# Il Fasciculo di Medicina of 1493: Medical Culture through the Eyes of the Artist

**Salvatore DiMaio, M.D.**

Department of Neurosurgery,
Montreal Neurological Institute and Hospital,
McGill University,
Montreal, Quebec, Canada

**Federico Discepola, M.D.**

Department of Neurosurgery,
Montreal Neurological Institute and Hospital,
McGill University,
Montreal, Quebec, Canada

**Rolando F. Del Maestro, M.D., Ph.D.**

Brain Tumor Research Center,
Department of Neurosurgery,
Montreal Neurological Institute and Hospital,
McGill University,
Montreal, Quebec, Canada

**Reprint requests:**
Rolando F. Del Maestro, M.D., Ph.D.,
Director,
Brain Tumor Research Center,
Montreal Neurological Institute and Hospital,
3801 University Street, BT210,
Montreal, Quebec, H3A 2B4
Canada.
Email: rolando.delmaestro@mcgill.ca

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THE *FASCICULUS MEDICINA*, printed in 1491, is considered the first illustrated medical book. The Latin essays and illustrations in this volume provide insight into the medical knowledge of Western Europe and, in the Italian edition published in 1493, glimpses into the medical culture of the late 15th century. We outline the scientific and social environments into which the *Fasciculus Medicinae* of 1491 was introduced and the transition that occurred with the publication of the 1493 Italian edition. The artist of the 1493 *Fasciculo* witnessed a paradigm shift occurring. In four woodcuts, the artist captured four themes: the relevance of knowledge-based medicine, the emergence of laboratory medicine, the Hippocratic lessons of patient observation, and the emerging revolution in anatomy.

**KEY WORDS:** 15th century medicine, History of anatomic dissection, History of medicine, Johannes de Ketham

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Important advances in the history of medicine occurred in Northern Italy in the late 15th century. This was catalyzed by the translation and printing of many Greek and Arabic medical treatises initiated by collections of physicians, surgeon-anatomists, and artists.

One impetus for this change, the *Fasciculus Medicinae*, was first printed in Venice in 1491. This compendium of Latin essays and illustrations provides insight into the emergence of medical knowledge in Western Europe and, in the 1493 vernacular Italian edition, glimpses into medical and anatomic culture. In this article, we outline some of the scientific and social context into which the *Fasciculus Medicinae* of 1491 was printed. The 1493 Italian edition is analyzed with emphasis on the artist's portrayal of medical, surgical, and anatomic culture in the universities of Northern Italy. The illustrations in the 1493 *Fasciculo* convey a paradigm shift from the medieval approach of the 1491 edition to the emergence of contemporary medicine.

## The *Fasciculus Medicinae* of 1491

In 1481, the brothers Giovanni and Gregorio dei Gregorii established a printing company in Venice and included medical texts in their output to service an expanding market (2, 16). In 1491, they published the *Fasciculus Medicinae* by Johannes de Ketham, recognized as the first printed illustrated medical book.

The *Fasciculus* contains a series of Latin essays related to subjects in clinical medicine and are discussed in the following order: 1) urine and uroscopy, 2) phlebotomy, 3) the "judgments of the veins," 4) a section on phlebotomy based on the zodiac, 5) a section on women's health, 6) reproduction and "the secrets of woman," 7) surgery, and 8) anatomy (16). There were six woodcut illustrations accompanying the text including 1) a circle of urine glasses, 2) a phlebotomy man, 3) a zodiac man, 4) a pregnant woman, 5) a wound man, and 6) a disease man. The last three are medieval representations of midwifery, surgery, and internal medicine, respectively. Except for the phlebotomy illustration, all figures appeared in this volume for the first time in a printed book (16). The first edition also contained a treatise related to the plague written by Pietro da Tossignano. Although the *Fasciculus* was composed of only 29 printed pages, six of which were occupied by the illustrations, it marks an important transition point in the history of the illustrated medical book.

The identity of the "author" of the *Fasciculus*, Johannes de Ketham, remains enigmatic. Karl Sudhoff (16) has suggested a professor at Vi-

enna, Johannes von Kircheim. His name appears in the *Acta Facultatis Medicae Universitatis Vindobonensis* between the years 1455 and 1470, in which he is referred to as "cyrurgie ac phisice medicinarum doctor." The academic roles assumed by von Kircheim included Dean of Medicine and administrator of "anatomic demonstrations" (16). It seems reasonable that a professor of medicine and surgery would have accumulated a collection of Latin manuscripts and practical diagrams that he would use for teaching. Ketham was not the author of these texts; anonymous manuscript versions of the texts and diagrams predating the work exist (5). The Venetian printers may have used the name Ketham, an Italian corruption of the name Johannes von Kircheim, along with his manuscripts and diagrams for the 1491 edition. The printing of the *Fasciculus* was an important transition point in the history of illustrated medical books.

## The *Fasciculo di Medicina* of 1493

The demand for the 1491 *Fasciculus* is evident by the rapidity with which the de Gregorii brothers printed a second edition in Italian. Its opening statement reads: Here begins the most worthy Fasciculus of Medicine in the vulgar tongue. It treats of all the infirmities of the Body of Man and of the Anatomy thereof. Together with many other tractates composed by various most excellent physicians, with authority and also proved tests (23).

The 1493 edition was improved in format, style, language, and content. The text was translated into the vernacular Italian by Sebastiano Manilio. This allowed the book to be read by a larger group of physicians, artists, and interested lay persons. Leonardo da Vinci may have owned a copy of the 1491 Latin edition (*Fasciculu Medicine Latino*), but he used the 1493 Italian edition as his dissection manual and as a primary source of his medical knowledge (9). Roman letters replaced the Gothic ones of the previous edition, enhancing readability. Improved versions of the original six woodcut illustrations are present. Four new illustrations were added related to the practice of medicine, including a scene representing anatomic dissection. A new essay was included, the first Italian edition of the treatise on anatomy by Mondino dei Liuzzi. The name Johannes de Ketham was removed from the title and the book is called *il Fasciculo di Medicina*. Upon opening the new *Fasciculo*, one encounters "Petrus de Montagnana" at his desk.

## The Petrus de Montagnana Scene

The Petrus de Montagnana scene serves as a "cover" illustration for *il Fasciculo* (*Fig. 1*). Petrus de Montagana is seated behind a desk and seems to be transcribing or translating a text. He is surrounded by books. Arranged on the shelf above him, from left to right, are works of the major Greek and Roman scholars (Aristotle, Hippocrates, and Galen), followed by a more ornate book by Avicenna, which takes the central place. To the right of Avicenna are the Arab authors (Ali Abate, Rhazes, Mesue, and Averroes). Pliny's *Naturalis Historia* is displayed open on his desk. On the floor is the *Conciliator*

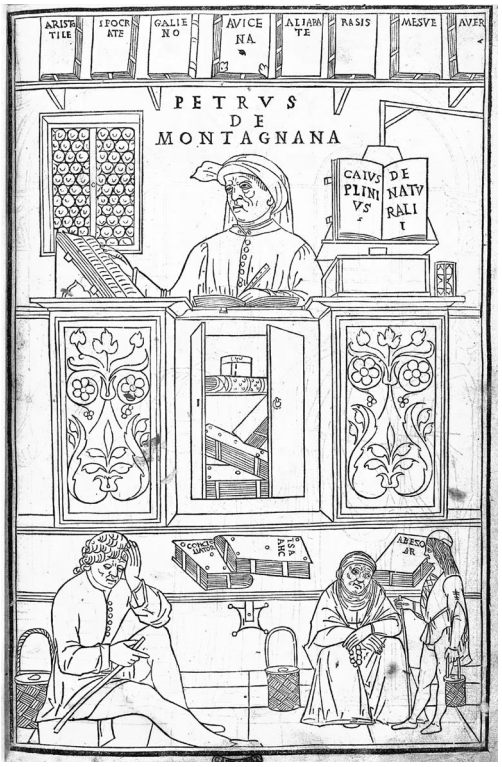


**FIGURE 1.** *Petrus de Montagnana frontispiece. Wearing his academic robes, Petrus de Montagnana sits transcribing and/or translating a book that lies open on his desk. The open desk in front of him contains some of his library, whereas other books are strategically placed on a shelf above his head and others on the floor. Three individuals, possibly representing patients, are shown in what may be his waiting room in the foreground of the scene. This woodcut demonstrates one of the first depictions in printed form of a typical medical library. One can appreciate the artist's interpretation of an impending transition toward knowledge-based medicine flowing from books arranged on the shelf behind Petrus to those on and in his desk, and finally to those almost touching the patients in the scene. Reproduced courtesy of the National Library of Medicine, Bethesda, MD.*

by Pietro d'Abano, a text by Isaahc, and one by Abezoar. At the bottom of the illustration, we see what is presumed to be his waiting room. Three individuals are shown, each with baskets. Singer (14) has suggested that they are three patients each carrying live coals in baskets, called *caldanini*, which were used both for warmth and to burn aromatic compounds to prevent infection. Another interpretation is that these baskets may be concealing urine flasks, and the individuals are patient messengers (5). The male individual on the left appears to be distressed and has a pomander in one hand and a walking stick in the other. The female figure is holding a rosary or therapeutic stones, and the smaller figure has a walking stick. The scene appears more consistent with Singer's interpretation that these figures are patients. The presence of *caldanini* in *Figures 1* and *3* supports the proposal that these individuals are patients awaiting a consultation. This would imply that Petrus was not only a scholar, but also had a medical practice.

The hourglass on his desk would have been used to measure the pulse of his patients during consultations (1). The artist of this scene has emphasized how the knowledge obtained from carefully chosen books can be translated directly into patient care. The artist has captured one of the important themes of *il Fasciculo*: the art of knowledge-based medicine.

Who was Petrus de Montagnana, and why does he appear in the frontispiece of the 1493 *Fasciculo* (20, 21, 22)? It has been proposed that the Montagnana name was a marketing fraud to increase the work's overall attractiveness (6). For a text written in the vernacular and intended for Italian physicians, it would seem unlikely that the Petrus identity is a fraud because the physicians in the Montagnana family were well known. Pietro da Montagnana, a professor of medicine ("docente di medicina nell'Ateneo") at the University of Padua, has been suggested as the physician in the figure (4, 15, 17). It is possible that Petrus, a teacher of medicine, may have helped Sebastiano Manilio translate and correct parts of the *Fasciculus* and is so pictured by the artist in this role.

The woodcut demonstrates an early depiction in printed form of a medical library. The time period in which the *Fasciculo* of 1493 was published was one of transition from manuscripts to the printed word. The "medical establishment" of the time relied on Latin editions of the Greek and Arab texts and saw value in "the additions made to medicine by the commentators" (2). Physicians of this period supported a "conceptual framework" of "late medieval Galenism," in which "doctrines rested on the supposed harmony of classical—Greek-Roman—medicine and [its] Arabic re-creation" (2). Atop the pillars of such a doctrine is Avicenna, who supported the ideas of Galen and Hippocrates (2). This may explain Petrus' top shelf, where Avicenna's richly decorated book sits at a pivotal position between the works of the ancient Greeks and the Arabic authors.

By counting the times the various works in the Petrus scene are quoted in the 1491 *Fasciculus*, we gain insight into the most influential authors. The most cited figure is Aristotle, with 51 quotes attributed to him. Among the Greek authors, the left-to-right arrangement reveals their relative impact factors: Galen is cited 16 times, followed by Hippocrates, who is cited five times. Avicenna, who assumes the center position, is cited 14 times. Among the Arabic authors to the right of Avicenna, only Averroes is quoted a total of five times. Pliny's *Historia Naturalis* was quoted seven times. Among the books in the foreground, Pietro d'Abano's text is cited once and Isaahc twice. Albertus Magnus, who is not among the authors included in the Petrus scene, is quoted 22 times. In the anatomic treatise of Mondino dei Luizzi, found in the 1493 edition, the most quoted authors are Galen, who is cited 36 times, and Avicenna, cited 14 times. Aristotle, however, is cited only four times.

The renaissance physician was in the business of "practical therapeutics" (24), which may explain why Pliny's *Historia Naturalis*, a universally useful volume, takes the most prominent position, open on Petrus' desk. The purpose of the *Fasciculo* was that of a practical handbook for everyday medical practice. The *Conciliator* of Pietro d'Abano, the work of Abenzoar's Al-Teisir, and a medical text by the Jewish author Isaahc are near the floor. One can appreciate the artist's interpretation of impending movement toward knowledge and science-based medicine, a transition flowing from the established scholastic texts arranged on the shelf behind Petrus to the more contemporary texts scattered nearer the floor close to the patients. By placing the more revolutionary works near the floor, the artist, possibly instructed by the *Fasciculo* editors, may have wanted to avoid criticism from the scholastic medical establishment. The presence of these texts in the scene was all the reader needed to understand: Petrus, the educated physician, also opened these volumes.

## Uroscopy Scene

The treatise on urine and uroscopy remains the first section in the 1493 *Fasciculo* and is represented in two woodcut illustrations. The uroscopy chart remains from the 1491 edition, and a new scene was added portraying a uroscopic consultation (*Fig. 2*). The teacher, accompanied by his students, are exiting a lecture hall and entering an atrium, likely within the

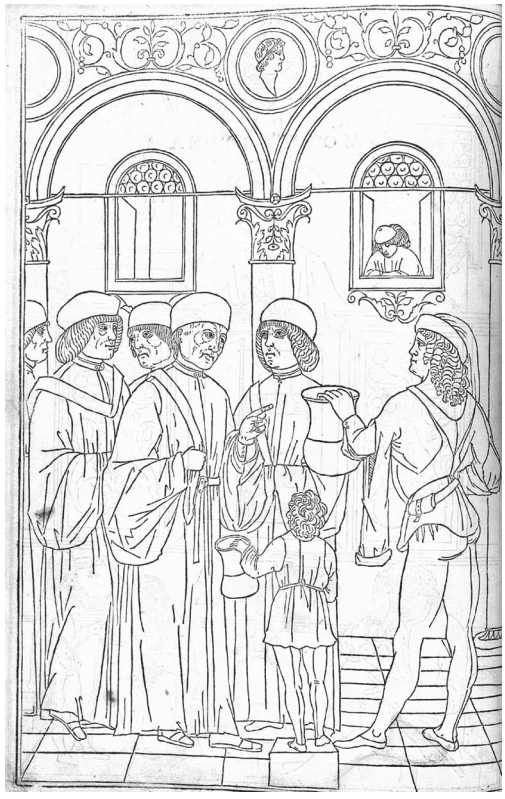

**FIGURE 2.** *Uroscopic consultation scene. In an open atrium recalling the cloisters of the University of Padua, a student sits quietly reading at one of the open windows. Five figures dressed in academic gowns are pictured in the foreground exiting a lecture hall, four students led by a professor. Two messengers holding urine vials anxiously await their opinions. In this scene, the artist foreshadows the emergence of laboratory medicine. Reproduced courtesy of the National Library of Medicine, Bethesda, MD.*

University of Padua. Outside the lecture hall are two messengers awaiting the physician's consultation, each holding vessels containing urine. On a nearby windowsill is another student, deep in study. The importance of this woodcut is reflected in the care invested by the artist to accurately depict the costumes and the architectural details (16).

The role of uroscopy in this period is recognized in the *Fasciculo* both by its prominence as the first treatise in the book and by its representation in two illustrated woodcuts. Uroscopy was a key component in the physician's diagnostic armamentarium, and it was common to represent the physician in art holding the urine flask, or *matula* (25). The *matulae*, as illustrated in the uroscopy scene, are quite large and have a specific shape. In addition to the practical purpose of transporting urine in large vials to avoid spillage, the *Fasciculo* treatise itself discloses how the vials' particular form and size were in fact necessary for the actual examination of urine: There are . . . three regions in urine: the lower, middle, and upper. The lower begins from the bottom of the urine flask and extends over a space of two fingers; the middle region begins where the lower ends, and it reaches up to the circle, because the circle is in the upper region (16).

The text describes that abnormalities of urine within each of the regions of the flask would indicate diseases related to specific parts of the body. The rationale for visual examination of urine can be found in the first lines of the urine treatise in the *Fasciculo*: Urine is the distillate of blood, and it is indicative in two ways: by itself it signifies either an ailment of the liver and veins or of the bladder and kidneys, and indirectly it is indicative of other things (16).

In the *Fasciculo*, the physician is represented examining the urine not in the presence of the patient, but in that of a messenger, suggesting that uroscopy was considered a more scientific aspect of clinical medicine and the precursor to modern laboratory medicine (1, 8). Diamandopoulos comments: The main difference between these ancient ancestors of uroscopy and today's laboratory tests for urine examination lies in the fact that in the remote past, urine samples were examined in their natural condition without any application of heat or any addition of chemical compounds (10).

## The Plague Consultation Scene

The third added illustration in the 1493 *Fasciculo* (*Fig. 3*) is a scene meant to reinforce the suggestions contained in the treatise entitled, "Counsel of the famous doctor Peter de Tussignano for avoiding pestilence" (16). The woodcut illustrates the chamber of a patient afflicted with pestilence, who is being visited by a physician. The physician breathes a "pomander of laudanum" to protect himself, for "the air continuously emits its bad property and thus disposes bodies to corruption" (16). He is portrayed in physical contact with the patient while taking his pulse. The physician is flanked on either side by assistants attired in nonmedical clothing, each holding wooden torches, for the "air should be dried as much as possible, by a fire of oak wood or of well dried boughs of laurel, of myrtle, juniper and other odiferous woods [to decrease transmission of the plague]" (16). The assistant on the right also holds a basket for embers, which was also portrayed in the cover illustration.

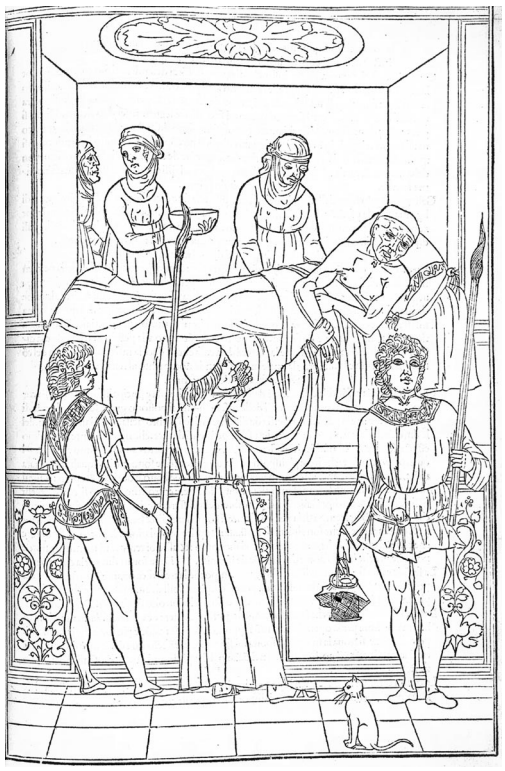

**FIGURE 3.** *Consultation of plague patient. This scene is meant to accompany the plague treatise of Petrus de Tossignano. The patient lies on a beautifully carved bed exhibiting the* Facies Hippocratica, *a harbinger of impending death. The physician feels the patient's pulse with one hand and smells a pomander with the other. Two male attendants carry flaming torches, and the one on the right carries a* caldanini *containing live coals to burn aromatic compounds. Three older females attend to the patient, and a cat is positioned in the foreground. In this scene, the artist has captured the important role that physician-patient contact will play in the future of medicine and emphasizes the ancient Hippocratic lessons of direct patient observation. Reproduced courtesy of the National Library of Medicine, Bethesda, MD.*

The patient, an elderly gentleman, lies in an elevated bed. He rests on his side with his head elevated on a pillow, because bed rest, according to Tussignano, should be "on the right for two hours, next on the left side, and then returning to the right. . .[S]leep should be with the head well elevated, and with sufficient cover" (16). The facial features of the patient have been interpreted to represent the *Facies Hippocratica*, a harbinger of impending death from the plague (7, 23). On the opposite side of the patient's bed are three older women, tending to the patient's needs. They are not protecting themselves from the contaminated air because "bodies which by nature have narrow pores but are not obstructed, as in the case of melancholies or certain older women, are at such times

injured less than other bodies by the plague " (16). A cat is represented in the bottom half of the scene. There is no mention of cats in the text, nor does one appear in other woodcuts in the *Fasciculo*. Because cats catch rodents, the artist may have had an understanding of the role played by cats in controlling the transmission of pestilence and added this feature to the illustration. The artist in this scene has interpreted the text and captured the important role that physician-patient contact would play in the future of medicine and emphasizes the ancient Hippocratic lessons of direct patient observation.

## The Anatomic Dissection Scene

The dissection scene, which accompanies Mondino's chapter on anatomy, is the most intriguing of the four new scenes to adorn the 1493 *Fasciculo* (*Fig. 4*). This figure directly faces Mondino's words as he begins his *Anatomia*: As Galen, following the authority of Plato hath said in the seventh book of his *Methodus Medendi*, "a work in Science or Art is published for three reasons: first for the satisfying of friends, second for the useful exercise of the faculties, and third as a remedy for the forgetfulness which doth come with lapse of time." Moved by these I have projected a work for my pupils in Medicine. . .I therefore purpose to give, among other topics, some of that knowledge of the human body and of the parts thereof which doth come of anatomy. In doing this I shall not look to style but shall merely seek to convey such knowledge as the chirurgical usage of the subject doth demand (14).

A lecture hall, "probably at the University of Bologna," is the backdrop for the scene (16). A wooden trestle table is placed in the foreground of the scene because the lecture hall is converted for the dissection of a corpse. The body is that of a young man, whom the artist has presented in rigor mortis and with a risus sardonicus. The dissection is just beginning because a man dressed in street attire is about to open the abdomen with a knife. Mondino writes: "I shall begin with the anatomy of the lowermost venter [i.e., the belly] so that the organs there, being most corruptible, may be first cast aside" (9, 14). At the head of the dissection table stands an older gentleman, a teacher, using a pointer to direct the dissector. At the foot of the table lies a basket for collecting dissected tissues. Surrounding the dissection table are several individuals, one of whom is engrossed in the lesson while others appear less interested. A younger figure, standing behind the dissector, is leaning over his shoulder to get a better look. At the top of the scene is a young man at a richly carved pulpit. This figure is flanked by windows on either side. The window to the left is open, revealing the countryside. On the right, one of the panes is broken, through which we see a small river traversing the countryside. The figure is looking straight at us and appears to be pointing out the open window.

The dissection scene of the 1493 *Fasciculo* is one of the first attempts to print a woodcut illustration in color. It is the only woodcut in the *Fasciculo* to have been colored, with the exception of color added to the uroscopy chart by hand using stencils. Several versions of this woodcut exist: 1) a simple, uncolored rendition (*Fig. 4A*), 2) a more elaborate colored version, predominantly hand painted, from Harvey Cushing's collection (18) (*Fig. 4B*), and 3) a second color version which has been block printed (*Fig. 4C*). Hand painted versions of these illustrations were included in the most expensive versions of the 1493 *Fasciculo*. This woodcut was illustrated with the help of a stencil, as noted by Harvey Cushing in his own copy (18), because one of the dissector's legs is in a different color, and the red ink from the robe of the young figure in the pulpit spills over his right hand. The difficulties encountered by the Gregorii brothers of coloring woodcuts in this manner are evident because there is overlay of color in many parts of the scene (note the different colors of the dissector's legs) (11, 13).

In addition to being among the first woodcuts to incorpo-

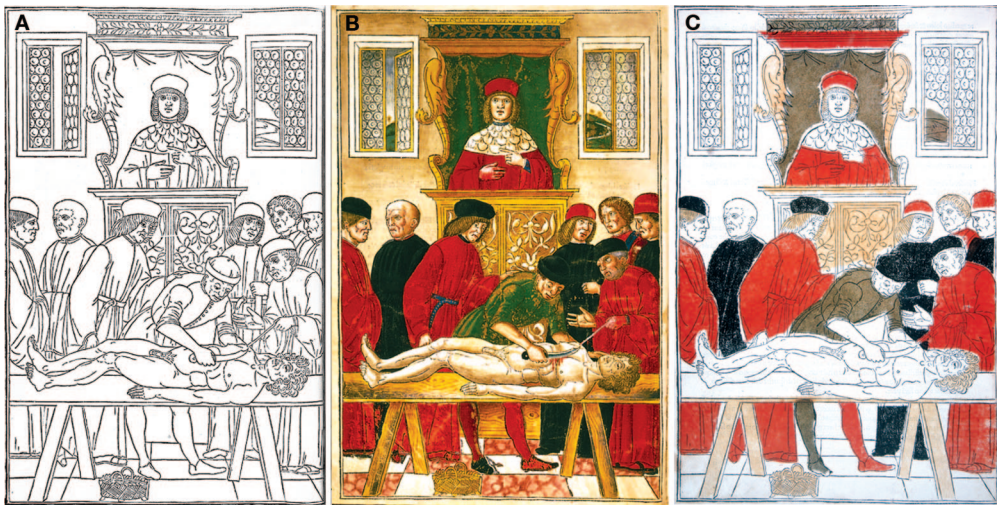


**FIGURE 4.** *Dissection scene. This illustration accompanies Mondino's chapter on anatomy. The body of a young man is placed on a trestle table in the foreground. The dissection is beginning, because a man, possibly a surgeon, is about to open the abdomen. The person on the right uses a pointer to "direct" the dissector while a young man in decorated attire, sitting at an elevated and richly carved pulpit, looks straight at us while pointing out an open window. Several other individuals appear disinterested in the proceedings, whereas others appear engrossed in the lesson. Three "versions" of this particular woodcut exist:* A, *a simple uncolored rendition;* B, *a hand painted copy from Harvey Cushing's own collection; and* C, *a block printed colored version (note the different colors of the dissector's legs).* A, *illustration reproduced courtesy of the National Library of Medicine, Bethesda, MD.* B, *illustration reproduced courtesy of Cushing/Whitney Medical Library of Yale University.* C, *illustration reproduced courtesy of Metropolitan Museum of Art, NY.*

rate printed color, the dissection scene is also one of the first printed renditions of a dissection scene (3). This illustration serves as the cover piece for Mondino's *Anatomia* chapter. Mondino dei Liuzzi was born in 1270 in Bologna to a wealthy family of physicians (12). He was influenced by the "*nuova medicina*" introduced by his teacher, Taddeo Alderotti, who advocated a return to the original Greek and Arabic texts (12). Mondino's *Anothomia*, written circa 1316, is one of 20 manuscripts bearing his authorship. Mondino's intent was to illustrate anatomy as applied to surgery and clinical medicine (12). He was among the first to apply concepts of physiology, pathology, and surgical experience to his personal expertise in dissecting cadavers. Mondino's major innovation was the reintroduction of the human cadaver in medical teaching. His anatomy texts are arranged in the order human anatomy is encountered in a true dissection, and this elevated anatomy to a scientific pursuit. The first printing of the *Fasciculo* dissection scene more than 150 years after Mondino's text was written, and the effect of Mondino's *Anatomia* regarding the teaching of anatomy, still reverberates in every medical school. Mondino became a major influence in the field of anatomy and through his pupil Bertuccio, the teacher of Guy de Chauliac (23), amplified his effect on the evolution of surgery.

The Anatomy Statutes of the University of Padua stated the manner in which anatomic dissections had to be executed (5). Two senior medical students were to be chosen to serve as *massarii* and were responsible "for all the practical arrangements, including the location, the instruments, and all necessary supplies . . . [and] rigidly to control attendance" (5). The Statute outlines that teachers and physicians, and those medical students who have completed at least 1 year of studies, may attend. An individual, typically a student, would be delegated to read line by line from Mondino's *Anatomia*. The instructor would then explain each sentence while at the same time demonstrating and verifying the various structures in the corpse. This component of the lesion is a focus of the *Fasciculo* scene. The Statute mentions that it is the responsibility of the lecturers on surgery to perform the dissection; however, if appropriate, an outside individual of greater technical ability, such as a surgeon, may be contracted for this purpose. The university had the option of hiring "academic surgeons" for the dissection, and reflects their "crucial importance [since] specific competence, and not academic qualification or rank, [was] the overriding criterion in choosing this person" (5).

The emphasis of the Statute on ensuring that the medical students benefited from the anatomic dissection is reflected in the *Fasciculo* scene because in the center of the illustration is the medical student, a hand placed on the shoulder of the "academic surgeon." The final section of the Statutes describes the role of the attending physicians. After the conclusion of the dissection, these physicians were permitted to provide comments and interpretation of various segments of the dissection. Thus, the seemingly uninterested group of physicians in the dissection scene would eventually conduct the "*disputatio*," a discussion that would follow the reading of the text and the practical demonstration (6).

Another theme outlined by the artist is the separation between a medieval scholastic procedure, represented by the lone reader in the lectern in the top half of the illustration, and practice: the actual dissection and its direct participants. The artist has reconciled these two concepts by the inclusion of the practical academic surgeon and by redirecting the viewer's

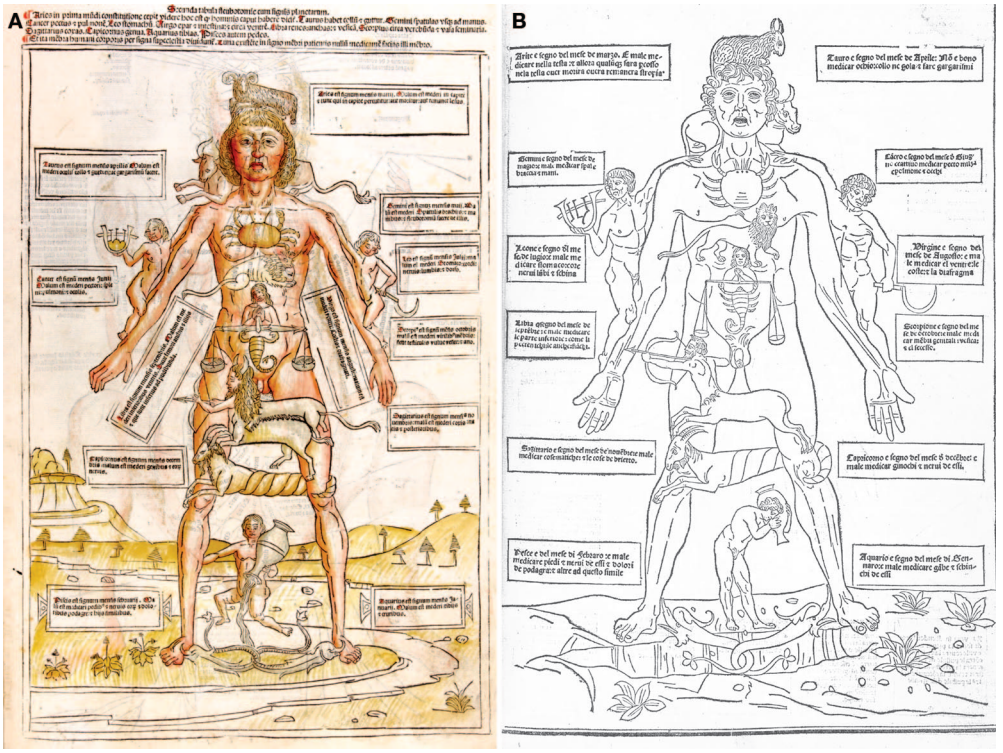


**FIGURE 5.** *Zodiac man* (A), Fasciculus Medicinae, *1491 edition, and* (B) *Zodiac man*, Fasciculo di Medicina, *1493. Fish at the feet on the figure that represent pisces are converted to dolphins in the 1493 Italian edition, demonstrating one of the idiosyncrasies of the artist involved in producing the woodcuts for the 1493 edition and outlines the diagrammatic nature of the woodcuts originating in the 1491 edition.* A, *reproduced courtesy of the Cushing/Whitney Medical Library of Yale University.* B, *reproduced courtesy of the National Library of Medicine, Bethesda, MD.*

attention from his young reader's eyes to the outdoors by way of his pointing finger. This links the scientific anatomy occurring before him with the natural philosophy of his time.

### Identity of the Artist

Singer (14, 16) "examine[d] a great number of early Venetian woodcuts" and believed that the artist was likely a resident of Venice and was either a student of or well acquainted with the work of Giovanni Bellini. Hind (13) described "the style of the 'classic' [Venetian] designer or designers as influenced by Andrea Mantegna," leading him to propose Gentile Bellini as the artist. Piot (19) attributed authorship of the 1493 *Fasciculo* woodcuts and the famous Dream of Poliphili to a "Maître aux Dauphins" based on a motif of ornamentation repeated enough to serve as a possible signature. He included the *Fasciculo* because of the dolphins that adorn the decorated pulpit in the dissection scene. The artist reproduced the zodiac man diagram from the 1491 *Fasciculus* with the exception of one detail: in the 1493 *Fasciculo*, the fish that represented Pisces are converted into dolphins (*Fig. 5*). There are also similarities between the cover woodcut illustration of the 1491 *Aesop* (*Fig. 6*) and the upper half of the dissection scene in the *Fasciculo* (16). The similarities include the overall theme and composition of the two scenes, the gesturing of the two figures, and a diagonal line that is identical between the cracked window in the dissection scene (5). This may imply a common authorship because in subsequent editions of the *Fasciculo*, the dissection scene is redone by different artists, without many of these idiosyncrasies. "Whoever the designer," Hind writes, "it can hardly be doubted that these woodcuts are the invention of a painter of genius" (13). Piot (19, 23) comments that this gifted artist helped create a book that "was among the most beautiful of any of the illustrated volumes that appeared during the first century of printing."

The artist had an understanding of both the statutes governing dissection in Padua and the books in Petrus' collection. One can imagine the artist accompanying physicians during their duties trying to distill, with a series of careful drawings to be incorporated into woodcuts, the essence of the practice of medicine in his time. Although the identity of this artist is not known, his art significantly influenced the future quality of medical illustration and foreshadowed the work of Vesalius.

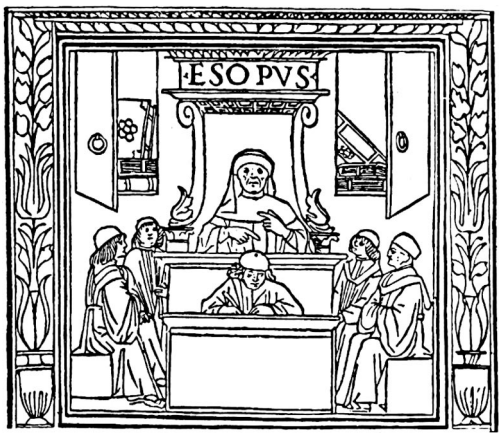


**FIGURE 6.** *Title page of 1491* Aesop *printed by Manfredo de Monteferrato. There are similarities between this title page and the upper half of the dissection scene in the* Fasciculo *of 1493 (*Fig. 4*). Reproduced courtesy of the Beinecke Rare Book and Manuscript Library of Yale University.*

## CONCLUSION

The scenes in the 1493 *Fasciculo* project a number of themes. Many of the illustrations depict a student in a prominent position. This is displayed in the dissection scene, in which the illustration revolves around the process of anatomic teaching at the university. In the uroscopy scene, the physician-teacher is accompanied by his students. In the frontispiece, we see the many books that may make up the curriculum and an academic clinician at the University of Padua.

The *Fasciculo* also emphasizes the importance of the academic surgeon. He emerges from the cover of the Mondino dei Liuzzi work and helps foster surgical anatomy as a scientific pursuit based on primary observation through cadaveric dissection. The artistic, aesthetic, and medical impact of the 1493 *Fasciculo* continued to expand through 14 further editions (seven Latin, four Italian, three Spanish) published between 1495 and 1688 (7, 14). The Italian and three Spanish editions printed by 1495 contributed significantly to the influence of this work at the end of the 15th century.

This artist has observed a paradigm shift occurring before his eyes. In four exquisite woodcuts, he has captured the relevance of knowledge-based medicine, foreshadowed the emergence of laboratory medicine, and outlined the Hippocratic lessons of patient observation and care while emphasizing the emerging revolution in anatomy. In Petrus' library, he chooses to keep the windows closed; in the dissection scene, he not only opens the window, but bursts one to reveal the things that may lie beyond when theory and practice are combined. The dissection scene emphasizes another philosophical theme, linking the microcosm of the human body to the macrocosm of the universe.

The 1493 *Fasciculo*, an Italian text covering many themes, emphasizes the practice of medicine displayed in the four scenes depicting the typical acts of the contemporary physician. Much like the student in the dissection scene who looks over the surgeon's shoulder to witness new insights, the reader looks through the eyes of the artist to witness an important transition taking place.

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# COMMENTS

Between the 15th and 16th centuries, medicine was taught in European universities on the basis of two fundamental educational corpuses: the Canon major, by Avicenna, and the Articella, brought from Salerno to Montpellier and Paris. These served as the basis for the study of medicine up to the 18th century.

The Rogerina by Rugerius Salernitanus, the Rolandina by Rolandus Parmensis, and the Chirurgia Magna by Brunus Longoburgensis were the classic texts teaching surgery at that time. These works did not contain any illustration. In fact, the illustrations describing surgical techniques of these authors, because there was no possibility to print them in books, were depicted in precious manuscripts and sumptuous miniatures jealously preserved in European libraries and museums. The majority of these Latin works were intended for professionals, even if sometimes were also produced works in vernacular for a more wide diffusion. One of the most famous was the Regimen Sanitatis Salernitanum.

In this context, the Renaissance saw in the study of anatomy the corner-stone of medical and artistic studies. The Fasciculus Medicinae attributed to Johannes de Ketham is a compendium of medical knowledge combining ancient and medieval medical tradition with Renaissance innovation. The first original text, in Latin, was printed in Venice by the de Gregorii brothers. It contained six schematic illustrations in woodcuts plates, derived from centuries-old conventions. The Fasciculus was the first illustrated medical book and was among the most beautiful of any of the so-called graphic incunabula (the term given to the book printed prior to 1501). The success of this first edition was so extraordinary that the editors decided to publish, almost three years later, a second edition with four additional woodblock plates that reflected the influence of Giovanni Bellini and Andrea Mantegna, among the most famous artists of the period. To give it a wider diffusion, this second edition was published in Italian with the title Fasciculo de Medicina.

Illustrations like the "uroscopic scene" and the "plague consultation scene" had been already seen in previous manuscripts and miniatures. Very interesting is the "anatomic dissection scene," where a dissection of the corpse of a young man is represented, carefully presented in typical rigor mortis and with a risus sardonicus. In the scene it can be seen, as usual at that time, the dissection directed by a teacher, an older gentleman, using a pointer to direct "the dissector," a man dressed in street attire and not in academic robes. With this scene, the artist wanted to outline the separation between a theoretic medieval scholastic procedure, represented by the young lone reader looking straight at us and appearing to be pointing out the open window, and the actual practical dissection and its direct participants. This dissection scene of the 1493 Fasciculus represents one of the first attempts to print a woodcut illustration in color.

This work has another merit: it stimulated the scientific interest in the human body from great Renaissance artists; among these, we can cite Tiziano, Michelangelo, Dürer and, above all, Leonardo, who personally sectioned more than thirty cadavers. In the following century, the famous Flemish painter Rembrandt von Rijn would represent in two skillful paintings: The Anatomy Lesson of Dr. Nicolaes Tulp (1632) and The Anatomy Lesson of Dr. Joan Deyman (1656).

**Enrico de Divitiis**
**Felice Esposito**
*Naples, Italy*

This article deals with one of the first books printed in Venice by the de Gregorii brothers, well-established publisher of different types of books. It was the first medical book of western countries published with the meaning of a "continuous education" of the medical doctors at the end of the century that would see the discovery of the new continent. The themes presented convey a paradigm shift from the medieval approach to the emerging horizons of modern medicine

The Fasciculo is a testimony of the new renaissance, of the illuministic view of medical art, of the medicine based on evidence, both from the cadaver observations, translated to medical practice for surgeons, and from the analysis of body specimens to reach, with a

rational thought, the diagnosis, such as for the urine examination, pulse check, etc., as illustrated in the tabulae.

This book is a real masterpiece, and it is not irrelevant that the first edition was sold out in few months, as it is shown by the fact that 18 months later a new edition of Fasciculus Medicinae was published. Furthermore, the interest was so high and the impact of this book on the culture was so immediately understood that an artist and scientist such as Leonardo da Vinci, wrote in 1943 "Here begins the most worthy Fasciculus of Medicine in the vulgar tongue. It treats of all the infirmities of the body of man and of the anatomy thereof. Together, with many others tractates composed by various most excellent physicians, with authority and also proved tests."

In my opinion, the Fasciculo is a founding stone of all the medical culture of the 15th and 16th centuries, innovative since the printing play the tremendous role of decreasing the cultural power of the upper cast of the "Dottori," giving a relevant role to the "Chirughi," till then considered no more than a barber or butcher, as one of the Tabulae is showing. In other words, the Cultural Revolution that is carrying upon may be parallel to the one of 20th century Internet. Compliments to the authors of this presentation for offering this fantastic contribution to the Neuroscientist community.

**Giovanni Broggi**
*Milan, Italy*

The authors have done an extraordinary job in putting together the impact of an important book in the history of medicine. The Fasciculo di Medicina underwent a number of reprintings and reissues from 1491 right up into the 20th century, when it was reprinted at least four times. This work has had an obvious impact on the history of medicine and I had been puzzled about why for many years. I acquired a copy of this work about twenty years ago, the 1522 edition. At the time I thought the Latin very idiosyncratic and the style sycophantic, i.e., difficult to read and understand. These authors have certainly done a superb job of clearing up some of my errors and confusion and in addition have provided an interesting contemporary portrayal of the work. At the time of this book, publication medicine, science and anatomy were entering an enormous new revolution. By going back to the human body for dissection, by becoming involved in bedside observation, the physician was finally going back to the roots of understanding. The long-standing archaic veil of the medievalists was finally being lifted. The contemporary surgeon or physician has been offered in this monograph a discussion of medical disorders, how to approach them and not unreasonable treatments for the time. A number of scholars like Charles Singer and Karl Sudhoff had earlier reviewed this work, however, I think the presentation here is even better.

I also particularly enjoyed seeing Jerry Bylebyl's wonderful work on the anatomical scene so nicely presented here. His paper is a classic and clearly showed how wrong we have been in interpreting the "ex cathedra" view of the professor, the anatomist and the prospector. This paper is a wonderful piece of scholarship and should be read by any neurosurgeon even remotely interested in the history of medicine.

**James Tait Goodrich**
*Bronx, New York*

The article by DiMaio et al. represents an interesting contribution to the understanding of the role of iconography as a signal of the evolution of medicine between Middle Age and Renaissance. As matter of fact, the 15th century in European medicine has rarely enjoyed good press, even when scholars have deigned to notice it. This is partly the result of chance, for it occupies an ambiguous position between the Middle Ages and the Renaissance, i.e., between an age of manuscript and one of print. Leonardo da Vinci had written that pictures could say more than words: these pictures, if traced on wooden blocks, could be accurately reproduced in their thousands by the newly invented printing press and so would not become corrupted through the errors of scribes in copying from manuscript to another. Printing had been already invented 20 years earlier, but no printing house had had the idea to collect in a single book all pictures which the medico-scientific iconography of the Middle Age had considered the most useful for the everyday medical and surgical practice. It is a great merit of the ingenious printers Giovanni and Gregorio de' Gregori to have sent to press the Fasciculus Medicinae in 1491.

The Fasciculus Medicinae by Johannes de' Ketham does not belong only to the history of anatomy or to the history of medicine, but it is a jewel of book-art and represents a fundamental step in the development of scientific iconography. The first edition dates back to 1491 and the second one, more Veneto, to 1493. Goldschmid (1) assigns it an essential role in the development of anatomical-pathological picture. In fact, the history of the anatomical-pathological scheme, passing through the representations of ancient art, then through the Krankheitsmänner (Disease Man) and the Wundenmänner (Wound Man), dates back to the Fasciculus Medicinae, which had to fix and show the morphological changes, produced in the organs by damaging noxiae. The images of both editions of Fasciculus present the body as a teaching-aid, neatly labeled and connected to the world of the stars and of the patient. The Fasciculus met with success: many copies were sold and the editors issued it again

The paper of DiMaio et al. highlights that iconography is the interpretative key of the differences between the first edition of Fasciculus and the second one. The xylographies, which accompany the editio princeps, regard the urine disk (circle of urine glasses), the blood-letting man (the phlebotomy man), the zodiac man, the pregnant woman, the wound man and the disease man. As already Sudhoff (4) has underlined, all of these pictures refer to previous patterns, i.e., the manuscript of Copenhagen (Ny Kge. Samml.48b) and Heidelberg (Palat.Germ.644) and had the particular aim to show to the physician every detail which could be useful to the everyday practice of medicine and surgery. In the first edition, the text was in Latin and in gothic characters; in the new edition, the text was translated into the Italian vernacular and it was written in Roman characters. These translations had important consequences for medieval medicine; they reinforced the power of tradition, while at the same time enabling a more sophisticated understanding of medicine to develop within the new linguistic community. The textual part was enlarged and four more pictures occurred, i.e., Petrus da Montagnana, the medical consultation, the lesson of Anatomy and the visit to the plague-stricken person, confirming the new relevance of knowledge based medicine. The hand who realized the images of 1491 is deeply different from the other one of 1493: the first engraver was a technician, who was under the influence of Giovanni Bellini (1459-1516), while the second one shows signs of the influence of the miniaturist tradition and of Mantegna with regard to the typology of the personages, the robes and the description of the surroundings. As far as the image of Petrus da Montagnana is concerned, his humanistic culture is manifest in the choice of books and in the attention to the architectural and ornamental elements. Petrus da Montagnana was the Author of the De urinarum judiciis, which was strictly linked with the other picture (the disk of urine) and the problem of uroscopy, one of the most important diagnostic method of that time; humoral balance, and consequently the state of health, was best judged by the careful inspection of urine. The color of the urine was considered a very important sign, as the

disk of urine shows. Urine was collected into a glass vessel, matula, which was preserved into a straw basket, fiscella, in order to be carried to the physician, who made his diagnosis using only the uroscopy, without visiting the patient. Even if DiMaio et al. do not choose one definitive interpretation of the basket's content's, recent studies (2, 3) showed that it can be nothing but a matula into its fiscella.

The edition of 1493 was also enriched by a picture representing the lesson of Anatomy. In order to understand the roles of the persons involved in the lesson, it is necessary to focus upon the problem of teaching anatomy in this period. When one dissection took place, it was as much spectacle as instruction. The university teacher (lector), in full academic robes, endeavored to set anatomy of a man in the whole context of creation, while a dissector, usually a surgeon, cut up the body in an order designed to reduce putrefaction. In the same time, an expositor (ostensor), usually an acquainted and trained servant, pointed out significant features, which the lector alluded to. In point of fact, Vesalio's revolution in the sixteenth century consisted in substituting these three figures (lector, dissector and ostensor) with the only anatomist, who could then observe directly the human corpse, realizing and correcting Galenos's mistakes.

The new pictures with the widened text of the 1493's edition represent a turning point in the history of medical teaching, as they constitute a first step forward to combining old concepts and new didactic methodologies, thus opening the way to the achievements of the following centuries.

**Pasquale Gallina**
**Donatella Lippi**
**Nicola Di Lorenzo**
*Florence, Italy*

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