taddeo Alderotti, wrote an immensely influential commentary on Galen's *Tegni* – a commentary upon which his reputation mostly rests. To support his attempt to reconcile the Aristotelian and Galenic doctrines regarding the primordially of the heart (of which more later), Torrigiano compared the body with a feudal society ultimately governed by a single authority, a central organ (the heart); a second analogy, of Aristotelian origin, showed the body as a well-organized state, where the monarch (the heart) and the citizens (the other principal organs) coexisted peacefully and cooperatively; a third analogy served to compare the body with the well-organized cosmos, where the sun, Torrigiano said, is the source of light just like the heart is the source of all vital functions.<sup>3</sup>

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<sup>1</sup> Jones, *Medieval Medicine*, 30-32.

<sup>2</sup> See London, The Wellcome Library for the History and Understanding of Medicine, MS 290 (*Anathomia. Anathomia porci*), largely based on a text attributed to Galen and written in English in the mid-fifteenth century, ff. 49v-53; a digital reproduction of the Wound Man can be seen at [http://library.wellcome.ac.uk/doc\\_WTL038441.html](http://library.wellcome.ac.uk/doc_WTL038441.html). For a catalogue description, see “Western Manuscripts and Archives – Online Catalogue of Western Manuscripts and Papers,” <http://archives.wellcome.ac.uk/DserveA/cgi-bin/CIdleTcl.exe>.

<sup>3</sup> Per-Gunnar Ottosson, *Scholastic Medicine and Philosophy: A Study of Commentaries on Galen's Tegni (ca. 1300-1450)* (Naples: Bibliopolis, 1984), 222-4

Furthermore, it was not unusual for medical men of the period to include in their tracts direct references to music, especially to its therapeutic virtues. In the field of the history of medicine Nancy Siraisi has devoted much attention to the examination of this topic, with special reference to the *studium* at Padua,<sup>1</sup> in the field of musicology, Giuseppe Vecchi long ago focused on the approach to speculative music taken by the prominent physician Pietro d'Abano (d ca. 1316),<sup>2</sup> of whom more, later. Elsewhere Siraisi has hypothesized that both Pietro d'Abano and Jacopo da Forlì could well have been among the physicians who were closely associated with *ars nova* musical circles of their time; in addition, she believed that, in terms of medical education offered and received at the northern Italian universities during the period under examination, “music was considered of real, if minor significance.”<sup>3</sup>

An especially favored subject was the music of pulse, on which prominent physicians relevant for the period under examination, such as Pietro d'Abano and Gentile da Foligno (d. 1348) wrote extensively, often using analogies that involved both anatomical and musical concepts. But Pietro's *Conciliator differentiarum philosophorum et medicorum*,<sup>4</sup> finished in 1303, went far beyond offering a medical view of the conjunction of pulse and musical rhythm: *Differentia* 83 is a lengthy discourse on music theory concepts such as interval species and their corresponding mathematical ratios, the division of the monochord, syllabic note nomenclature, the structure of the ancient Greek Greater Perfect System, and the like.<sup>5</sup>

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<sup>1</sup> Nancy Siraisi, *Arts and Sciences at Padua: The studium of Padua Before 1350*, Studies and Texts 25 (Toronto: Pontifical Institute of Mediaeval Studies, 1973), 94-107.

<sup>2</sup> See Giuseppe Vecchi, *Medicina e musica, voci e strumenti nel Conciliator (1303) di Pietro d'Abano*, *Quadrivium: studi di filologia e musicologia medievale* 8 (Bologna: [Forni], 1967).

<sup>3</sup> “The Music of Pulse,” *Medicine and the Italian Universities, 1250-1600* (Leiden: Brill, 2001: 114-39; originally published as “The Music of Pulse in the Writings of Italian Academic Physicians (Fourteenth and Fifteenth Centuries),” *Speculum* 50 (1975): 689-710; this reference is to pp. 138-9 in the Leiden reprint.

<sup>4</sup> Of which I have consulted the edition marked “Papie mandato et expensis Girardi de Zeis et Bartholomei de Morandis, Anno domini 1525 die 14 februarii.”

<sup>5</sup> For a reproduction of f. 157r in Cesena, Biblioteca Malatesta, MS *Plut. VI, sin. 3* (a manuscript including the complete text of the *Conciliator*, with an illustration of the monochord drawn on this folio), see Giuseppe Vecchi, *L'ars musica di Marchetto e l'ambiente culturale di Cesena nella Padania del Trecento*, *Romagna musicale nei secoli I* (Cesena: Comune di Cesena-Assessorato alla

Although it is not the focus of the present paper, and although it has been discussed in great detail and with superb expertise by Siraisi in a separate study,<sup>1</sup> the music of the pulse was such an important and widespread concept in thirteenth- and fourteenth- centuries writings, both musical and medical, that it is worth a brief reprise here:

In addition to prominent medical tracts containing observations on the musical associations of the pulse discussed by Siraisi, the *Anatomia vivorum*, an anonymous work datable to the first quarter of the thirteenth century, viewed the conjunction of the heart beat and music thus:

In all this nature employs a sort of musical art, for just as music is formed by the succession of high and low notes properly and rhythmically arranged, so in the arrangement of pulsation in the heart there is a systematic arrangement of the rate and an alternation of strength and weakness of pulse-beat and rest.<sup>2</sup>

Joining a tradition begun before Galen and including him, writers outside medical circles, too, expected physicians to be well versed in identifying a certain musical harmony in the human pulse. In other words, intellectual speculation on this subject could easily translate into a matter of practicality, and it was something of a general belief that observing the conjunction of these two “harmonies” should be part of medical consultation and diagnostic. And because physicians were perceived as extremely useful members of society, any work discussing, directly or by analogy, the fabric of the state or the diversity of human occupations allowed for the inclusion of references to the art of medicine. By logical extension, such works might also contain references to physicians’ knowledge of the music of the pulse. Not surprisingly, therefore, a book like the *Libellus de ludo scacorum* (a treatise on the art of playing chess, taking the game as an allegory for the structure and organization of society and composed towards the close of the thirteenth century by the Dominican Giacomo da Cesole) required that “perfectus

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Cultura, [1987]), 72; for supplementary details, see Siraisi, *Arts and Sciences at Padua*, 96-9.

<sup>1</sup> “The Music of Pulse,” see above.

<sup>2</sup> The *Anatomia vivorum* is an *opusculum* variously attributed in the fourteenth and fifteenth centuries to Ricardus Anglicus, Galen, and Aristotle; twentieth-century scholarship considers the work to have originated in either Bologna or Paris, or Western Germany; see Corner, *Anatomical Texts of the Earlier Middle Ages*, 35-45 and 93.

medicus phisicus novit ... armoniam pulsuum tamquam quandam armoniam musice.”<sup>1</sup>

Conversely, it is widely known that music theorists saw music and human pulse as conjoined at a fundamental, physiological level: in the early fourteenth century Marchetto of Padua (of whom more, later) in his *Lucidarium*<sup>2</sup> credited Pythagoras with the original statement; in the fifteenth, Guillermus de Podio quoted Galen on this subject,<sup>3</sup> while Johannes Tinctoris (ca. 1436-1511) traced the concept to both Avicenna and Galen.<sup>4</sup> In fact, the phrase had long before appeared in Cassiodorus’s *Institutiones* 5.2<sup>5</sup> and Isidore’s *Etymologiae*;<sup>6</sup> it was most probably

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<sup>1</sup> “A skillful doctor knows ... [that] the harmony of the pulses [is] like some harmony of music;” in F. Alberto Gallo, *Music in the Castle: Troubadours, Books, and Orators in Italian Courts of the Thirteenth, Fourteenth, and Fifteenth Centuries*, transl. Anna Herklotz (Chicago: University of Chicago Press, 1995), 59-60.

<sup>2</sup> Marchetto of Padua, *Lucidarium*, ed. and transl. Jan W. Herlinger (Chicago: Chicago University Press, 1985), 82. An earlier edition is printed in *Scriptores ecclesiastici de musica sacra potissimum*, 3 vols., ed. Martin Gerbert (St. Blaise: Typis San-Blasianis, 1784; reprint ed., Hildesheim: Olms, 1963), 3:83-87; this statement appears on p. 66.

<sup>3</sup> *Ars musicorum libri VI et VIII*, ed. Albert Seay, Critical Texts 8 (Colorado Springs: Colorado College Music Press, 1978), 9-34, at 10: “Inde enim medicus in examinatione duorum pulsuum, in quibus teste Galieno, libro de illorum convenientia, natura musices reperitur in qua se habuerint proportione, ut de statu alicuius morbi augmento vel declinatione recte iudicare possit (Hence the doctor, in the examination of the two pulses in which – as Galen testifies in the book on their coming together – is located the nature of music [that is, in what proportion they stand with respect to each other] so that the physician could rightly judge on the state of increase or decrease of any illness.)” [My translation.]

<sup>4</sup> “Quod satis probabile videtur ex dictis Avicenne et Galieni quorum primus ait: ‘Debes autem scire quod in pulso reperitur natura musicae.’ Et alter: ‘Cum natura proportionum musicalium mihi nota fuit, tunc ianuae pulsus mihi apertae fuerunt’. (Which is very probably seen in the sayings of Avicenna and Galen, of whom the first says: ‘It must be known that the nature of music is located in the pulse.’ And the other: ‘When the nature of musical proportions became known to me, then the gates of pulse were open to me’).” [My translation.] See Johannes Tinctoris, “Complexus effectum musices,” in *Johannis Tinctoris opera theoretica*, 3 vols., ed. Albert Seay, Corpus scriptorum de musica 22 ([Rome]: American Institute of Musicology, 1975), 2:173.

<sup>5</sup> Cassiodorus, *Institutiones*, ed. R. A. B. Mynors (Oxford: Clarendon Press, 1937), 143.

<sup>6</sup> Isidore of Seville, *Isidori hispalensis episcopi Etymologiarum sive originum libri XX*. Ed. W. M. Lindsay (Oxford: Clarendon Press, 1911), 3.17: “Sed etiam

retained from the latter text in the treatise of Magister Lambertus of Paris,<sup>1</sup> and from there it migrated into the *Quatuor principalia musice*, written by the Franciscan John of Tewkesbury in Oxford and there finished on the day before the Nones of August, 1351.<sup>2</sup>

Under certain circumstances, astrology or astronomy<sup>3</sup> (one of the four mathematical disciplines of the *quadrivium*, alongside arithmetic, geometry, and music) was perceived as one of medicine's closest and most useful allies.<sup>4</sup> In fact, some of those who had trained to become physicians at Paris and Bologna in the thirteenth and fourteenth centuries wrote astrological tomes, among other things.<sup>5</sup> Pietro d'Abano taught medicine, philosophy, and astrology at both Paris and Padua; his *Lucidator dubitabilium astronomie (astrologie)*, completed in 1303 and revised in 1306 in Padua, ranks with the most important scientific and philosophical works of the time;<sup>6</sup> and in 1318 Taddeo da Parma finished his work on the *Expositio* on the *Theorica planetarum* of Gerard of

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quicquid loquimur, in venarum pulsibus commovetur, et armonie probatur esse virtutibus sociatum (But also, whatever we say, [music] moves together with the pulses of veins and is proven to be associated with the virtues of *armonia*.)” [My translation.]

<sup>1</sup> Edited as “Cuiusdam Aristotelis Tractatus de musica,” in *Scriptorum de musica medii aevi nova series a Gerbertina altera*, 4 vols., ed. Edmond de Coussemaker (Paris: Durand, 1864-76; reprint ed., Hildesheim: Olms, 1963), 1: 251-81.

<sup>2</sup> Oxford, Bodleian Library, MS Digby 90, f. 63v.

<sup>3</sup> Frequently these two designations were interchangeable.

<sup>4</sup> For instance Jacquart (“Medical Scholasticism,” 235) views astrology as “an integral part of the history of medical thought” that “contributed to its enrichment.”

<sup>5</sup> O’Boyle (*The Art of Medicine*, 80) gives the following names for Paris: Dominic de Clavaxio – who was also the author of a work on natural philosophy and one on geometry; Geoffrey of Meaux; John Fusoris; Thomas Brown; and Mayninus de Mayneriis – who in 1347 became an escort to Isabelle Fieschi Visconti on her journey to Venice (*ibid.*, 74) and authored a treatise on chiromancy; a book on pulses, urines, and fevers; a book on moral philosophy; and, after the Black Death of 1348, a work on the plague (*ibid.*, 79). Siraisi (*Taddeo Alderotti*, 47 and 47 n. 97) shows that Bartolomeo da Varignana, active at the medical school in Bologna, was credited with having written a treatise on astrology.

<sup>6</sup> The work is edited in *Il Lucidator dubitabilium astronomiae di Pietro Abano. Opere scientifiche inedite*, ed. Graziella Federici Vescovini (Padova: Programma e 1+1 Editori, 1988), 53-324; see also Siraisi, *Arts and Sciences at Padua*, 81-8.



Cremona – a book composed specifically for the use of his medical students at Bologna.<sup>1</sup>

Being geared towards prognosis, astrological medicine required the construction of complicated tables involving very specific associations between bodily organs and members, the signs of the Zodiac, and the position and motion of planets.<sup>2</sup> Chaucer's physician is representative in this respect: the "Doctour of Phisik" of the fourteenth century was well versed in diagnostic, prognostic, and treatment based on the correct reading of the stars' and planets' configuration and alignment.<sup>3</sup> Equally representative is Boccaccio's surgeon from Salerno, Mazzeo della Montagna (identified as Matteo Selvatico Montano, d. ca. 1342), who had to wait until the propitious hour of Vespers to perform surgery on a gangrenous leg.<sup>4</sup>

The relationship medicine-astrology is immediately apparent in the art of book illustration, where pictures of the Zodiac man made explicit the connections between men of flesh and blood, and the cosmos – partly real, partly imagined – of which man was an integral part. In

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<sup>1</sup> See Federici Vescovini, *Il Lucidator*, 80-81, n. 32, for extant manuscripts and an overview of the work.

<sup>2</sup> On this subject, see Roger French, "Fortelling the Future: Arabic Astrology and English Medicine in the Late Twelfth Century," *Ancients and Moderns in the Medical Sciences* V (originally published in *Isis* 87 [1996]: 453-80); and id., "Astrology in Medical Practice," *Ancients and Moderns in the Medical Sciences* VI (originally published in *Practical Medicine from Salerno to the Black Death*, ed. L. Garcia-Ballester, R. French, J. Arrizabalaga, and A. Cunningham [Cambridge: Cambridge University Press, 1994], 30-59).

<sup>3</sup> *The Canterbury Tales, General Prologue* 414-418: "For he was grounded in astronomye//He kepte his pacient a ful greet deel// In houres, by his magyk nature// Wel koude he fortunen the ascendent// Of his ymages for his pacient." For a modern edition see Geoffrey Chaucer, *The Canterbury Tales*, The Works of Geoffrey Chaucer, ed. F. N. Robinson (Boston, Mass.: Houghton Mifflin, 1961), 1-265.

<sup>4</sup> Giovanni Boccaccio, *Decameron*, 2 vols., ed. Mario Marti (Milan: Rizzoli, 1994), 1: 329 (Day IV, Story 10): "Il medico, avvisando che l'infermo senza essere adoppiato non sosterebbe la pena nè si lascerebbe medicare, dovendo attendere in sul vespero a questo servigio, fe' la mattina d'una sua certa composizione stillare un'acqua ... (the doctor, realizing that the patient would not stand the pain or the treatment without being put to sleep, and having to wait until Vespers to perform this operation, had made that morning a potion of his own combination ...)." [My translation.] For a complete English translation, see *Giovanni Boccaccio's The Decameron*, transl. Mark Musa and Peter Bondanella (New York: New American Library, 1982).

these illustrations, the body was partitioned into several areas that were assigned to the twelve Zodiac signs. Personifications of these signs were drawn on the body's members and in its internal cavities (which in illustrated medical tracts would host internal organs): thus the head was governed by Aries; the neck, by Taurus; the arms, by Gemini; the breast, by Cancer; the upper abdomen, by Leo; the lower abdomen, by Virgo; the genital zone, by Libra and Scorpio; the upper thighs, by Sagittarius; the lower ones, by Capricorn; the calf, by Aquarius; finally, the feet, by Pisces.<sup>1</sup>

Passages in canon law treatises discussing the concept of blood relationships were illustrated as a rule through representations of trees of consanguinity (*arbores consanguinitatis*) and trees of affinity (*arbores affinitatis*). Fully independent works were also dedicated to the discussion of this concept, for instance the *Lectura arboris consanguinitatis et affinitatis* by the Italian jurist Giovanni d'Andrea ([Johannes Andreae], ca. 1270-1348), himself educated at the University of Bologna, where he returned as a professor of canon law, after having taught at Padua and Pisa.<sup>2</sup> Not infrequently, however, the human body

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<sup>1</sup> See, for example, Paris, Bibliothèque Nationale, MS esp. 30, an atlas illustrated in Cataluña in the fourteenth century; Washington, DC, Library of Congress, Rare Book and Special Collection Division, Rosenwald Collection, MS 128, produced in the South of Germany around 1410 (a digital reproduction of the Zodiac man is found at <http://www.loc.gov/exhibits/world/images/s128.jpg>); Munich, Hof-und-Staatsbibliothek, Codex germ. 32 (in Karl Sudhoff, *Beiträge zur Geschichte der Chirurgie im Mittelalter* [Leipzig: J. A. Barth, 1914]); Chantilly, Musée Condé, MS 65 (*Les très riches heures de Jean de France, Duc de Berry*, begun ca. 1409 by the Limbourg brothers and completed in 1487 by Jean Colombe), f. 14v.

<sup>2</sup> On this work and on its reception in central and northern Europe, see Helko Eis, *Zur Rezeption der kanonischen Verwandtschaftsbäume Johannes Andreae's: Untersuchungen und Texte* (Wuppertal-Elberfeld, Universitätsdruckerei E. Pfiem, 1965). For extant manuscripts, see *Manuscripts of Canon Law and Roman Law: Notes from Literature and from Catalogues, Collected by a Group of Law Students and Other Young Academics at the University of Leipzig*, dir. Gero R. Dolezalek,

<http://www.uni-leipzig.de/~jurarom/manuscr/Can&RomL/authors/11108.htm>,

<http://www.uni-leipzig.de/~jurarom/manuscr/Can&RomL/authors/11109.htm>,

and <http://www.uni-leipzig.de/~jurarom/manuscr/Can&RomL/authors/11110.htm>.

For early printed tree diagrams, see Iohannes Andreae, *Arbor Consanguinitatis cum suis enigmatibus et figuris* (Nuremberge: per Hieronymum Höltzel, Anno Domini Millesimo quingentesimo sexto, XXIIJ die Mensis Decembris), aii<sup>v</sup> (*arbor consanguinitatis*), biii<sup>v</sup> (*arbor affinitatis*), d (*arbor cognacionis spiritalis*), to name but a few.

itself, not a tree, was drawn to illustrate the concept of consanguinity: in such cases, the body was depicted as a highly stylized or schematic receptacle nesting in its internal cavities rows and columns of circles or squares; these were inscribed with the names of relationships involving generations of family members stemming from the common ancestors, the *abavus* and *abava*.<sup>1</sup>

Last but not far from least, the works of Aristotle carried such immense prestige, that those involving ample discussions of the anatomy and physiology of the animal body – the twenty one books on animals, including the *Historia animalium*, *De partibus animalium*, and *De generatione animalium* – were taken as a prime source from which excerpts were lifted to create parallels with musical concepts and practices. In fact, by 1260 these works were known in two different translations: the earlier one, from the Arabic, had been finished by Michael Scotus in Toledo before 1217;<sup>2</sup> the later one, from the Greek,

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<sup>1</sup> Great-great grandfather and great-great grandmother, respectively; see “Arbre généalogique,” in *Dictionnaire de droit canonique contenant tous les termes du droit canonique avec un Sommaire de l’Histoire et des Institutions et de l’état actuel de la discipline*, dir. R. Naz, 7 vols. (Paris: Letouzey et Ané, 1935-65), 1: col. 94-7.

For a systematic classification of the hundreds of anthropomorphic and botanical images, and for other types of diagrams drawn in European manuscripts to illustrate the concepts of consanguinity, affinity, spiritual and legal cognition, etc., see Hermann Schadt, *Die Darstellungen der Arbores Consanguinitatis und der Arbores Affinitatis: Bildschemata in juristischen Handschriften* (Tubingen: E. Wasmuth, 1982). For illustrations involving the human body see (to name but a few) plates 34 (Vatican, Biblioteca Apostolica Vaticana, MS Vat. lat. 1339, f. 303v), 36 (Nuremberg, German National Museum, MS KG 1138, f. 21r), 37 (Munich, Bayerische Staatsbibliothek, MS clm. 15823, f. 1v), 38 (Paris, Bibliothèque Nationale, MS fr. 9220, f. 14r), 42-47 (Cortona, Biblioteca del Comune, MS 75, f. 79r; Paris, Bibliothèque Nationale, MS lat. 9630, f. 118r; Montecassino, Biblioteca dell’Abbazia, MS 44, p. 171; Milan, Biblioteca Trivulziana MS 601, f. 84r; Vatican, Biblioteca Apostolica Vaticana, MS Vat. Lat. 4880 f. 92r, and Vatican, Biblioteca Apostolica Vaticana, MS Vat. lat. 1346, f. 128r).

<sup>2</sup> A modern edition of Scot’s translation of *De generatione animalium* is in *Michael Scot’s Arabic-Latin translation: Part three, books XV-XIX, Generation of animals*, ed. Aafke M.I. van Oppenraaij, with a Greek index to *De generatione animalium* by H. J. Drossart Lulofs, *Aristoteles Semitico-latinus* 5 (Leiden: Brill, 1992).

was fashioned by William of Moerbeke (ca. 1215-1286)<sup>1</sup> at Thebes in or before 1260. Similarly, Albertus Magnus's commentary on Aristotle's *De generatione et corruptione*, alongside Albertus's own twenty six books titled *De animalibus*,<sup>2</sup> probably composed ca. 1260 and supporting the Aristotelian doctrine of physiology rather than Galen's, was widely read by physicians and philosophers alike.<sup>3</sup>

## II. The Body Partial

### 1. Function Before Form

Let us now turn to the music theory tracts. Discursive, rather than pictorial, references to the human body taken as a whole, or to its

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<sup>1</sup> A modern edition of William's Latin translation is in *De historia animalium. Translatio Guillelmi de Morbeka. Pars prima: lib. I-V*, ed. P. Beullens and F. Bossier, *Aristoteles latinus XVII/2.1.1* (Leiden: Brill, 2000) and *De generatione animalium. Translatio Guillelmi de Moerbeka*, ed. H.J. Drossaart-Lulofs, *Aristoteles latinus XVII/2.V* (Bruges-Paris: Desclée De Brouwer, 1966). As at the time of writing this paper books VI-IX of the *Historia animalium* in Moerbeke's Latin translation have not yet been published in the *Aristoteles latinus* series, my references to books later than Book V are from *Aristotelis De animalibus historia*, ed. Leonardus Dittmeyer (Lipsiae: In aedibus B. G. Teubneri, 1907). An English translation from the Greek is in Aristotle, *Historia animalium*, transl. D'Arcy Wentworth-Tompson, in *Works of Aristotle Translated into English*, eds. J. A. Smith and W. D. Ross, vol. 4 (Oxford: Clarendon Press, 1910); an English translation from the Latin edition established by J. G. Schneider is found in *Aristotle's History of animals. In Ten Books*, transl. Richard Cresswell (London: G. Bell, 1878). Translations from the Greek used in this paper are as follows: Aristotle, *Parts of Animals*, transl. A. L. Peck, The Loeb Classical Library (Cambridge, Mass.: Harvard University Press, 1955); Aristotle, *Generation of Animals*, transl. A. L. Peck, The Loeb Classical Library (Cambridge, Mass.: Harvard University Press, 1953); and Aristotle, *The History of Animals*, transl. D'Arcy Wentworth-Tompson (see above, this note).

<sup>2</sup> A modern edition is available as Albertus Magnus, *De animalibus libri XXVI, nach der Cölnher Urschrift*, 2 vols., ed. Hermann Stadler, *Beiträge zur Geschichte der Philosophie des Mittelalters* 15-16 (Münster i. W.: Aschendorff, 1916-21). An English translation is in Albertus Magnus, *On Animals: a Medieval summa zoologica*, 2 vols., transl. and annotated Kenneth F. Kitchell, Jr. and Irvn Michael Resnick, *Foundations of Natural History Series* (Baltimore: Johns Hopkins University Press, 1999); see also Albert the Great, *Man and the Beasts (De animalibus, Books 22-26)*, transl. James J. Scanlan, *Medieval and Renaissance Texts and Studies* (Binghamton, N.Y.: Center for Medieval and Early Renaissance Studies, 1987).

<sup>3</sup> Siraisi, *Taddeo Alderotti*, 43 and 189.

diverse members taken individually and placed in a rather rigorous hierarchy were frequently used by music theorists as verbal *similes* to prescribe rules of polyphonic composition. In the early fourteenth century Johannes de Grocheio or Grocheo (fl. ca. 1300) wrote a treatise (called *De musica* or *Theoria*) that, among other things, gave a lively picture of contemporary and earlier Parisian musical genres.<sup>1</sup> The book was perhaps not too well known in its own time, for it has only been preserved in two fourteenth-century manuscripts,<sup>2</sup> whose exact dates of completion and early provenance are not known.<sup>1</sup>

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<sup>1</sup> The form used in this paper is Grocheo. Recently there have been attempts to move the date for Grocheo's treatise to a slightly later year: it might have been written at some point during the first quarter of the fourteenth century; for this, and for a detailed examination of one of the three branches of the Parisian repertory discussed by Grocheo, see Robert Mullally, "Johannes de Grocheo's *musica vulgaris*," *Music and Letters* 79 (1998), 1-26; see also Christopher Page, *Discarding images: Reflections on Music and Culture in Medieval France* (Oxford: Clarendon Press, 1993), 65-111 (chapter 3: "Johannes de Grocheio, the *Litterati*, and Verbal *Subtilitas* in the *Ars Antiqua Motet*"); and id., *The Owl and the Nightingale: Musical Life and Ideas in France 1100-1300* (Berkeley: University of California Press, 1990). For Grocheo and additional relevant bibliography, see Christopher Page, "Grocheio [Grocheo], Johannes de," *Grove Music Online*, ed. L. Macy (accessed 17 June 2004), <<http://www.grovemusic.com>>. A modern edition of Grocheo's tract is printed as *De musica*, in Ernst Rohloff, *Der Musiktraktat des Johannes de Grocheo nach den Quellen neu herausgegeben mit Übersetzung ins Deutsche und Revisionsbericht*, *Media Latinitas musica* 2 (Leipzig: Gebrüder Reinecke, 1943), 41-67; available as an electronic file in *Thesaurus Musicarum Latinarum* (<http://www.music.indiana.edu/tml/start.html>, henceforth TML), fourteenth century, GRODEM TEXT.

<sup>2</sup> These are Darmstadt, Hessische Landesbibliothek, MS 2663, ff. 56r-69r, and London, British Library, MS Harley 281, ff. 39r-52r. The former was used as the basis for the nineteenth-century edition printed as *Theoria*, in Johannes Wolf, "Die Musiklehre des Johannes de Grocheo," *Sammelbände der Internationalen Musikgesellschaft* 1 (1899-1900): 69-120 (available as an electronic file in TML, fourteenth century, GROTHE TEXT). The later was the basis for Mullally's readings. In addition to his 1943 work, Ernst Rohloff published a second edition of Grocheo; see *Die Quellenhandschriften zum Musiktraktat des Johannes de Grocheo im Faksimile herausgegeben nebst Übertragung des Textes und Übersetzung ins Deutsche, dazu Bericht, Literaturschau, Tabellen und Indices* (Leipzig: Deutscher Verlag für Musik, 1972), which includes facsimiles of both manuscripts on facing pages, 54-107. In this paper I follow the readings in the manuscript facsimiles published in Rohloff rather than those in the printed editions. For catalogue descriptions, see Christian Mayer, Michel Huglo, and

Grocheo is, nevertheless, easily placed in the Parisian milieu at the turn of the fourteenth century – a fact known from his unique focus on Parisian musical genres, and strengthened to some extent by evidence (that, however, should be taken with a grain of salt) found in the later of the two manuscripts that have preserved the tract: MS Darmstadt, Hessische Landesbibliothek 2663 concludes on f. 69: “Explicit theoria magistri iohannis de grocheio,” to which the same hand has added, as an afterthought, “regens.” Following this, a word that can be interpreted as “parisius” was added, perhaps by a different hand, perhaps by the same one writing, however, in haste and using cursive characters rather than the Gothic bookhand employed for the explicit.<sup>2</sup> That the scribe of MS Darmstadt 2663 has chosen to refer to Grocheo as *magister* may or may not indicate the latter’s association with the University of Paris in a magisterial capacity: evidence collected by Richard H. Rouse and Mary A. Rouse in their monumental study of Parisian book-making during the pertinent period shows that *master* was used not only to refer to unmarried men teaching at the university, but indeed as a courtesy title applied to men who were married (which ruled them out as university people) and had achieved a certain economic and social status.<sup>3</sup>

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Nancy C. Phillips, *The Theory of Music: Manuscripts from the Carolingian Era up to c. 1500 in Great Britain and in the United States of America. Descriptive Catalogue*, Répertoire international des sources musicales, Series B III/4 (Munich: Henle, 1992) [henceforth *RISM BIII/4*]: 74-78 (for MS Harley 281); and Michel Huglo and Christian Meyer, *The Theory of Music: Manuscripts from the Carolingian Era up to ca. 1500 in the Federal Republic of Germany*, Répertoire international des sources musicales, Series B III/3 (Munich: Henle, 1986) [henceforth *RISM BIII/3*]: 41-2 (for MS Darmstadt 2663).

<sup>1</sup> The earlier of the two, London, British Library, MS Harley 281, was once believed to have been written before 1300, but in light of recent scholarship it seems that the hypothesis is no longer tenable. The manuscript was certainly read at some point in the seventeenth century, for it includes marginal notes in a hand that can be assigned to that period. The notes are as follows: “nota quod et,” “significat et,” “ordo disciplinae” (f. 39r); “.t. significat et,” “motetus quid,” “organum quid,” (f. 46v); and “hoquetus quid” (f. 47r). The manuscript was a donation of Christopher Wren, the son of the famous architect, to the British Museum (Rohloff, *Die Quellenhandschriften*, 172).

<sup>2</sup> On this, and on the supposition that Grocheo might have attended lectures at the University of Paris, see Page, *Discarding images*, 71-3.

<sup>3</sup> Richard H. Rouse and Mary A. Rouse, *Illiterati et uxorati: Manuscripts and their Makers. Commercial Book Producers in Medieval Paris, 1200-1500*, 2 vols. (Turnhout: Harvey Miller, 2000), 1: 36. The example given is that of a thirteenth-century libraire (i. e., the contractor coordinating the activities of the scribe and

All this is, of course, a matter of speculation. Evidence in the treatise itself clearly points to the fact that Grocheo was familiar with both the musical genres and forms of Paris of his time, and the works that formed the torso of contemporary university education in the arts. Modern scholarship has proposed that his approach to the discussion of musical forms owed much to the Aristotelian approach of discussing animals from the perspective of the categories of species.<sup>1</sup>

Grocheo's references to Aristotle are, indeed, overly abundant, expected to be so, and have been studied elsewhere.<sup>2</sup> He obviously knew about and most probably had read Aristotle's books on animals, for they are quoted more than once by title, and references are made to the subject matter of each.<sup>3</sup> But one finds that, in addition to language that is overtly Aristotelian, the text involves non-Aristotelian – more specifically, Galenic – terminology as well: clearly the author had some knowledge, however elementary or fragmentary, of anatomy as it was taught and studied in the later part of the thirteenth- and the earlier part of the fourteenth centuries. To begin with, Grocheo cited *Tegni* by title in a comparison involving the general compositional scheme and the scope of both Galen's and his own book:

We however do not intend to discourse here on the diversity of these, nor do we intend to get down to all the particulars; instead, we [intend] to treat, according to our ability, of the universal canons of the

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the illuminator, and providing the liaison with the client), who in contemporary property records is referred to as “*Master Richard the scribe*,” the man and his wife, Odeline, occupied a house on rue Neuve Notre Dame.

<sup>1</sup> Patricia A. M. De Witt, “A New Perspective on Johannes de Grocheo’s *Ars Musicae*,” Ph. D. dissertation, University of Michigan (1973), quoted in Mullally, “Johannes de Grocheo,” 2.

<sup>2</sup> Ellinore Fladt, *Die Musikauffassung des Johannes de Grocheo im Kontext der hochmittelalterlichen Aristoteles-Rezeption*, Berliner musikwissenschaftliche Arbeiten 26 (München: Musikverlag E. Katzbichler, 1987).

<sup>3</sup> For example: “Unde Aristoteles in libro qui *De animalibus* intitulatur, sic notitiam de animalibus tradit. Primo enim ea notificavit confuse et universaliter et per anatomisationem et mores et proprietates eorum in libro, qui *De historiis* dicitur. Secundo vero ea magis perfecte et determinate notificavit per partium cognitionem in libro, qui *De partibus* appellatur. Sed tertio maxime notificavit ea per *Generationem* vel eorum factionem, in quo cognitionem de animalibus ultimavit;” see ed. Rohloff (1943), 49-50.

art of music, just like in the book of Galen which is called *Techne* the universal canons of the art of medicine are treated.<sup>1</sup> [My translation]

Next, describing, in the context of polyphonic composition, the positions of various parts with respect to each other, Grocheo posited that the tenor is that part on which all others are founded, just like the parts of a house or edifice rest upon their foundation. Additionally, the tenor regulates these parts and endows them with quantity, just like bones do for the other parts of the body.<sup>2</sup> Both the architectural and anatomical *similes* for the tenor employ a terminology that is essentially Aristotelian: according to William of Ockham (1280-1349, one of the most prestigious Aristotelian commentators of the fourteenth century and a lecturer at Paris and Oxford), the Philosopher, when refining his definition of *quantitas* to explicate its various facets likened continuous quantity to a house, for its parts were joined to each other.<sup>3</sup> The anatomical *simile* involving the skeleton is probably resting on Aristotle as well, for it introduces the notion of *quantitas* as would have been understood by those of Grocheo's contemporaries who were acquainted with the doctrine: thus the tenor "giving" the other parts "quantity" meant that the tenor was endowing them with that which made them divisible into several parts of the same nature.<sup>4</sup>

The passage that I will discuss below, however, is not in line with these statements; rather, it is strongly reminiscent of the fourth

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<sup>1</sup> Nos vero hic non intendimus istorum diversitates enarrare nec ad omnia particularia descendere, sed secundum posse nostrum canones universales artis musicae tradere, sicut in libro Galeni, qui dicitur *Techne*, traduntur canones universales artis medicinae; ed. Rohloff (1943), 56; Wolf (105) gives a slightly different version, but Rohloff's edition is clearer at this point.

<sup>2</sup> MS Harley 281, f. 47r and MS Darmstadt 2663, ff. 63v-64r: "Tenor autem est illa pars super quam omnes alie fundantur. Quemadmodum partes domus vel edificii super suum fundamentum. Et eas regulat et eis dat quantitatem, quemadmodum ossa partibus aliis;" see ed. Rohloff (1943), 57; and ed. Wolf, 108 – both using Classical orthography and editing punctuation.

<sup>3</sup> "Ed ideo forte Aristoteles ... sub quantitate comprehenderet domos ... quia ... requiritur partes suas invicem copulari;" in Leon Baudry, *Lexique philosophique de Guillaume d'Ockham: étude des notions fondamentales* (Paris: P. Lethielleux [1958]), 59.

<sup>4</sup> Baudry, *Lexique philosophique*, 59: "Philosophus accipit ibi quantitatem pro omni quod est divisibile in plures partes ejusdem rationis sive distent loco et situ, sive non (The Philosopher takes *quantitas* to mean everything that is divisible into several parts of the same nature, whether these parts are distant from each other or not with respect to their locality and place)". [My translation.]



“natural” in the Galenic series of the seven “naturals.” Involving statements concerning the members of the body divided into principal and subsidiary,<sup>1</sup> the passage establishes a firm parallel between the chronological sequence supposedly followed by nature in the formation of animal organs and the path that composers were to follow in creating musical pieces based on a pre-existing or newly composed tenor:

Wishing to compose these [i.e., motets and *organa*, which were described in the previous chapter or section], one must first create order within a [pre-existing] tenor or compose it, and assign some mode and measure to it. For the more principal part must be formed first, from which the other [parts] are formed afterwards, just like nature, in generating animals, first forms the principal members, for instance the heart, the liver, the brain, and, by means of those, the other [members] are formed afterwards.<sup>2</sup> [My translation.]

Rohloff hypothesized that the source for this analogy was Aristotle’s *De generatione animalium*,<sup>3</sup> and this makes perfect sense, given the number and frequency of Aristotelian references in Grocheo. Moreover, the preceding section had involved, as shown above, statements of unambiguous Aristotelian lineage that, additionally, referred to the function of the skeleton within the body.

One, however, notices that the passage under examination has clear Galenic overtones, for Galen’s works and the commentaries on them categorized the seven “naturals” as follows: (1) the elements; (2) the mixtures; (3) the compounds or humors; (4) the members or kinds of bodily parts; (5) the faculties; (6) the functions of the body; and (7) the spirits. Among these, the fourth “natural” classified the heart, brain, liver, and sometimes the testes as the principal parts, and the nerves, arteries, veins, and spermatic vessels (when the testes were part of the scheme) as the subsidiary parts.<sup>4</sup>

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<sup>1</sup> O’Boyle, *The Art of Medicine*, 85.

<sup>2</sup> MS Harley 281, f. 47r and MS Darmstadt 2663, f. 64r: “Volens autem ista componere primo debet tenorem ordinare vel componere et ei modum et mensuram dare. Pars enim principalior debet formari primo, quoniam ea mediante postea formantur alie. Quemadmodum natura in generatione animalium primo format membra principalia, puta Cor, Epar, Cerebrum. Et illis mediantibus alia post formantur;” see ed. Rohloff (1943), 57; and ed. Wolf, 109.

<sup>3</sup> *Die Quellenhandschriften*, 147 n. 208.

<sup>4</sup> O’Boyle, *The Art of Medicine*, 85. A Latin translation from *Tegni Galieni* 2.28-29 printed in an early edition of the *Articella* (Lyon, 1515) is given in Siraisi, *Taddeo Alderotti*, 187: “Principalis igitur sunt cor, cerebrum, epar, et testiculi. Ab illis vero exorta sunt et illis famulantur nervi et spinalis medulla cerebro, Cordi

In fact, herein lies one of the major points of contention, familiar to all medically educated men of the late thirteenth century, between Aristotelians and Galenists: Galen had posited these three (or four) parts as principal and had explained the other systems as derived from them. Aristotle, on the other hand, had averred that there was only one primary organ in the whole of the body: the heart, “citadel of the body,” source of blood, heat, and life, controlling sense and motion, and the arterial and venous systems as well.<sup>1</sup> According to him, the heart was the first organ to be formed in the embryo – whether human or animal – because it was the seat of the nutritive part of the Soul<sup>2</sup> and because it contained in itself the very principle of generation,<sup>3</sup> additionally, he saw the heart as the organ where the specific sex of the embryo is determined.<sup>4</sup> The liver in his view, although “necessary for the sake of concoction,”<sup>5</sup> was not the source of blood, therefore was not worthy of occupying a position of primacy and governance,<sup>6</sup> like the heart did.

Whether Grocheo read about the Galenic “naturals” or attended lectures concerning them, or whether someone else in his circle reported on them, either Grocheo or his informant had access to (and had read from) a copy of either Galen’s *Tegni* (*Techne*) or the Latin *tractatulus* known as the *Isagoge ad Tegni Galieni*,<sup>7</sup> both part of the collection *Ars medicine* studied at the time at the University of Paris. It is of little importance for the present discussion whether Grocheo assimilated the anatomical concepts and terminology through direct contact with the

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vero arterie, Vene epati, Seminalia vasa testiculis (The principal ones, therefore, are the heart, brain, liver, and testes. From those arise, and to them are subservient: the nerves and spinal cord – to the brain; the arteries – to the heart; the veins – to the liver; the seminal vessels – to the testes.)” [My translation.] For the same passage, see Ottosson, *Scholastic Medicine and Philosophy*, 221 n. 78.

<sup>1</sup> See for example *De partibus animalium* 3.4. 665b-666b (transl. Peck, 237-9); 3.5. 667b (transl. Peck, 249); 3.7. 670a (transl. Peck, 265).

<sup>2</sup> *De generatione animalium* 4.1. 763b (transl. Peck, 371 n. d).

<sup>3</sup> *De generatione animalium* 2.1. 735a (transl. Peck, 157).

<sup>4</sup> *De generatione animalium* 4.1. 766a (transl. Peck, 391-2).

<sup>5</sup> *De partibus animalium* 3.7. 670a (transl. Peck, 265).

<sup>6</sup> i.e., in the central, upper, and frontal part of the body: *De partibus animalium* 3.4. 666a-b (transl. Peck, 239).

<sup>7</sup> The *Isagoge*, attributed in medieval texts to Johannitus, was shown more recently to be an abbreviated, Latin version of an introduction to Galen’s *Tegni*, perhaps originally composed in the 9th century by Hunain ibn Ishāq; see O’Brien, *The Art of Medicine*, 83.

discipline or through conversational osmosis; what matters is that he understood them and used them to construct perfectly edifying parallels.

Grocheo's intended readership, the friends he referred to in the first lines of his work, the very ones who had urged him in his youth to compose a little explanation of music,<sup>1</sup> must have had some understanding of Galenic classifications as well. Such understanding would have enabled them to comprehend the rudiments of musical composition explained by means of anatomic *vocabula*. It is likely that they derived some amount of satisfaction from identifying the medical source, just like it is very probable that they derived satisfaction from recognizing the Aristotelian allusions (*not* the quotations or paraphrases that Grocheo himself identified in his text).

The prestige of the *auctoritas* – in this case a medical one – had to be invoked and it was. Grocheo's choice of this particular reference and the ensuing recommendation bespeak his preference for creating dynamic, rather than static, anatomic parallels in discursive writing on music theory; the one under examination borders on rudimentary physiology. Rather than opting for a phrase that would take the body as an already formed and complete unit with the shape and position of its organs clearly delineated, the writer believed that a causal sequence would better convey the *simile* he needed at this point to strengthen his argument. Both the body and the piece of music were seen in the process of being generated through the gradual formation of their individual members; of these, some were principal – thus being formed first –, and some derived. This view was in line with the general trend manifest in late thirteenth- and fourteenth-century medical tracts and the scholastic *questiones* appended to these tracts for, as Nancy Siraisi has noted in her study of the medical writings of the period, “one finds that the emphasis is still on explanation of function rather than description of form.”<sup>2</sup>

Fittingly, part of this anatomical comparison – not necessarily Grocheo's, though – was retained by the music theorist Gallus Dressler in chapter 6 of his *Praecepta musicae poeticae* of 1564 (a work roughly

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<sup>1</sup> MS Harley 281, f. 39r: “Incipit prologus in arte musice Quoniam quidam iuvenum amici mei me cum affectu rogaverunt, quatenus eis aliquid de doctrina musicali sub brevibus explicarem (Here begins the Prologue on the Art of Music Since some young friends of mine asked me with fondness to explain to them to some extent and briefly something about the doctrine of music...)” [My translation]. See ed. Rohloff (1943), 41. MS Darmstadt 2663 omits “Incipit prologus in arte musice.”

<sup>2</sup> Siraisi, *Taddeo Alderotti*, 265.

contemporary with Vesalius's *De humani corporis fabrica*) precisely at the point where he referred to the compositional procedures of the old masters:

The ancients judged that the tenor was to be found first among all [other parts]; secondly – the discantus; thirdly – the bassus; the altus was to be added last. Whence the tenor is seen to have acquired its name from “holding,” for the other parts look to it as if it were the brain.<sup>1</sup> [My translation]

Jessie Ann Owens saw with clarity the inclination of this Renaissance theorist to speak about the primacy of the tenor from the perspective of its *function*, and not from that of its location;<sup>2</sup> all that needs to be added is that Dressler and his contemporaries inherited the parallel with the primacy of the brain from their predecessors of the thirteenth and fourteenth centuries.

Although Grocheo's comments on the behavior of the tenor in a polyphonic composition could have stemmed from direct observation, his knowledge of anatomy and physiology most certainly did not. In fact, in cases like this, direct observation was not needed at all. Instead, the writer's process of speaking about anatomical parts while thinking of musical parts was reminiscent of the way an illuminator would have gone about drawing anatomic illustrations while thinking of the medical text – these, too, did not come from direct observation, but from descriptions given in books of medicine used in Paris and at other European medical schools. As noted above, drawing perfect replicas of either body or organs or extremities was simply not an objective.

For both music theorist and medical illustrator, what mattered was what the organ did, not how the organ looked. Consequently, neither illustration nor textual reference needed to be realistic or literal (although Grocheo's was): their function was to expeditiously capture the essence

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<sup>1</sup> “Veteres judicaverunt Tenorem omnium primo inveniendum, secundo loco discantum tertio Bassum, ultimo Altum addendum. Inde Tenore nomen adeptus videtur a tenendum quod ad eum tanquam ad cerebrum (ceterae partes) respiciunt. In contrapunto simplici vel florido haec veterum sententia potest et debet observari sed quilibet vox cui thema componendum attribuitur tenor iure quodam appellanda est sive Discantus sive Bassus vel quaecunque vox fuerit;” quoted and translated in Jessie Ann Owens, *Composers at Work: The Craft of Musical Composition 1450-1600* (Oxford: Oxford University Press, 1997), 22.

<sup>2</sup> Owens, *Composers at Work*, 22 n. 27: “Dressler recognized that the essence of the tenor derived not from its location in the overall sonority but from its role as the presenter of the given line (*thema*).

of the concept under examination and convey the information; this was no doubt achieved in both cases in a most efficient manner.<sup>1</sup>

The tenor, therefore, functioned as the principal member in musical composition, just like the heart, the liver, and the brain functioned as the principal members of the body, or like the skeletal system functioned as a solid foundation for the soft organs. That which is principal comes first, for the principal parts perform the vital functions; it is from these physiologically active parts that the secondary ones are derived. Once the tenor – whether pre-existing or newly composed – has been configured in terms of its inner structure and order, its mode, and its measure, in other words, once it is able to perform its intended vital function, it will supply the means of deriving the other parts. Together, the tenor and the derived parts will form the whole piece.

A variant of anatomic figures of speech involving process rather than location was the kind involving internal organs as the recipients of actions; activities in this case were performed not by them, but on them. Marchetto of Padua (fl. ca. 1305-19) dwelled extensively on human anatomy and physiology in more than one theoretical tract. In doing so, he drew on the opinions of both physicians and philosophers, increased the number of anatomic *similes*, extended the domain of their application to problems of mensural music, and couched his arguments in religious language to give them an impeccable foundation.

His *Lucidarium*,<sup>2</sup> a *summa* of music theory omitting rhythmic notation (which was to be taken up in his *Pomerium* – of which more, later) was begun in Cesena and finished in Verona, probably in 1317 or 1318. It was a work well-known not only to Marchetto's contemporaries, but also to theorists and composers of the Quattrocento and Cinquecento – in fact, it has had a significance and impact that its modern editor, Jan

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<sup>1</sup> Jones, *Medieval medicine*, 32.

<sup>2</sup> See ed. Herlinger, 224-56. On this work, see Jan Herlinger, "Marchetto da Padova," *Grove Music Online*, ed. L. Macey (accessed 30 September 2004), <http://www.grovemusic.com>; Herlinger's preface to his edition of the text (see above), 21; id., "Marchetto's Influence: the Manuscript Evidence," *Music Theory and its Sources: Antiquity and the Middle Ages*, ed. A. Barbera (Notre Dame, In: University of Notre Dame Press, 1990), 235-58; id., "A Fifteenth-Century Italian Compilation of Music Theory," *Acta Musicologica* 53 (1981): 90-105; id., "Marchetto's Division of the Whole Tone," *Journal of the American Musicological Society* 34 (1981): 193-216; id., "Fractional Divisions of the Whole Tone," *Music Theory Spectrum* 3 (1981): 74-83; Jay Rahn, "Marchetto's Theory of Commixture and Interruption," *Music Theory Spectrum* 9 (1987): 117-135.

Herlinger, describes as “enormous.”<sup>1</sup> The book was dedicated to Ranieri di Zaccaria (vicar general in Romagna of John, brother to Robert King of Naples) and, like Marchetto’s *Pomerium*, clearly shows that the writer was at some point in some way connected to the Anjou king and his entourage.<sup>2</sup> Both works, according to their author, were composed with the help of Friar Syphans of Ferrara<sup>3</sup> – an issue that will be discussed below in conjunction with Marchetto’s *Pomerium*.

In the sixth section of this work, the *Tractatus sextus*, Marchetto composed the following verbal image to explain the octave and its capacity to generate and subsume other intervals:

Just as the sign of circumcision was given to humankind for three reasons, so this consonance of the octave was given to music for three reasons ... Thirdly, the sign of circumcision is given because circumcision is justly performed on a member through which the flesh is propagated. Thirdly, similarly, the octave in music is given and constituted as an octuple figure because it is the origin of all consonances; it contains the fourth and the fifth as its parts, just like the whole contains parts.<sup>4</sup> [My translation.]

The parallel here was deftly planned along Biblical connections<sup>5</sup> and, in Marchetto’s text, it was positioned so as to follow direct references to the practice and significance of circumcision among the

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<sup>1</sup> *Lucidarium*, ed. Herlinger, xv.

<sup>2</sup> *Ibid.*, 3-4. For Marchetto’s dedicatory letter and its English translation, see *ibid.*, 68-71.

<sup>3</sup> See dedicatory letter in ed. Herlinger, 70-71: “... Infrascriptum opus composui adiuvante me Fratre Syphante de Ferraria Ordinis Predicatorum, tam circa libri ordinem quam etiam ipsi libro necessarias suas phylosophicas rationes (I composed the following work aided by Brother Syphans of Ferrara of the Order of Preachers in organizing the book and in the philosophical arguments necessary to it).” [Transl. Herlinger.] Information from both *Lucidarium* and *Pomerium* was used in compiling the entry for Friar Syphans in Thomas Kaeppli, *Scriptores Ordinis Praedicatorum Medii Aevi*, 4 vols. (Rome: Typis Polyglottis Vaticanis, 1970-93), 4 (by Emilio Panella): 281-2.

<sup>4</sup> “Sicut enim signum circumcisionis propter tria datum est generi humano, sic hec consonantia dyapason propter tria in musica data est ... Tercio, signum circumcisionis datum est, quia in tali membro circumcisio iussa est fieri per quod carnis origo propagatur. Tercio, similiter, dyapason in musica data est, et in octonaria figura constituta, eo quod ipsa omnium consonantiarum est origo; continet enim in se dyatessaron et dyapente tamquam partes suas, sicut totum continet partes;” ed. Herlinger, 240-42; ed. Gerbert, 85-6.

<sup>5</sup> Genesis 17: 9-14; also identified in Herlinger’s edition at 241.

ancient Hebrews.<sup>1</sup> Having established the proper religious, historical, cultural, and medical context for his *simile*, Marchetto proceeded to further explore its potentialities, itemizing the similarities he perceived – or thought fit to perceive – between the act of circumcision, the octave, and their respective functions within the systems they generated. This he did in a series of three consecutive statements, each comprised of two clauses: the first pertained to circumcision; the second, to the octave. The third and final couple of clauses focused on the procreative power of the octave, compared to the procreative power of the circumcised organ. At this point, however, the anatomic *simile* ceased to be relevant, for by this time all of its metaphoric potentialities had been exploited. Marchetto therefore left the parts of the body behind and went on to speak about the wholeness of the octave as an entity enclosing the component parts that it had generated.

## **2. Location Before Function**

Perseus and Petrus, suggested by Christopher Page to have been the authors, ca. 1200, of the *Summa musice* (long attributed to Johannes de Muris and preserved in a single manuscript),<sup>2</sup> looked at the body from a different perspective: their angle was purely anatomical, as the authors' parallel took the *location* rather than the *function* of organs to be of significance for the topic at hand – the structure of the hexachord:

But perhaps someone would ask why the semitone is located this way in the middle of the six aforesaid notes, neither at the beginning nor at the end. To this, one has to say together with the Philosopher that art imitates nature.<sup>3</sup> In natural things it is so: the soft members are located in the middle and withdrawn internally, like the brain in the skull, the intestines and *spiritualia* in the rib cage, the marrow in bones; and, as the

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<sup>1</sup> “Hec figura octonaria pre cunctis mirabilis est, nam octava die Ysaac circumciscus est post circumciscionem patris sui Abrae, et Dominus noster Ihesus Xpistus octava die ab eius nativitate voluit circumcidi (This octuple entity is wonderful, for Isaac was circumcised on the eight day after the circumcision of his father Abraham, and Our Lord Jesus Christ was to be circumcised on the eight day after his birth).” [My translation.] See ed. Herlinger, 240; and ed. Gerbert, 85.

<sup>2</sup> See *The Summa musice: A Thirteenth-Century Manual for Singers*, ed. Christopher Page, Cambridge Musical Texts and Monographs (Cambridge: Cambridge University Press, 1991), 139-211; TML, thirteenth-century file, PEPESUM TEXT. For a discussion of the only manuscript (copied c. 1400) preserving the text, see *Summa musice*, ed. Page, 1-2 and n. 1. For questions of authorship, see *id.*, 2-12.

<sup>3</sup> Aristotle, *Physica* 2. 94a.

semitone should have a soft sound with respect to the other notes, it is better to have it located in the midst of those than at the extremities.<sup>1</sup> [My translation.]

On the anatomic side of the parallel, the *spiritualia* nested in the rib cage were, of course, the *membra spiritualia*, that is, the heart and arterial system,<sup>2</sup> whose function was, in terms of Galenic physiology, “to disperse blood enriched with vital spirit (*spiritus vitalis*) obtained from inspired air, throughout the body.”<sup>3</sup> The brain here was seen as a soft, therefore easily damageable organ, needing special protection and care. Aristotle had averred that the brain was nested in the skull, and that further protection was offered by the two membranes enclosing it.<sup>4</sup>

Grocheo’s vision of one hundred years later was a far cry from this: in his text the material qualities of this same organ were not introduced at all. This must be so, since for Grocheo’s parallel the tangible, material aspect of the brain served no purpose: only the immaterial quality of it, its importance as a functional organ – and one of the principal ones at that – was relevant. Perseus’s and Petrus’s enumeration of soft organs was centered on describing the position of the various parts of the body chosen to participate in the *simile*. They were not concerned with inquiring into *how* and *when* or *for what purpose* these organs were generated, for their figure of speech did not rely on the dynamics of the creation of animal bodies and, by metaphoric extension, of musical compositions. They were rather interested in

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<sup>1</sup> “Sed forte queret aliquis quare semitonium sic locatur in medio sex notarum predictarum, quod nec in principio nec in fine. Ad hoc dicendum est, cum Philosopho, quod ars imitatur naturam. In naturalibus autem sic est quod membra mollia in medio sunt locata et intra reclusa, ut cerebrum in craneo, intestina et spiritualia in cratere costarum, medulla in osse, et cum semitonium mollem habeat sonum respectu aliarum notarum, in medio illarum potius quam in extremitate locatur;” ed. Page, 155.

<sup>2</sup> Siraisi, *Taddeo Alderotti*, 111.

<sup>3</sup> Siraisi, “The Music of Pulse,” 123.

<sup>4</sup> *Historia animalium* 1.16 (transl. Wentworth Thompson): “In the first place then, the brain lies in the front part of the head. And this holds alike with all animals possessed of a brain; and all blooded animals are possessed thereof, and, by the way, mollusks as well. But, taking size for size of animal, the largest brain, and the moistest, is that of man. Two membranes enclose it: the stronger one near the bone of the skull; the inner one, round the brain itself, is finer. The brain in all cases is bilateral. Behind this, right at the back, comes what is termed the 'cerebellum', differing in form from the brain as we may both feel and see.”



choosing a verbal image that would explain the structure and organization of a system, not the way the system worked.

Their semitone was the softest – thus the weakest – element among intervals, therefore it needed to secure protection. The protective couch was provided by the other intervals of the hexachord, the tones amidst which the semitone was nested just like the brain is nested and protected within the skull. Grocheo’s tenor was the principal element of the composition, therefore it needed to possess the uncontested, dynamic leadership that Galen and the Galenists believed the brain provided within the body. Similarly, and at the same level of authority, the heart and liver were used to convey the concepts of primacy, strength, and, very importantly, generating potential – all having to do with function and performance. Looking again at contemporary medicine, it is worth noting that Mondino de’ Liuzzi was highly doubtful of Aristotle’s assertion of the absolute primordially of the heart: writing on the dissection of the brain in his *Anatomia*, Mondino described this particular organ as the source of the nerves of motion and sense, and did not even mention Aristotle’s theory; furthermore, in his *Commentary* on Galen’s *Tegni*, he bluntly stated that Aristotle had been wrong on many accounts – something that had caused many errors in medicine –, and concluded that Galen was more credible than the Philosopher.<sup>1</sup>

### III. Conciliator

*Aristotle! What a thing for you to say!*  
**Galen, *De usu partium***<sup>2</sup>

Marchetto’s *Pomerium*<sup>3</sup> was written ca. 1318-19<sup>1</sup> or 1321-26<sup>2</sup> in Cesena, in the house of Raynaldus Cintiis (Rainaldo dei Cinzi), a

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<sup>1</sup> Siraisi, *Taddeo Alderotti*, 193; the following formulation by Mondino is given in *ibid.*, n. 125: “sedit quod sententia Aristotelis est causa multi erroris in medicina propter quod magis est credendum Galieno quam Aristoteli.”

<sup>2</sup> 8.3 (ed. Helmreich, 1: 451; transl. May, 2: 391).

<sup>3</sup> Marchetto da Padova, *Pomerium*, ed. Giuseppe Vecchi, *Corpus scriptorum de musica* 6 ([Rome]: American Institute of Musicology, 1961), 29-210. For an early printed edition of the tract, see Marchetus de Padua, “Pomerium,” *Scriptores ecclesiastici de musica sacra potissimum*, 3 vols., ed. Martin Gerbert (St. Blaise: Typis San-Blasianis, 1784; reprint ed., Hildesheim: Olms, 1963), 3: 121-88. Both Vecchi’s and Gerbert’s editions are found in TML (fourteenth-century link): for Vecchi’s edition, see MARPOME TEXT; for Gerbert’s edition, see MARPOM TEXT. On the structure of the treatise, see Giuseppe Vecchi, “Su la composizione

nobleman and local Mecena,<sup>3</sup> and dedicated to King Robert of Naples. Modern scholarship considers this work “the earliest major treatise dealing systematically with a mensural system which permitted a duple as well as a triple division of the breve.”<sup>4</sup> Nearly thirty years ago Giuseppe Vecchi gave an overview of the cultural milieu at Rainaldo’s refined court and itemized the cultural opportunities arising from the city’s close proximity to Bologna, its university, the houses and libraries of the Franciscans and Dominicans there, and the lively debates on suitable topics between select members of these two orders.<sup>5</sup>

In the book Marchetto included a lengthy passage elaborating, in strict scholastic fashion, on the principal or subservient function of internal organs with respect to their location on the right or left side of the body. Perhaps Nancy Siraisi was the first to bring this passage to general attention,<sup>6</sup> and to the best of my knowledge no alternative interpretation of it was proposed since. It is this passage that I will examine next, and in doing so I hope to be able to further refine Siraisi’s view. The statement was the first member of a parallel meant to clarify by analogy the meaning of concepts and practices associated with thirteenth- and fourteenth-centuries mensural music.

Thus, Marchetto said in his introductory phrase, the accepted view was that the human internal organs situated to the right are more perfect than the ones situated to the left:

But in man it is so: the right side is more perfect than the left side. For that side which contains that from which the whole body is nourished and perfected is more perfect than that side which does not

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del *Pomerium* di Marchetto da Padova e la *Brevis compilatio*,” Biblioteca di “Quadrivium.” Serie musicologica I (Bologna: [Forni?], 1957).

<sup>1</sup> Marchetto, *Lucidarium* (ed. Herlinger, 4, n. 3).

<sup>2</sup> Before Vecchi published his edition of the *Pomerium*, Nino Pirotta (“Marchettus de Padua and the Italian *ars nova*,” *Musica disciplina* 9 [1955]: 57-71, at 60-63) had proposed a date of ca. 1324-26 for the composition of this work.

<sup>3</sup> *Explicit* in Brussels, Bibliothèque Royale, MS II 4144, of the fourteenth century; Pisa, Biblioteca Universitaria, MS 606, ca. 1429; and Rome, Biblioteca Apostolica Vaticana, MS lat. 5322 of the (fifteenth?) century; and ed. Vecchi, 210: “Explicit *Pomerium artis musice mensurabilis magistri Marchetti de Padua conditum Cesene in domo Raynaldi de Cintis*.” On Raynaldus and his association with the cities of Padua and Cesena, see Marchetto, *Pomerium* (ed. Vecchi, 25-7), and Vecchi, *L’Ars musica di Marchetto*, 14-16.

<sup>4</sup> Jan Herlinger, “Marchetto da Padova,” *Grove Music Online*.

<sup>5</sup> See Vecchi, *L’Ars Musica di Marchetto*, especially 11-23.

<sup>6</sup> Siraisi, *Arts and Sciences at Padua*, 105.

contain that; yet the right side in man contains that which nourishes and perfects the whole body, viz. the blood; for the liver is containing (creating) blood, and it is placed on the right side: therefore the right side in man is more perfect than the left; this is the reason that Christ on the cross was pierced on his right side,<sup>1</sup> so that he spilled all his blood for humankind. And this we say according to physicians.<sup>2</sup> [My translation.]

We will return later to the concept of the right side's primacy. The nutritive function of the liver needs no further discussion, for with regard to this there was general agreement among anatomists and philosophers (or, rather, The Philosopher). The view of the liver as the vehicle of sanguinification (in other words, the liver was believed by some to perform a hematopoietic function), however, calls for a few comments and some amount of clarification. First of all, the idea and its phrasing come straight from Galen or works in the Galenic tradition (I have already shown Aristotle's opinion on this point). According to his

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<sup>1</sup> John 19. 34: "sed unus militum lancea latus eius aperuit, et continuo exivit sanguis et aqua." I wish to extend my thanks to Jason Schlude for helping with the identification of this quotation.

John does not mention on which side Christ was pierced after death, while still on the cross. But a long-standing tradition in medieval iconography depicted Christ before his decollation showing the spear-inflicted wound on the right side of the chest. It was this particular image that Giotto chose to illustrate in his series of frescoes on the life of Christ at the Arena Chapel in Padua – an edifice for whose inauguration Marchetto composed the motet *Ave regina celorum-Mater innocencie*. Giotto's rendition of the scene includes three angels holding receptacles in which they collect the blood of Christ as it oozes from the wound.

<sup>2</sup> Book I, Part I, Tract I, Chapter 2 (ed. Gerbert, 3: 128; ed. Vecchi, 51): "Sed in homine ita est, quod latus dextrum est perfectius quam sinistrum. Nam illud latus quod continet [in se, *add.* Vecchi] illud unde totum corpus nutritur et perficitur est perfectius quam illud latus quod hoc non continet: sed dextrum latus in homine continet illud quod totum corpus nutrit et perficit, scilicet sanguinem; nam hepar [epax, Vecchi] est continens [condiens, Vecchi] sanguinem, et est in latere dextro: ergo perfectius est latus dextrum in homine quam sinistrum: haec est ratio quare Christus in cruce voluit percuti in latere dextro, [scilicet, *add.* Vecchi] ut totum suum sanguinem funderet pro genere humano. Et hoc dicimus secundum medicos." For "liver" I prefer to use *hepar* (epar), following Gerbert, for Vecchi's *epax* (see Francisco Arnaldi, *Latinitatis italicae aevi inde ab A. CDLXXVI vsque ad A. MXXXII lexicon imperfectum*, 2 vols. [Brussels: Secrétariat Administratif de L'U. A. I., 1939; reprint, Torino: Bottega d'Erasmus, 1970], 1: 246; see also the orthography for this term employed in manuscripts transcribed or quoted by Siraisi, French, O'Boyle, and other medical historians).

own statements, Galen had championed this concept not in one, but in several works; the *De usu partium* is one of them, and in it the anatomist averred the following:

Now it would be well to take up the discussion of the liver and to remind you at the very outset of the principles that I have established in my other works ... the liver ... we suppose to be the source of the veins and the principal instrument of sanguinification.<sup>1</sup>

Having thereafter eliminated the arteries, the veins themselves, the nerves, and the external tunic surrounding the viscus from the group of organs that, hypothetically, could have generated the veins and formed the blood, he was left with one sole choice: the “flesh” itself of the liver [i. e., the material of which the liver is made, the “fabric” of it]:

There remains, then, as the principal instrument of sanguinification and source of the veins, only the so-called flesh of the liver, which is certainly the characteristic substance of the viscus. Indeed, if one observes carefully the nature of this flesh, it obviously seems very closely akin to blood; for if in imagination you dry out and thicken some blood by warming it, you will find that what you have produced is no different from the flesh of the liver ... The flesh of the liver, then, which is its characteristic substance, is the main instrument of sanguinification. I say “main” because the veins leading to the stomach and to all the intestines also have a certain haematopoietic faculty which naturally inclines them to turn the juice derived from the food into blood even before it reaches the liver.<sup>2</sup>

Margaret May’s commentary on this passage encapsulates to perfection the very essence of Galen’s statement: “In other words, the substance of the liver was supposed to be blood effused from the veins and congealed.”<sup>3</sup>

Marchetto having touched, as seen, upon the higher potential and virtues of organs belonging to right side of the body and having emphatically included the liver among them, went on to explicate the philosophical view on the same issue; this view, as it turns out, ran quite contrary to the medical one:

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<sup>1</sup> 4. 12 (ed. Helmreich, 1: 217; transl. May, 1: 220-21).

<sup>2</sup> Ibid. (ed. Helmreich, 1: 219; transl. May, 1: 222-3).

<sup>3</sup> Ibid. (ed. Helmreich, 1: 219; transl. May, 1: 222, n. 46).

According to philosophers, however, we say that the heart is the beginning of the generation of blood; the beginning of all motion is in the left side as well.<sup>1</sup> [My translation.]

In other words, the heart is the prime motor for the creation and circulation of blood, and thus an organ of crucial importance – which, however (and quite unfortunately for Marchetto’s argument), is situated to the left of the body (a position that would make it less than perfect).<sup>2</sup> The statement on the heart as the source of blood is of Aristotelian descent, for the Philosopher had this to say on the matter: “Of the other internal organs the heart alone contains blood. And the lung has blood not in itself but in its veins, but the heart has blood in itself; for in each of its three cavities it has blood, but the thinnest blood is what it has in its central cavity.”<sup>3</sup>

From all this it would be reasonable to conclude that the left side, nesting the heart, is of utmost importance in the functioning of the body – and this, to a larger extent than Marchetto was willing to admit. Admitting it, however, would not have served his point, for in the ensuing discussion of note values (which was to be the second member of his parallel) he was bent on proving that “making a note more perfect” (that is, lengthening its value) meant adding something to an existing note-head *on the right side of it* – the side from which Aristotle had shown perfection to come, or in which he wanted perfection to reside. It was essential for Marchetto to show that the left side was less perfect than the right one in both music and the human body, and this required further elaboration on the anatomical side of the *simile*.

The argument that enabled him to do so was the positioning of some of the constituent parts of the heart within the organ itself:

Nevertheless the left side is more imperfect and less potent than the right; the reason is that the *cusps* of the heart is leaning to the left, the

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<sup>1</sup> “Secundum autem philosophos dicimus, quod cor est principium generationis sanguinis, principiumque omnis motus est in latere sinistro;” ed. Gerbert, 3: 128; ed. Vecchi, 52.

<sup>2</sup> For the position of the heart, see Aristotle, *De partibus animalium* 3.4. 665 b (transl. Peck, 235): heart in a central position, in the upper and frontal part of the body – a place “of primacy and governance;” and Galen, *De anatomicis administrationibus* 7. 7 (quoted in Galen, *De usu partium*, transl. May, 1: 281, n. 9): heart leaning to the left.

<sup>3</sup> *Historia animalium* 1. 17 (transl. Wentworth Thompson, ).

*os cordis*, however, is leaning to the right, in this same originally emitting heat and nourishment.<sup>1</sup> [My translation.]

But what is the *os cordis* and why was its position so important for the strengthening of Marchetto's argument? This point, however minute, is not without significance in the present context; yet it has been overlooked in both musicological and medical literature – understandably so, as will be shown below:

First, some amount of confusion might arise from the dual meaning of *os*: as *os*, *oris* the term means “mouth,” hence the translation “mouth of the heart” for *os cordis* by those who have previously interpreted this passage;<sup>2</sup> as *os*, *ossis*, however, the term means “a bone.” The latter translation would mean that Marchetto, and before him certain physicians and philosophers, new about and possibly saw or at least believed in the existence of a bone in the heart – something that would seem quite implausible. Yet I will show that this was, indeed, the case.

Second, we have the testimony of Aristotle and Galen, both of whom had averred the presence of a bony structure of rather large dimensions in the heart of elephants (one of which Galen had dissected) and other big animals, and of a cartilage in the heart of smaller ones; this was called the *os cordis* – the “heart bone,” an ossicle also mentioned by ancient naturalists such as Pliny the Elder.<sup>3</sup> Aristotle's description ran as follows: “In all cases that we have examined the heart is boneless, except in horses and a certain kind of ox. In these, owing to its great size, the heart has a bone for a support, just as the whole body is supported by bones.”<sup>4</sup> Galen reprised Aristotle's statement and expanded on it, thus:

Since in large animals a bone is found at the head [base] of the heart, it would not be proper to omit mention of its usefulness. That [usefulness] told by Aristotle is perhaps reasonable. He says that the bone is a support and foundation, so to speak, for the heart and hence is found in large animals ... Nature everywhere fastens the ends of ligaments to

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<sup>1</sup> “... et tamen latus sinistrum est imperfectius et impotentius dextro; cuius ratio est quia cuspis cordis versus sinistrum tendit, os autem ipsius cordis versus dextrum tendit, in ipsum primitus emittens calorem et nutrimentum,” ed Gerbert, 3: 128; ed. Vecchi, 52.

<sup>2</sup> I, too, have initially translated *os* as “mouth,” and based on this reading went in search of texts on the anatomy of the heart; this search having proved fruitless, I proceeded to use the alternative translation – which, in turn, has led to the information presented here. For the “mouth of the heart,” see Siraisi, *Arts and Sciences at Padua*, 105.

<sup>3</sup> *Historia naturalis* 8. 38.

<sup>4</sup> *De partibus animalium* 3. 4. 666b (transl. Peck, 241).

cartilage or to cartilaginous bone ... Hence in large animals there is a cartilaginous bone and in very small ones a neuro-cartilaginous body. Every heart has at the same location some hard substance, formed for the sake of the same usefulness in all animals.<sup>1</sup>

Lastly, Albertus Magnus, while enumerating elephants, stags, and wild oxen on his list (probably collating Aristotle's and Galen's lists) added that *os cordis* might even exist in humans: "Sometimes a large bone is found in the heart of large animals, and perhaps it is found in some men."<sup>2</sup>

As for the position of this ossicle or cartilaginous formation, the "head" or "base" in this context means the upper part of the heart: to take but the example of Galen's description of it, the heart begins "at the broad, circular base above, which is called the head; it gradually decreases in size, very like a cone, and becomes narrow and slender at its lower end."<sup>3</sup> And further about the relative strength and importance of the two "ends" of the heart:

... [The parts] at the base are devoted to the production of vessels ... [the lower end, i. e., the *cuspis* in Marchetto, in fact the *apex*] is the least important; that which is to give rise to the vessels is the most important of all ... Hence it is not at all surprising that the heart should be

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<sup>1</sup> *De usu partium* 6. 19 (ed. Helmreich, 1: 365-6; transl. May, 1: 326-7). Aristotle averred this in both his *De partibus animalium* (3. 4. 666b 17-21) and *Historia animalium* (2. 15. 506a 8-10) – see May, *ibid.* 327, n. 94, who also notes (*ibid.*, 327, n. 97) that, according to Ellenberg and Baum (*Handbuch der vergleichenden Anatomie der Haustiere* [Berlin, 1926]), the horse, pig, and dog have a heart-cartilage, while the oxen has two "heart bones;" furthermore, in old horses and pigs this cartilage has ossified, therefore fully justifying the use of the term "heart bone."

<sup>2</sup> *De animalibus* 1. 3. 4 (ed. Stadler, 1:208): "Aliquando etiam invenitur in cordibus magnorum animalium os magnum, et forte invenitur in quibusdam hominibus, et hoc os est declinans ad naturam cartillaginis et induratur, sicut superius diximus, et durius quod invenitur, est in corde elephantis; et eorum quae apud nos inveniuntur, durius est in corde cervi et bubalorum generibus (Sometimes a large bone is found in the heart of large animals, and perhaps it is found in some men, and this bone departs from the nature of a cartilage and becomes hard, as we have said above, and the hardest bone is found in the heart of the elephant; and among the animals that are found among us, the hardest bone is in the heart of the stag and wild oxen)." [My translation.] *Bubalus* (βουβαλος) means both "an antelope" and "a wild ox (buffalo)," but Albertus clearly speaks about animals that are found *apud nos* [in our parts, among us], therefore one should rule in favor of the ox.

<sup>3</sup> *De usu partium* 6. 7 (ed. Helmreich, 1: 317; transl. May, 1: 291).

cone-shaped, or that its head, being most important, should occupy the safest position, whereas its bottom, being least important, is most exposed to injury.<sup>1</sup>

Furthermore, a long-standing tradition still alive and rather widespread in Marchetto's time assigned special curative virtues to the "heart bone" extracted from the heart of a stag. References to the therapeutic effects of a powder obtained from grinding this cartilage were included in medieval hunting treatises such as the thirteenth-century *La chace dou cerf* [*The Hunting of the Stag*] or the late-fourteenth-century *Les Livres du roy Modus et de la royne Ratio* [*The Books of King Modus and Queen Ratio*]<sup>2</sup> – the source for Gaston Phoebus's *Livre de chace*.<sup>3</sup> The concoction, whose medicinal uses were also noted by Albertus Magnus in Book XXII of his *De animalibus*,<sup>4</sup> was believed to be especially helpful in cleaning the blood and curing all sorts of cardiac and circulatory ailments; it was also administered to pregnant women, probably as a strong tonic. In addition, folks believed that the stag's "heart bone" took the shape of a cross (called a *croix de cerf* in such instances) on Holy Rood Day (the Exaltation of the Cross),<sup>5</sup> and the author of *The Books of King Modus* created a parallel between the "heart bone" and God conforming "to the nature of a man when he entered the womb of the Virgin."<sup>6</sup>

Obviously these bits of legend and literature, added to the prestigious status already granted to the *cervus* through reinterpretation

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<sup>1</sup> Ibid.

<sup>2</sup> See Marcelle Thiébaux, "The Mediaeval Chase," *Speculum* 42 (1967): 260-74, at 273-4.

<sup>3</sup> Anne Rooney, *Hunting in Middle English Literature* (N.p. : The Boydell Press, 1993), 8; Debra Hassig, *Medieval Bestiaries: Text, Image, Ideology* (Cambridge: Cambridge University Press, 1995), 50.

<sup>4</sup> 2. 1 (in Hassig, *Medieval Bestiaries*, 214. n. 62, quoting Stadler's edition of 1920 [2:1373] and Scanlan's translation of 1987 [96]). The text is as follows: "Os autem cordis eius exsiccatum et pulverizatum contra cardiacam dicit valere Plathearius" (ed. Stadler, 2: 1373). Mattheus Platearius (d. 1161) mentioned here was the author of the *De simplicibus medicina*, a book on *materia medica*. A powder obtained from toasting the stag horn was prescribed as an antidote for viper's bites, and it was widely believed by medieval medical men that a cord made of stag hide should be used to tie the wound caused by snake bites (see Pietro d'Abano, *Il trattato De venenis*, ed. with commentary by Alberico Benedicenti ([Florence: Olschki, 1949], 69 and 84-5, respectively).

<sup>5</sup> Thiébaux, "The Mediaeval Chase," 274.

<sup>6</sup> Hassig, *Medieval Bestiaries*, 50.



and adaptation of Classical motifs in medieval Christian writings (both *patristica* and *spiritualia*),<sup>1</sup> in bestiaries,<sup>2</sup> and in learned poetry such as Boccaccio's sylvan allegory *Caccia di Diana*<sup>3</sup> lent even more appeal to an organ already endowed by popular imagination with superior healing power: it placed the *os cordis* in the class of things surrounded by an aura of miracle and mysticism, much like the tiny cross said to have been extracted from the heart of sister Chiara de Montefalco in 1308.

Clearly medical and pharmaceutical lore, learned and practical medieval discourse on hunting, and popular superstition assigned special nourishing, protective, and curative virtues to this elusive anatomic

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<sup>1</sup> Rooney, *Hunting*, 46; Marcelle Thiébaux, *The Stag of Love* (Ithaca, NY: Cornell University Press, 1974), 144. The stag and the hart were considered the noblest and worthiest among the "beasts of chase" and thus described not only in hunting treatises, but also in tracts of English forest law: see, for instance, John Manwood, *A Treatise and Discovrse of the Lawes of the Forrest* (London: Printed by Thomas Wight and Bonham Norton, 1598), 24: "And because of all other beastes of venery, the Hart is the most noblest, and the most worthiest beast, and taketh the first place, I will first begin and speake of the termes belonging to him."

<sup>2</sup> Where the stag or hart is depicted killing snakes – symbols of vices and of the Devil himself – by trampling them under foot and sucking them up through his nostrils. After ingesting the poisonous creatures, the stag will always find a body of water (a fountain, pond, lake, or river) from which he will drink amply to quench his thirst and cleanse himself of the venomous substance he had ingested; see Hassig, *Medieval Bestiaries*, 40-51 and *ibid.*, figures 32-45. See also Isidore, *Etymologiae* 12.18: "Hi serpentium inimici, cum se gravatos in infirmitate persenserint, spiritu narium eos extrahunt de cavernis, et, superacta pernicie veneni, eorum pabulo reparantur." For a different interpretation involving ingested toads and snakes as agents of purgation and regeneration of the ailing stag, see Hildegard of Bingen, *Physica* 7.10: "... et deinde querit locum, ubi *unck* inveniat ... Sed cervus magis ac magis vocem suam exaltat, *luet* et ore *hyat*; at tandem *unck* ille quasi prae ira in fatigatione se in os illius torquet, et ventrem ejus intrat ..." (in *Patrologiae cursus completus. Series latina*, ed. J.-P. Migne [Paris: apud Garnier fratres, 1878-90], 197: col. 1321).

<sup>3</sup> Boccaccio's poem is datable to 1333-4, thus coinciding with the poet's first years as a student of canon law at Naples; modern scholarship views the poem as closely associated with the cultural milieu at the court of King Robert, the dedicatee of Marchetto's *Pomerium*. See *Diana's Hunt/Caccia di Diana: Boccaccio's First Fiction*, ed. and transl. Anthony K. Cassell and Victoria Kirkham, University of Pennsylvania Middle Ages Series (Philadelphia: University of Pennsylvania Press, 1991), 3. On the symbolism of the stag in medieval literature, see the excellent discussion in Chapter 3 (*ibid.*, 39-68). This chapter also includes a good selection of stag illustrations from medieval manuscripts.

formation; and clearly Marchetto followed the knowledge and fashion of the day. What is more, he also believed what some of his own contemporaries – including Albertus Magnus – believed, namely that the human heart itself included a “heart bone,” that this “heart bone” was the very source of heat and nourishment for the heart, and that it was placed somewhat to the right with respect to the *axis* of the organ.<sup>1</sup> All these

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<sup>1</sup> Late-fifteenth-century anatomists dismissed this belief – some in more drastic terms than others. Thus Alessandro Benedetti in chapter 10 of his *Historia corporis humani* of 1497 wrote: “The heart itself is fleshy and ... without bone, although that is found in some animals such as in the hearts of deer.” Chapter 28 in the *Liber introductorius* of Niccolò Massa took up the subject in the following terms: “In large animals such as oxen and old stags there is found in the upper region of the heart a certain large cartilaginous part, a substance I have not found in men.” And Vesalius devoted Chapter 20 (“On the Cartilaginous Substance which is Ascribed to the Base of the Heart, or the Bone of the Heart”) in Book I of his *De humani corporis fabrica* to the dispelling of the myth of the heart bone, of which he had found no trace when performing his dissections; rather, he said, the formation known under that name was a cartilaginous structure ascribed to the base of the heart: “Galen stated that a bone of unusual size had been cut from the heart of an elephant by one of his friends, and he says that there is a bone in the hearts of great animals and a cartilage in the hearts of the lesser ones. But so far I have found a true bone in no heart, human or otherwise, and in that place where Galen located that bone of the heart I observe a cartilaginous substance which in my view, at least, is nothing but the roots of the great artery and the arterial vein taking their origin from the heart.” To this, he added: “Those who attempted to write about the human body after Galen consider a certain structure in the base of the heart to be a bone [*os cordis*] ... Nor did it suffice those people so to invent a bone in the base of the heart: worse, yet, they added that the base of the heart, and therefore even the entire heart, is braced by it no differently than the base of the tongue is braced by that bone [*os hyoideum*] which is placed before the larynx. For they believe that the heart is braced and moved by such a bone, without even considering whether a heart possessed of such a bone could be propped up by it just as an iron rod would support a bed in the air ... At the same time, we cannot deny that the connection of the four vessels of the heart to their adjacent surfaces does somewhat support the heart.” [Transl. Garrison and Hast, see n. 3 above].

Modern anatomists, including Henry Gray, however, have observed and described a bony formation at the base of the heart of larger animals: “The fibrous rings surround the auriculo-ventricular and arterial orifices: they are stronger upon the left than on the right side of the heart. The auriculo-ventricular rings serve for the attachment of the muscular fibers of the auricles and ventricles, and also for the mitral and tricuspid valves; the ring on the left side is closely connected by its right margin, with the aortic arterial ring. Between these and the right auriculo-ventricular ring is a mass of fibrous tissue; and in some of the

associations, then, caused the right side of the heart to be nobler, stronger, more powerful, more useful, more efficient – thus more perfect – than the left, and that is exactly what needed to be demonstrated. The heart was placed somewhat to the left in the scheme of the whole body, but within its own microcosm the most vital portion of it was leaning to the right.

Marchetto's goal was obviously not that of addressing – much less solving – the contradictions arising from divergent takes on animal or human anatomy and physiology. On the contrary, just like his contemporaries Torrigiano (in his commentary on Galen's *Tegni*) and Pietro d'Abano (in his *Conciliator*), Marchetto was rather making an attempt to bring these views together.<sup>1</sup> In doing so, he was only one in a long series of authors – theologians and others – whose philosophy of writing and manner of approach were representative of a whole era: following in the footsteps of Petrus Lombardus, they “merely juxtaposed the texts, or tried to reconcile dissonant assertions.”<sup>2</sup>

At this point Marchetto believed he had done enough to establish the anatomo-physiological framework for his *simile*: from the perspective of formal logic he had, indeed, done so. His demonstration had been sufficiently elaborate to offer the satisfaction of the thing cleverly conceived and well executed. His conclusion stipulated in proper scholastic manner and elegant terminology that the right side of the body took precedence over the left side of it:

And this is apparent from the location of the members placed on the right side, which are more potent and more workable than the ones placed on the left side on account of being the parts that move; the left-side ones are less potent on account of being the parts that are moved. [My translation.]<sup>3</sup>

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larger animals, as the ox and elephant, a nodule of bone, the *os cordis*,” see Henry Gray, *Gray's Anatomy*, 16<sup>th</sup> ed., eds. T. Pickering Pick and Robert Howden (London: Longmans, Green & Co., 1905; reprint ed., East Molesey, England: Merchant Book, 2003), 591.

<sup>1</sup> Siraisi expressed the same opinion in *The Arts and Sciences at Padua*, 105.

<sup>2</sup> Jaques-Guy Bougerol, “The Church Fathers and *auctoritates* in Scholastic Theology to Bonaventure,” in *The Reception of the Church Fathers in the West, from the Carolingians to the Maurists*, 2 vols., ed. Irena Backus (Leiden: Brill, 1997), 1: 289-335, at 290.

<sup>3</sup> Ed. Gerbert, 3: 129; ed. Vecchi, 52: “Et hoc apparet ex dispositione membrorum dextrorum, quae quidem sunt potentiora et magis operabilia sinistris, tamquam pars movens; sinistra vero impotentiora et minus operabilia, tamquam pars mota.” See Aristotle, *De incessu animalium* 705b-706a (transl. E. S. Forster, 493-4): “For the part of the body where the origin of change from place to place naturally

Formally, the demonstration had been successful, for it had all the prescribed ingredients. Further discussion of the matter would be superfluous; Marchetto therefore went on to talk about the other member of his parallel: note values. Anatomic organs, as well as their properties and functions were transferred to music theory to explain the perfection and imperfection of notes:

The right side is more perfect than the left, as it was proven; but [when] property is added to a note, it is added to it on both the right and the left side, as shown to the sense: therefore when property is added to the note from the right side it perfects the note, whereas when added from the left side, it imperfects the note. To perfect a note is to lengthen it, to imperfect it is to shorten the same note. Rightly did therefore the aforesaid doctors say that property added to the note on the lower right side imperfects the note (on the upper right side – as discussed); on the left side, however, if added to the lower part it imperfects the note, making it a brevis; if added to the upper part, it makes the notes a semibrevis. [My translation]<sup>1</sup>

By now the concept of the precedence of the right side over the left should be understood and its origin and channels of transmission elucidated. As for *proprietas* (property), Marchetto had already explained in the immediately preceding section that this was a variant of the *cauda* or tail (stem) drawn downwards and to the right or the left of the note-head, and having its point of origin in this same note-head.<sup>2</sup> He took great

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arises is the right in each kind of animal, while the part which is opposed to this and naturally follows its lead is the left.”

<sup>1</sup> “Latus dextrum est perfectius quam sinistrum, ut probatum est; sed proprietas addita notae additur sibi per dextrum et sinistrum, ut patet ad sensum: ergo proprietas addita notae ex parte dextra perficit ipsam, ex parte vero sinistra imperfectit ipsam. Perficere autem notam est ipsam prolongare, imperfecticere vero est ipsam abbreviare. Bene ergo dixerunt praedicti doctores, quod proprietas addita notae ex latere dextro inferius ipsam perficit, superius vero a latere dextro in modo proferendi, a parte vero sinistra inferius imperfectit ipsam, faciendo eam brevem, in superius vero semibreve,” ed. Gerbert, 3: 128; ed. Vecchi, 52.

<sup>2</sup> “... ideo merito tales lineae sic protractae inferius, caudae debent suis propriis nominibus nominari ... Distinguuntur similiter ipsae caudae a proprietatibus, quia licet ipsae sint etiam proprietates, sicut et lineae adiunctae notis et protractae superius, tamen in hoc differunt, quia oportet quod caudae sint lineae protractae inferius, infra scilicet ipsas notas ... (therefore rightly such lines, drawn downwards, must be called tails by their proper names ... Similarly, these same tails are different from properties, because granted that they are properties just like the lines adjoined to the note and drawn upwards, they differ in this, that the

pains to make it clear that, as one of the *accidentia* that facilitates full knowledge of the essence of things,<sup>1</sup> neither tail nor property changed the substance of the note: rather, each was a sign that should be taken to signify or elucidate the essence of this note. In other words, wherever property in the form of a tail was drawn, it would not add or subtract from whatever duration previously contained in the note-head. The tail was a graphic sign, a property used to signify or display, for the benefit of human sight and taken together with the note-head, some existing, real substance – therefore an entirely measurable value composed of both head and tail; the magnitude of this value, in turn, would depend on the position and direction of the tail.<sup>2</sup>

We now need to once again resort to Aristotle’s classification of parts to fully grasp the philosophical foundation of the relative value of the upper and lower parts in the animal body: according to the Stagirite, “that which is better and more honourable tends to be above rather than below, in front rather than at the back, and on the right side rather than on the left.”<sup>3</sup> Clearly an upper position is better than a lower one, in man even more so than in any other animal, for man is superior to all others and possesses in a higher degree all that is possessed by the others. Likewise, in the realm of musical rhythm, drawing a tail to the lower side of the note will lessen the value or duration of the compound tail-note head, for even adding something becomes a minimizing operation when performed on a less important side or in (from) a less important direction on the note’s body.

All these references would have been fully understood and appreciated by Marchetto’s university-educated contemporaries, or by those who had acquired their degrees at one of the *studia generalia*

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tails are lines drawn downwards, that is, below these same notes).” [My translation.] See ed. Gerbert, 3: 124; ed. Vecchi, 41-2.

<sup>1</sup> “Quoniam, dicente Philosopho in proemio de Anima, accidentia multum conferunt ad cognoscendum quod quid est, id est, per cognitionem accidentium devenimus in cognitionem essentiae rei (Since, like the Philosopher says in the Preface to *De anima*, accidents contribute much in the process of getting to know that what is [*quid*], that is, we gain a knowledge of the essence of the thing through the knowledge of accidents).” [My translation.]. See ed. Gerbert, 3: 123-4; ed. Vecchi, 39.

<sup>2</sup> “Sed tunc possent dicere: Quomodo ergo cauda addita notae facit ipsam longam? Dicimus quod non mutat substantiam notae, sed solum est quaedam proprietas innuens ipsius notae, quae etiam cauda dicitur propter rationem superius demonstratam.” See ed. Gerbert, 3: 127; ed. Vecchi, 46-7.

<sup>3</sup> *De partibus animalium* 665a (transl. Peck, 233).

within the Franciscan or Dominican orders. First and foremost, the audience would have lent an attentive ear to Marchetto's numerous inclusions of Biblical *loci*. In fact, the music theorist, himself a former *cantor* at the Paduan cathedral and composer of the sacred motet *Ave regina celorum-Mater innocencie* (a piece connected with the inauguration in 1305 of the Cappella degli Scrovegni [the Arena Chapel])<sup>1</sup>, duly acknowledged the help he had sought – and received – in the writing of his *Pomerium* from a man of religion, the Dominican Syphans of Ferrara who had also aided in the writing of the *Lucidarium*.<sup>2</sup> That friar Syphans had helped with the musical part of the book may or may not have been the case – for, unlike the *Lucidarium*, the *Pomerium* is an exposition on mensural music and its intricacies; but that he had helped with biblical references must be taken for granted.

Next come the Aristotelian quotations; with regard to these one is inclined to believe that friar Syphans not only “suggested” the scholastic form and organization of the tract, as proposed by Vecchi,<sup>3</sup> but perhaps also sifted through and no doubt approved of Marchetto's references to the Philosopher's *Physica* and his books on animals (*Historia animalium*, *De partibus animalium*, and *De generatione animalium*). This must have been so, for after an initial ban on the study of liberal arts, philosophy, medicine, and civil law in the Dominican Constitutions,<sup>4</sup> and long before either Syphans or Marchetto would have reached the peak of their maturity (and, in the latter's case, creativity) – or, perhaps, even be born, the year 1240 marked a dramatic reversal of circumstances, culminating in 1259 in the enacting of a code of studies that made natural philosophy (specifically the works cited above) part of

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<sup>1</sup> Vecchi, “*L' Ars musica di Marchetto*,” 12; the motet is edited in *ibid.*, 52-9. See also Galliano Ciliberti, “Produzione, consumo e diffusione della musica in Italia nel tardo medioevo,” *Studia Musicologica Academiae Scientiarum Hungaricae* 32 (1990): 23-39, at 33; and Anne Walters Robertson's analysis of the motet in “Remembering the Annunciation in Medieval Polyphony,” *Speculum* 70 (1995): 275-304, at 297-303, and the bibliography there cited.

<sup>2</sup> “... adiuuante me religioso viro fratre Siphante de Ferrara ordinis fratrum Predicatorum ...,” ed. Gerbert, 3: 187; ed. Vecchi, 209.

<sup>3</sup> Vecchi, *L'ars Musica di Marchetto*, 21.

<sup>4</sup> For this, as for all matters relating to the history of Dominican learning mentioned in this paper, see William A. Hinnebusch, O.P., *The History of the Dominican Order: Intellectual and Cultural Life to 1500*, 2 vols. (New York: Alba House, 1973); for this specific reference, see *ibid.*, 2: 24-5.

the *curriculum* in the Order's *studia generalia*.<sup>1</sup> Whether friar Syphans had studied all of these or some of them as a Dominican or prior to entering the order, we do not know, for we know nothing further about or of him, except that he had either been a native of Ferrara or became an adopted Ferrarese by living in that city for a long time.<sup>2</sup> Whatever the case, we can safely assume that in aiding Marchetto he was not on unfamiliar territory in more than one discipline that was not theology or philosophy – including music and music theory.

The availability within the order of most of these works is beyond doubt: for instance, the earliest surviving inventory of books in the *studium* of the Dominican house at Padua, compiled in 1390 and listing 238 volumes residing in the library at the time, is representative for the type (if not size) of collection that would be assembled in a Dominican library in the fourteenth century.<sup>3</sup> Among dozens of volumes

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<sup>1</sup> Hinnebusch (*History of the Dominican Order*, 2: 23-8) shows that even when the ban was in effect, some of the friars were able to study the prohibited disciplines by virtue of dispensations granted by the Chapter General, and that these dispensations soon became the rule. The new, post-1259 *curriculum* called for the study of grammar (Priscian, Donatus's *Barbarismus*, and Gilbert de la Porée's *De sex principiis*); old logic (Porphyry's *Isagoge*, Aristotle's *Categorie* and *De interpretatione*, and Boethius's *Divisiones* and *Topica*); new logic (Aristotle's *Topica*, *De sophisticis elenchis*, and the *Analytica priora* and *Analytica posteriora*) – all of which formed the torso of the *curriculum* in rational philosophy (or the arts); then came natural philosophy with physics and physiology (in addition to Aristotle's works on animals, the following were studied: *De anima*, *De generatione*, *De sensu et sensibilibus*, *De somno et vigilia*, *De plantis*, *De memoria et reminiscentia*, *De juventute et senectute*); astronomy (Aristotle's *De celo* and *Meteorologica*); and metaphysics (Aristotle's *Metaphysica*; Pseudo-Aristotle's *De causis*).

<sup>2</sup> In the eighteenth century the writer Girolamo Baruffaldi (*Supplementum et animadversiones ad Ferrariensis gymnasii historiam per Ferrantem Borsetum conscriptam* [Bononiae: Martelli, 1740-41], 478 and 487, respectively) stated that at the time no records had been discovered that would shed light on the names of the doctors of theology associated with the *gymnasium* at Ferrara prior to 1460 and of the graduates in law prior to 1480: "Album doctorum ferrariensis collegii theologorum Ab anno 1460 circa usque ad 1579, aliorum enim, ante annum 1460 memoria non extat;" and "Album laureatorum in Almo Collegio Juris Utriusque Doctorum Ferrarie, ab anno 1480 circiter, usque ad hodiernam diem, & prout jacent in Statuto MS. dicti Collegii: Aliorum vero, ab Universitatis erectione usque ad annum 1480, memoria non extat."

<sup>3</sup> See Luciano Gargan, *Lo studio teologico e la biblioteca dei domenicani a Padova nel Tre e Quattrocento* (Padova: Antenore, 1971), 192-228. Gargan

of Biblical commentaries; manuals and *summe* of pastoral theology; collections of *sermones*, homilies, and *exempla* for preaching (all similar to holdings at other libraries of the Order in Italy and elsewhere)<sup>1</sup> the inventory lists two volumes containing Aristotle's books of natural philosophy,<sup>2</sup> one volume comprising the *Tabula super Yconomiam, Capitula primi Phisicorum, Liber Ethicorum, De animalibus*,<sup>3</sup> and one unidentified *Liber de medicina*.<sup>4</sup> Although the original library building was destroyed in the fire of 1352, presumably together with all or most of the books residing there, a new library was quickly built<sup>5</sup> and it must be assumed that efforts were made to first replace those volumes that had perished, and that the late fourteenth-century holdings listed in this document were meant to mirror (and, possibly, expand) the holdings from the beginning of the century.

At Bologna the situation was similar, and not surprisingly, for some amount of consistency throughout the order in terms of core library holdings is to be expected. In addition to volumes brought by the masters and students from the Bolognese *studium* who joined the order from 1219 on, there were donations by popes (for instance, Honorius III gave his own *Sermones de tempore et de sanctis* around 1220) and bequests by local citizens of both books and sums of money earmarked for the purchase of books. Just like its Paduan counterpart, the Dominican library at Bologna was endowed throughout the thirteenth and fourteenth centuries with bibles, missals, antiphoners, works by the fathers and doctors of the Church (St. Augustine, Gregory the Great, St. Bernard, Jacob de Varagine); in addition, secular works such as Seneca's *De*

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(*ibid.*, 184 and n. 2), however, cautions that this particular library was rather ill-equipped – certainly so in the fifteenth century – when compared to those of other Italian *studia* belonging to the order, or even to the library of the Franciscan *studium* in the city of Padua (whose holdings during the same period had been discussed by K. W. Humphreys, *The Library of the Franciscans of the Convent of St. Anthony, Padua at the Beginning of the Fifteenth Century* [Amsterdam: Erasmus Booksellers, 1966]).

<sup>1</sup> Gargan, *Lo studio*, 186.

<sup>2</sup> *Ibid.*, 202.

<sup>3</sup> *Ibid.*, 209.

<sup>4</sup> *Ibid.*, 202. In addition to these, works of St. Augustine, St. Thomas Aquinas, Petrus Lombardus, Petrus Comestor, Nicholaus de Lyra, Raymundus de Penaforte, Monaldus, Guilelmus Peyraut, Guilelmus Durandus, Bartholomeus Brixiensis, the *Digestum vetus*, the *Decretales*, Pseudo-Aristotle's *Secreta secretorum* were also listed.

<sup>5</sup> *Ibid.*, 175.



*remediis fortuitorum* and Boethius's *De consolatione philosophie* were also present in the library as part of the donation of twenty five books made in 1312 by fra Agostino Orsi. By 1381 (the date of the oldest preserved inventory) the library was the best in the city, and was well endowed with volumes of dogma, philosophy, patristic and exegetical literature, law, moral theology and homilectics, hagiography, science, music, and so on.<sup>1</sup>

Finally, we come to the inclusion of anatomical terms: these, too, had ample reasons to reside in Marchetto's text. Just like Grocheo, Marchetto may have read pertinent passages in contemporary or freshly translated anatomy and zoology books, or might have attended lectures on pertinent doctrines. His adviser Syphans may have done so as well, and for more than one reason: after all, he was a Dominican and Albertus Magnus, the author of the twenty-six books on animals with chapters devoted in full to analyses of the anatomical doctrines of both Aristotle and Galen, had been a Dominican, too – one of the most celebrated within and without the Order, and traditionally believed to have occupied in 1228 the chair of theology at the Dominican *studium* in Padua.<sup>2</sup> Furthermore, Nancy Siraisi rightly hypothesized that Marchetto was familiar with Abano's *Conciliator* or his *Expositio Problematum Aristotelis*; and that the friar from Ferrara might well have studied medicine himself, probably in Padua.<sup>3</sup>

Certainly more than cosmetic, Marchetto's and Syphans's choice of anatomical *similes* – possibly even the decision to include them at all – was “coherent and deliberate” (to use David Quint's appropriately coined expression<sup>4</sup>). The very thought of tracing parallels between the internal workings of a musical composition and the internal workings of the human body was fully congruent within the intellectual space in which Marchetto was thinking and writing, a space that must have reflected the general cultural and specific medical climates at the universities of Padua, Bologna, and Ferrara during the first decade of the fourteenth century. With regard to the latter point, both F. Alberto Gallo

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<sup>1</sup> See Alfonso d'Amato, *I Domenicani e l'Università di Bologna* (Bologna: Edizioni Studio Domenicano, 1988), 271-7.

<sup>2</sup> Gargan, *Lo studio*, 9, citing information from the *Catalogus eorum qui in Patavino coenobio S. Augustini ordinis praedicatorum in primaria theologiae cathedra docuerunt*, compiled by Domenico Maria Federici.

<sup>3</sup> Siraisi, *Arts and Sciences at Padua*, 104-5.

<sup>4</sup> “Fear of Falling: Icarus, Phaethon, and Lucretius in *Paradise Lost*,” *Renaissance Quarterly* 57 (2004): 847-79, at 847.

and Giuseppe Vecchi have long ago proposed that Marchetto's sojourn in Padua, documented from the earlier part of 1305 through the summer of 1307, was contemporaneous with the most productive years of Pietro d'Abano as a *magister* at the Paduan University.<sup>1</sup> Of course Marchetto did not have to be physically present in the city in order to gain some awareness of Pietro's ideas, for the first version of the latter's *Conciliator* had already been finished by 1303, probably in Paris, and was circulating in manuscript copies. Additionally, Pietro, like any other medieval or present-day master, disseminated his teachings both through the written and the spoken word, both directly and through students and followers. Having said that, the presence of Marchetto in Padua when Pietro arrived there is a matter of near certainty: recent research has shown that the noted physician was most probably in the city by 1304 and remained there to teach, after the death of Mondino, for the last years of his life.<sup>2</sup>

Berkeley and London, June-November 2004

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<sup>1</sup> Vecchi, *L'Ars musica di Marchetto*, 13.

<sup>2</sup> For chronology and bibliography, see Federici Vescovini, *Il Lucidator*, 22-3 and 26-7.