M04 578H – Syllabus

Fall 2013

Dissecting to Think: The History of Anatomy

Locations:
• Archives and Rare Books 7th Floor Bernard Becker Medical Library
• Center for History Of Medicine – 6th Floor Bernard Becker Medical Library

Time: 3:30 – 5:30 pm

Format:
3:30 – 4:00 pm, Examination of Archival Materials - Archives and Rare Books
4:00 – 5:15 pm, Students assigned to summarize lead discussions of articles - Center for History Of Medicine
5:15 – 5:30 pm, All students write and turn in a short paragraph on the topic

Readings: General background from Manger’s e-book, Article PDFs for each session on thumb drive available at 12 pm on 10-22-13 in CfHOM office. All students should read all materials before each session.

Participants:

WUSM I Students: Mr. Brent Bruck, Mr. Kevin Cross, Mr. Colton Gits, Mr. Jared James, Mr. Randy Laine, Mr. Zhe Liang, Ms. Charlotte Lin, Ms. Bree Porcelli, Mr. Max Riley

Becker Library and Rare Books Staff: Ms. Elisabeth Brander – Rare Book Librarian, Mr. Stephen Logsdon – Archivist, Ms. Martha Riley – Rare Books Cataloger & Archivist, Mr. Philip Skroska - Visual & Graphic Archivist

Faculty: Rebecca Messbarger, PhD - Professor of Italian & Women, Gender and Sexuality Studies, Robert M. Feibel, MD – Professor of Clinical Ophthalmology & Visual Sciences, Thomas A. Woolsey, MD – Professor of Experimental Neurological Surgery & Acting Director of the Center for History Of Medicine
Bibliography


Vesalius, Andreas, J. B. de C. M. Saunders, and Charles Donald O’Malley. 1950. *Illustrations from the works of Andreas Vesalius of Brussels; with annotations and translations, a discussion of the plates and their background, authorship and influence, and a biographical sketch of Vesalius*. Cleveland.: World Pub. Co.


Antiquity to the Renaissance

Week I. Wednesday October 23, 2013

Readings: (Carlino 1999; French 1999; Skinner 1997)
Reference: (Magner 2005) – Chapters 2, 4 & 5
Bibliography


ARB Display

Week I - October 30, 2013

I. Manuscripts and facsimiles of manuscripts - 17th century B. C. to 15th century A.D.


Most of the hieroglyphic manuscript is 48 case reports of traumatic injuries. The original manuscript is from 17 century B.C, but the content is at least a thousand years earlier. The papyrus is named after Edwin Smith, who purchased the document in January 1862 during his stay at Thebes. After his death in 1906 it was presented to the New York Historical Society. Later it was given to the New York Academy of Medicine. cf. General introduction. To unroll the papyrus scroll, look at it online at turn the pages http://archive.nlm.nih.gov/proj/ttp/flash/smith/smith.html


Pedanios Dioskurides was a Greek physician in the service of the Roman emperor Nero in the 1st century AD. “De Materia Medica” was compiled around 65 AD and is arguably the first textbook of pharmacology ever written. This so-called “Vienna Dioscorides” dates from about 512 AD and is a superb example of Byzantine book-painting.-- Peter Holzer, “Opioid receptors in the gastrointestinal tract,” Regulatory Peptides, Volume 155, Issues 1-3, 5 June 2009, Pages 11-17 http://www.sciencedirect.com/science/article/pii/S0167011509000731

This facsimile of a 13th-cent. Latin ms. (Cod. vind. 93) is a copy of the text and illustrations of various tracts on materia medica in use in Western Europe since late antiquity. An English commentary is included. [http://beckerexhibits.wustl.edu/Herbal/1/codex1.jpg]


Vellum definition: A fine kind of parchment prepared from the skins of calves (lambs or kids) and used especially for writing, painting, or binding; also, any superior quality of parchment or an imitation of this. OED online.

5. Becker copy: Binding is a parchment manuscript fragment. BECKER B288 1583
Bartisch, George, 1535-ca. 1607. [Ophthalmodouleia (romanized form)], das ist, Augendienst - Gedruckt zu Dreszden : Durch Matthes Stöckel, 1583.

Parchment definition: A piece of animal skin, esp. from a sheep or goat, dressed and prepared as a surface for writing; a scroll or roll of this material; a manuscript or document written on this. OED online.

II. Centers of Learning at Salerno and Bologna Early printed Books: Mondino and Ketham, 1491-1513 and Guy de Chauliac Grande Surgery, 1519

A. Salerno

6. Rare Book - Level 7 x610.9 R335 1500 Regimen sanitatis cù expositione magistri Arnaldi de Villa nova Cathellano Noviter impressus. - Venice : Bernardino dei Vitali, ca. 1500.

7. Rare Book - Level 7 BALL R335 1634 Regimen sanitatis Salerni, or, The schoole of Salernes regiment of health : Contayning most learned and judicious directions and instructions, for the guide and government of mans life London : Printed by B. Alsop and T. Favvcet, dwelling in Grab-Street neere the Lower Pumpe, 1634

Regimen sanitatis Salernitana, Latin: The Salernitan Rule of Health is a medieval didactic poem in hexameter verse. It is allegedly a work of the Schola Medica Salernitana.
B. Bologna

8. Rare Book - Level 7 x610.9 C496 1519 Guy, de Chauliac, ca. 1300-1368

Following study in Toulouse and Paris, he became master of medicine and surgery in 1325. He survived the epidemic of 1348 after treating many people and documenting the symptoms for his Chirurgia Magna or Grand Surgery. His surgery’s first chapter is anatomy. In six other parts, it also covers bloodletting, cauterization, drugs, anesthetics, wounds, fractures, ulcers, special disease, and antidotes.


Fasciculus Medicinae (1491) was the first illustrated practical treatise on medicine issued from the printing press. It has a number of works on anatomy and an account of the 14th century plague. Illustrations added to the 1493 edition are in an appendix at the end.

10. Rare Book - Level 7 xxWZ 290 K43 1495 Ketham, Joannes de, 15th cent. Fasciculus medicinae / Johannes de Ketham.] - Editions Medicina Rara, 1975?] - [42]
leaves xxWZ 290 K43f 1495 Ketham, Joannes de, 15th cent.
The complete 1495 edition has Mondino’s Anathomia as one of the five texts. It is illustrated with a depiction of veins used of bloodletting with various diseases and a depiction of a dissection.

Pages from the 1494 edition at the national Library of medicine are online
Turn the Pages:
It also has Mondino’s dissection manual as one of its texts.
11. Rare Book - Level 7 xxWZ 290 K43 1495 Ketham, Joannes de, 15th cent. Fasciculus medicinae / Johannes de Ketham.] - Editions Medicina Rara, 1975?

12. Rare Book - Level 7 BALL M741d 1513 Mondino dei Luzzi, d. 1326. De omnibus humani corporis interioribus membris anathomia. - Impressit Argentine [Strasbourg]: Martinus Flach, anno Domini 1513. - [40] leaves: 2 ill. (woodcuts); 18 cm. (4to)

3 illustrations: astrological man (t.p., repeated on recto of last leaf), the heart (verso of F4); woodblock initials. Includes index and printed marginalia.

III. Classical Authors and the Medical Humanists who translated them, 1510-1597

A. Hippocrates, ca. 460 BC – ca. 370 BC

13. Rare Book - Level 7 x 610.9 H667 1538 Hippokratous K_oou ... biblia apanta (romanized form) Hippocratis Coi ... libri omnes, ad vetustos codices summo studio collati & restaurati. Basile: Hieronymus Froben & Nicolaus Episcopius, 1538 Description: [8], 562, [2] p.; 30 cm.

B. Claudius Galen, 129 – 217 A.D.

14. x610.9 G153 1532-1536 Cl. Galeni ... Opera omnium utilissima, Basileae, apud And. Cratandrum, 1536. [28], 521 p.: ill.; 32 cm.

Wood cuts of a skeleton, front and back, and the base of the skull are among the few illustrations in this edition of Galen. They are part of De ossibus, Galen’s elementary course on bones (illustration, p. 491-493).

15. Rare Book - Level 7 x610.9 G153 1596-1597 Galeni Opera ex septima luntarum editione ... - Venetiis, apud luntas, 1596-1597. - 12 v. in 6: ill.; 35 cm.

This much later edition of the collected works of Galen has illustrated title-pages with illustrations of Galen. One shows Galen dissecting a pig. Volumes 1.

C. Mesue, d. 857 or 8 (Yuhanna ibn Masawaih)

16. The first printed Arabic edition of the Canon in the West. Books of medical practice, with some writings relating to the science of logic, nature and rhetoric.
In the ancient world, diseases were thought to be from demons and poor behavior in regions such as Mesopotamia and Egypt. These diseases were treated by multiple parties working together, including spiritual physicians, magicians as well as surgeons, who physically treated patients using medical procedures. In the Middle Ages, past saints were dismembered into relics which were thought to provide spiritual treatments for certain diseases. Hospitals became prevalent in the Dark Ages, but used spiritual treatments more than scientific methods. In the 9th and 10th centuries, Arabic knowledge (and classical Greek and Latin texts translated into Arabic) began to be integrated with the Western world via translation of texts in Italy. Beginning in the Middle Ages, a lot of medical knowledge was obtained via dissections of human cadavers. These dissections were contentious (illegal under Roman law), but many Christians argued that bodies were distinct from souls, which would move on to the afterlife, regardless of dissections after death. It is interesting to see how the incorporation of multiple disciplines into one treatment is still utilized (eg. Medicine, chiropractor, herbal, religious, etc.). It is also interesting to see how the acceptance of human cadavers has evolved and how the opposition to animal research has emerged.

The paths of Anatomy and Medicine have proceeded in ebbs and flows both in acceptance and geography throughout history. In Mesopotamia philosophy starts with sickness being a result of spiritual ailments and this theme continues throughout history through the middle ages. However, the recognition of physical sources of the ailments begins in Egypt and continues to grow throughout the progression of Medicine. Central to this spiritual aspect are the limitations placed on dissection as philosophies progress from Alexandria when the dissection was allowed, to its prohibition during Galen’s time under Aristotelian philosophy, and the later Christian view of the body as a temporary vessel which again allowed dissection. This path also was present geographically as medical advancements moved from Egypt to Greece to Rome. When Rome fell, the knowledge moved east and was furthered by the Muslim culture. Later the knowledge returned west through the opening of contact with the crusades and efforts of translators at places like Salerno. This led to curricula of teaching and dissection in universities, namely the university at Bologna when dissection now became a didactic tool beyond its use as treatment. This was the point dissection and medicine had reached prior to the Renaissance.
The most interesting aspect of today’s readings and discussion involved the interplay between the east and west with respect to medical knowledge. Whether or not the Salernian Medical School existed as a stand-alone place, it represents the transmission of ideas between the three major religions (Christianity, Islam and Judaism) with Southern Italy serving as the conduit. This stands in stark contrast to the political and religious climate that we see now. It was also interesting to see the ways in which the ancient/medieval world was actually more progressive than now with respect to education. Mesopotamian civilizations (eg: Sumer) and ancient Egypt educated their women substantially, and female physicians seemed to be commonplace. Again, this stands in contrast to the Mesopotamia (middle east) and Egypt (north Africa) of today, where the education of women has become a rallying cry for religious fundamentalists. When we think about the ancient world, we assume that significant progress has been made in education and social justice. It seems as though these historical centers of medical innovation have actually regressed socially, while progressing scientifically.

During the period spanning Antiquity through the Renaissance, the acquisition and dissemination of medical knowledge and practice was heavily influenced by the prevailing religious ideas. For example, in Mesopotamia illness was considered a punishment cured by physicians who were considered to be priest-like. Monks were also instrumental in the movement of knowledge through translation of Arabic and Greek texts, and also were considered to be doing the work of Christ in their charitable endeavors at the hospitals contained within monasteries. In addition to this, during the Middle Ages the prevailing medical knowledge had to acknowledge the superiority of the heavenly medicine. This interaction between religion and medicine also relates to the practice of dissection. The prevailing Catholic ideas about resurrection allowed the practice of dissection based on the belief that the whole body would be regained in the last stage of the world. One last interesting intersection between religion and medicine is the work of Plato and Aristotle who used dissection to explore the relation between human and his Creator by examining the divine within the body. In this way, religious authorities both helped and hindered medical discoveries and the practice of dissection.
One of the most intriguing aspects of understanding history of medicine is appreciating the changing impact of spirituality and religion in medical practice. In many different cultures in ancient and more modern historical eras, spirituality was integral to medicine. Oftentimes, spirituality was elevated in importance compared to the physical body, as in ancient Mesopotamian cultures and in European Christianity of the Middle Ages. Dissection functions as a particularly interesting manifestation of religious beliefs in medicine. This was particularly clear in the contrast between those who treated the physical body as being more sacred (the ancient Greeks) and those who saw the body as having more of a temporal nature (Christians). Nowadays, my impression is that society at large (in America and the Western world at least) generally places a lot of stock in medically treating the physical body. It would be interesting to compare how the Western world steeped in Christian tradition differs in opinion with regard to cadaver dissection compared to cultures with different religious backgrounds.

Medicine (the past attempts, and modern successes, to relieve illness and suffering) has a long history. A brief survey of ancient civilizations seems to indicate that medicine and spirituality were linked with various degrees. In fact, one of Hippocrates' main contributions is to stress the natural causes of diseases. Egypt, an example of a country which was stricken with many diseases, early on developed an elaborate and specialized medical expertise intertwined with the religious establishment.

Knowledge in anatomy was not uniformly recognized as essential, but some schools of thought nevertheless stressed its importance and carried out animal and human dissections. It moreover seems that the most celebrated medical scholars in both the Western medieval and Islamic traditions valued and exchanged anatomical knowledge. However, the degree to which human dissection was performed depended on the philosophical and religious perception of life and body. When frowned upon, knowledge was obtained clandestinely, through animal dissection, or whenever chance would allow a scholar with adequate preparation and interest to stumble upon a body in sufficient state of preservation.
Knowledge of anatomy from ancient times to the middle ages parallels the history of medicine in general, in that it remained relatively stagnant for long periods of time prior to the renaissance. From the beginnings of recorded history there were physicians, or individuals who cared for the sick. However, knowledge of anatomy was not always essential for their practice. For example, Hippocrates, the so-called "father of medicine," wrote at length about the influence of the humours on health, but did not emphasize familiarity with human anatomy. After the ancient Egyptian priests, Galen (2nd century AD) was the first to emphasize anatomical knowledge and experimentation. He dissected both deceased humans and animals such as pigs, and wrote several books on the subject (i.e Tegni). This work essentially remained the standard for a millennium. At Salerno, Italy, where many historians have located a medical school in the 12th century as a site of a new medical renaissance, Galen's work on anatomy was still being used. Yet, though Galen was widely respected, various professors were beginning at that time to update the canon with their own experimentation.

The common theme that I saw through a lot of these readings was the importance of a social, political, and cultural context to the study of medicine and dissections. First, religion, in particular, affected how disease was treated and the restrictions upon studying humans. In Egypt and Sumeria, there was a blending of medical and spiritual traditions. The articles also talked about the nature of the soul and how opinions on that influenced dissection. Aristotle viewed the loss of the soul as a profound change in the nature of the organism and thus dissection was not as useful as vivisection. In contrast, European physicians were permitted to study cadavers because there was no more soul. Second, during the early stages of medicine, there was also a strong reliance on tradition. People referenced classical texts even if they were hundreds of years old because that knowledge was difficult to obtain under the aforementioned constraints of the time. The return to classical texts facilitated the use of dissection because the benefits of such practices became clear. Overall, dissection was seen as a repelling but valuable didactic tool, despite its limitations in the clinical setting.
In ancient Egypt, people faced various health problems such as parasitic worms, and the average life span was approximately 40 years. Due to these reasons, ancient Egypt became the birthplace for medicine and surgery. High standards were established for the practice of medicine. A few queens were known to be good at medicine. With the fall of Roman Empire, the Western world entered the Dark Age and kept the Hippocratic tradition. During this time period, medicine was divided into human and religion based medicine. For religion medicine, relics of saints were dismembered and shipped around the country. During this time period, church also had monopoly over all the new knowledge, and dissection was banned until 13th century. At the same time, Arab world entered its golden age, and their system of knowledge was spread with their conquests. They tested their doctors before allowing them to practice and paid them well to not take another job. During 13th century, Salerno Italy established its own medical school and opened a new chapter in medicine and anatomy. Shipping routes and Crusade might have contributed to the mix of culture and lead to the accumulation of medical knowledge at Salerno. Technicians were hired to make precise cuts on human bodies, while professors would read Galen's textbooks and pointed at various structures. It has been very interesting to see how the practice and teaching of anatomy has been changed over the years, and how it was influenced by religion and philosophy during different time periods.

Today's readings highlighted how the evolution of the perceptions of medical and anatomical knowledge have been influenced by religion, individuals, and institutions over the past 1500 (for 3000) years up to the Renaissance (~ 1350 CE). In Mesopotamia, illness was believed to be to be the result of sin, and treatment required things like exorcism and prayer to heal a person. Less of an emphasis was put on the physical manifestation of disease. Conversely in Egypt, disease was viewed as physical phenomenon that could be treated via the use of medicine, and Egyptian people believed that medicine and magic were distinct, but that magic could enhance the actions of medicine. The middle ages fostered the view of two separate kinds of medicine, one human and the other religious. Additionally, religious individuals played a profound impact on the assimilation of medical knowledge. Perhaps most notably at Salerno where monks were crucial to transcribing and collecting medical knowledge from the Greeks, Romans, and Islamic empires. Views on dissection also changed over time, and it seems that Christianity helped to pave the way for Anatomy to become a part of medical curriculum.
Da Vinci and Vesalius

Week II.  Wednesday October 30, 2013

Readings: (French 1999; Jose 2001; Vesalius, Saunders, and O'Malley 1950)
Reference: (Magner 2005) Chapter 6
Bibliography


Vesalius, Andreas, J. B. de C. M. Saunders, and Charles Donald O’Malley. 1950. *Illustrations from the works of Andreas Vesalius of Brussels; with annotations and translations, a discussion of the plates and their background, authorship and influence, and a biographical sketch of Vesalius*. Cleveland,: World Pub. Co.
ARB Displays

Week II - October 30, 2013


2. John Chamberlaine, F.S.A. *Original designs of the most celebrated masters of the Bolognese, Roman, Florentine, and Venetian schools* : comprising some of the works of Leonardo da Vinci, the Caracci, Claude Lorraine, Raphael, Michel Angelo, the Poussins, and others, in His Majesty’s collection / engraved by Bartolozzi, P. W. Tomkins, Schiavonetti, Lewis, and other eminent engravers ; with biographical and historical sketches of L. da Vinci and the Caracci by J. Chamberlaine. - London: Printed by W. Bulmer and Co., Shakspeare Press, 1812. - [4], 14, [6], 5 pages, [65] leaves of plates (some numbered): ill., ports. (engravings and lithographs) ; 51 cm. (fol.)


5. ____________ *Della simmetria de i corpi humani, libri Quattro*. In Venetia: Presso Domenico Nicolini, 1591. - [6], 143, [1] leaves: 142 illustrations (woodcuts); 33 cm. (folio in 6s).


8. Andreae Vesalii... De humani corporis fabrica ... Basileae, Per Joannem Oporinum 1555 [12], 824, [48] pages: illustration, portrait; 44 cm.

9. Andreae Vesalii Bruxellensis, scholae medicorum Patauinae professoris. De humani corporis fabrica libri septem ... - Basileae: Ex officina Joannis Oporini, anno salutis reparatae 1543. Mense lunio. - [12], 659 (i.e. 663), [37] pages: ill. (some folding), port.; 43 cm.


15. Valverde de Amusco, Juan.. *Anatomia del corpo humano / composta per M. Giouan Valuerde di Hamusco ; da luy con molte figure di rame, et eruditi discorsi in luce mandata.* - In Roma: Per Ant. Salamanca, et Antonio Lafrerj, 1560. - [18], 154 leaves, incl. 42 plates: 42 illustrations (copper engravings); 31 cm. (folio in 6s) ca. 1525-ca. 1588.

16. Realdi Columbi Cremonensis, in almo Gymnasio Romano Anatomici celeberrimi, *De re anatomica, libri XV.* - Venetiis: Ex Typographia Nicolai Beuilacquae, - [9], 2-169 [i.e. 269], [3] p.; 34 cm. (folio in 4s), 1559.

In the 14th and 15th centuries, there were public dissections for general learning and more specific dissections for scholars. Cadavers were often acquired from public executions, where the dissection was an additional punishment with a common belief being that their souls were no longer allowed into heaven. People attempted to justify dissections to the leaders of the day, like the holy Roman emperor, by citing the educational benefits. In addition, with the rise of printing presses, anatomical textbooks began to be utilized with very detailed images providing reference material without live dissections. Leonardo studied anatomy as a science, relating structure with function. Leonardo’s work was not published during his lifetime because he was not an academic, but instead a tradesmen. As a result, his work was not published and integrated into practice, despite his advances in understanding of anatomy.

It is a shame that Leonardo’s work was not able to be used in his time, but it is amazing to think of how much information was gained from performing dissections on human cadavers. However, the importance of the printing press was evident in anatomical textbooks that preserved and spread this knowledge.

The European Renaissance signaled an era of growth in philosophical and technological knowledge from 1300-1650. This growth of knowledge was centered in the idea of Classicism whereby scholars were uncovering the knowledge of classical scholars such as Hippocrates, Aristotle, and Galen. This availability and dissemination of knowledge was enhanced by the printing press and global connections through the invention of the compass and trade routes such as the silk road. In regards to anatomy and medicine, the view changed from the idea of theological punishment by dissection on executed prisoners to the value of dissection as a tool of learning and discovery. In this period, we see the incorporation of images to the classical texts in the 1400s particularly by Leonardo da Vinci. He studied the form and mechanics of the body, but never published. Thus, it was Vesalius in the 1543 with the Fabrica that contained unmatched illustrations with which to demonstrate the anatomical text. This learning method drove anatomy as a basis for medical study as opposed to the previous status of physicians having a general knowledge. The anatomy, in conjunction with gunpowder-based weapons, led to advances in surgery by Peré and Vesalius as well as others that brought surgery to the physician as opposed to just the barber.
The era of the Renaissance brought about a focus on the study of man. Several innovations and historical events facilitated and encouraged this study, including high death rates due to illness, the discovery of new plants and drugs, and perhaps most importantly the spread of literature and printing. Anatomists began criticizing classical texts even as they were celebrating a return to knowledge from this era. This led to learning from firsthand sources such as dissections in order to supplement classical study. As this practice was more adopted, errors and discrepancies were noted and anatomical knowledge was reconsidered.

This learning also brought benefit to contemporary artists and sculptors interested in realistic portrayals of man. Among these was Leonardo da Vinci, whose genius enabled him to investigate a large number of fields in science and medicine. However, da Vinci was not academically trained or accepted, and his discoveries were thus not published and did not have a significant impact on medicine at the time. Thus, although anatomy and medicine were involving, there remained significant adherence to tradition.

The Renaissance was a period in which there were great strides made in establishing anatomy as an academic subject. Prevailing cultural ideas had shifted, that brought the focus of study on the human body, including both philosophical and anatomical knowledge. This combined with the availability of printing allowed for recording and disseminating information. Vesalius and Da Vinci are two examples of Renaissance figures that were involved in these advancements.

Vesalius believed that anatomy should be learned from human bodies, instead of focusing on understanding Galen’s writing. He also believed in using dissection as a tool for understanding human anatomy. His dissections at Padua led to the publication of De humani corporis fabrica, which was based on several dissections and included illustrations, which was atypical of the time period.

Da Vinci, although not published, also was responsible for innovations in understanding of anatomy. His approach deviated from Vesalius’ in that he had a focused on understanding the mechanics or function of anatomical structures. For example, he noted antagonistic muscles. He was also the first to draw an embryo in utero and counted the normal number of teeth in an adult.
This week’s readings focused on the transition from the middle ages to the renaissance, with an emphasis on the work of Vesalius and Leonardo da Vinci as exceptional examples of the work in this period. The renaissance saw a renewed interest in public and private dissection, justified both philosophically (based on the view of the nature of man) and practically (to advance surgical techniques). Printing also allowed more extensive display and exchange of knowledge. A few centers in Europe were focal points of medical scholarship, such as Bologna, Padua, or Paris. Leonardo da Vinci (15th century AD) pioneered numerous fields of knowledge. In anatomy, he precisely described bones, muscles, the uterus, and the heart, emphasizing the mechanistic functions of the human body. He nevertheless was not considered to be a scholar by his contemporaries, and his work at first mostly went unnoticed. Vesalius (16th century AD) on the other hand utilized the printing and wood cut techniques at their best to exhibit his discoveries or challenges to the anatomical consensus (mostly based on Galen). He studied at the foremost centers and his “De Corporis Fabrica,” beautifully illustrated, rapidly became a reference.

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Da Vinci and Vesalius are notable in that they progressed the study of anatomy and dissection through meticulous practice and illustration. First, the transition from medieval times to the European Renaissance brought with it newfound interest in the study of mankind. In almost all areas of learning and art – painting, literature, theology being just a few – admiration of God and the ancients, which had previously come first, yielded to a focus on earthly, contemporary life. If the renaissance was an effort to study mankind, as opposed to God, then dissection was a logical means by which to further it. Public dissections began to occur more regularly in the universities, while in his cellar Leonardo da Vinci dissected privately. Between the two figures of Vesalius and da Vinci there were several notable differences. For one, the two men had been educated in vastly different traditions. Whereas Vesalius, coming from a distinguished family, had attended the most prestigious schools of his day, including the University of Paris, da Vinci was almost entirely self-taught. This discrepancy may also help to explain why da Vinci did not publish his work in a similar way to Vesalius. He did not know how to read or write in Latin, the universal language of the educated at the time.

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The relationship between anatomy and knowledge is an interesting aspect of the history of dissecting during the Renaissance. Anatomy was used to gain knowledge about how the human body functions but was in many ways limited by the lack of knowledge in human physiology. This was exemplified by the extent to which dissections were not seen as being particularly useful to physicians and medical student: theoretical and philosophical education were given a premium while scholarly dissections were not emphasized in medical education. During this time period though, dissections were allowed to occur and became more common. The work by important anatomists such as Vesalius and da Vinci demonstrates that dissections were used to gain more knowledge about the human body, such as in the case of experimentations with organ function (heart, bladder, uterus, etc.) in cadavers. However, even the apparent objectivity that one would think comes with direct observation of the body was limited by knowledge: da Vinci’s drawings, for example, often showed bovine features. Thus, anatomy and its connection to knowledge of the human body show a particularly unique interplay during the Renaissance.

During the Renaissance, Europe experienced the disintegration of medieval culture, and important economic, social and intellectual transformations took place between 1300 and 1650. According to Francis Bacon, three important inventions changed the world during that period, including printing, gunpowder and compass. The establishment of printing presses helped to accelerate the spread of new ideas. Gunpowder forced physicians to deal with gunshots and other problems that were unknown to physicians. Compass allowed Europeans to explore the world and bring back new animals, plants and remedies. During this period, human dissection was practiced to a limited extent until the city of Bologna authorized the provision of two cadavers each year for university dissection in 1442. Students attended these dissections in order to confirm their readings and prepare for exams. These dissections were also open to the general public and provided entertainment. Many artists also attended the dissections since they believed that human body was beautiful and worthy of study, and a good example is Leonardo da Vinci. He made many drawing of the anatomical parts on human body. He was the first one to recognize the coronary arteries and discover that heart is made of muscles. Unfortunately, the notebook that contained his drawings remained unpublished for centuries. Overall, this is an interesting time period since people started to recognize the values of learning from human bodies, instead of following the religion teachings or classical Galen texts.

The Renaissance marked an era of social, political, and economic transformation. War, famine, and disease in the time leading up to the beginning of the Renaissance were key to this transformation. Notably, the Renaissance ushered in an era in which secular investigation in contrast to religious thought became meritorious in its own right. One of the main purposes of dissections in the 13th century in Bologna and other places in Italy was to publicly shame criminals (who were most likely heretics). A second effort of anatomy
was to uncover the information lost from the Greek and Roman periods. To accomplish this, anatomists often employed resurrectionists who performed murder and grave robbery to obtain bodies. Perhaps one of the most studied figures of the Renaissance in today’s light is Leonardo da Vinci. Da Vinci made many notable anatomical discoveries including studying human embryos, the coronary vessels of the heart, and antagonistic muscle pairs. He made such headway into the study of anatomy because he approached it as a science. His goal was to understand the mechanics of the human body. However, da Vinci never published his anatomical findings, so he had little to no influence on the study of anatomy at the time. This highlights the importance of publishing scientific data.

The most interesting aspect of today’s class was the fierce resistance of scholars to non-Galenic thought. Galen, the spiritual father of anatomy, presented the most comprehensive study of anatomy that the world had seen to that point. It was a monumental step forward for anatomy, but that progress stopped abruptly after him. Apparently, later scholars revered this colossal work so greatly that they were intolerant to dissenting ideas. Scholars spent the next 1300 years translating, re-translating and editing Galen’s work, instead of learning from the body itself. The most shocking thing I read this week was about how scholars blamed the de-evolution for the anatomical differences between the dissected body and Galen’s text. Rather than accept that the great Galen could be mistaken, these scholars invented reasons to discredit the newer school, Vesalius most importantly. To modern readers, it seems exceedingly obvious that the best way to learn anatomy would be from the body itself. However, medicine as a science has historically been stuck in the mires of tradition.

The second most interesting aspect of today’s lecture was the tragedy of da Vinci. The fact that the entirety of da Vinci’s groundbreaking anatomical work sat locked away for centuries is a crime. It seems as though da Vinci’s perfectionism, combined with his deficits in the scholarly languages conspired to keep his work hidden from the world. I think this perfectionism can be seen in his own words. On his death bed, da Vinci lamented the fact that he offended God because his work was not good enough. If he truly believed this, it would partially explain his lack of published anatomical works. (sorry it’s a little long)
Scholarship from the Renaissance through the 19th Century

Week III. Wednesday November 6, 2013

Readings: (Carlino 1988; Ferrari 1987; Messbarger 2010)
Reference: (Magner 2005) Chapter 6
Bibliography


ARB Displays
Week III - November 6, 2013

I. Public Anatomy and Anatomy Theatres


The Dissection scene in color is from the 1493 edition of Mondino’s dissection manual, one of many works in Ketham’s compendium of medicine.

2. Rare Book - Level 7 CID F126t 1624 FABRICIUS, AB AQUAPENDENTE, CA. 1533-1619. Hieronymi Fabricii ab Aquapendente ... Anatomicis et Chirurgiae in Florentissimo gymnasio Tractatus quatuor. Quorum I. De formatio foetu. II. De locutione & eius instrumentis. III. De loquela brutorum. IV. De venarum ostiolis. Francofurti: Iacobi de Zetter, typis Hartm. Palthenii, 1624.

The Dissection scene is one of many anatomical engravings on a spectacular engraved title page. Hieronymus Fabricius ab Aquapendente is the Latin name for Girolamo Fabricio, an anatomist and surgeon who taught for many years in Padua. Fabricius, teacher of Harvey at Padua, discovered the venous valves and illustrated them in life-size copperplates in De venarum ostiolis first published in 1603. He didn't recognize their true function, considering the valves to delay the blood flow. This work must have influenced Harvey to turn his experimental efforts toward an accurate explanation of the venous valves. One of the eight plates showing the valves in the veins of an arm, was adapted by William Harvey for his work on blood circulation.


Johann Vesling became professor of anatomy at Padua in 1632. As professor of anatomy he wrote a much-used manual Syntagma anatomicum in 1641. In this edition, the title page shows a body in the center of an anatomy theatre. The 24 plates, made under Vesling’s supervision by G. Georgii, represent some organs of the human body more correctly than earlier atlases. The title page shows a body as the center of an anatomy theatre. Harvey’s recent discovery of the circulation is discussed on p. 121 and the heart is depicted with four pulmonary veins emptying into the left auricle of the heart on p. 127.
4. **Rare Book - BALL C344a 1656**
Casseri, Giulio Cesare, ca. 1552-1616. Anatomische tafeln. - Franckfurt am Mayn : Jn Verlegung Thomae Matthiae
Götzen, Jn Jahr Christi 1656.

The added engraved title page is illustrated with a dissection scene in an anatomy theatre.

5. **Rare Book – BALL D561a 1683 Diemerbroeck, Ysbrand van, 1609-1674.**

The Added engraved title page is illustrated with a corpse in an anatomy theatre. Diemerbroeck, professor of anatomy and medicine at Utrecht, is remembered not only for his studies of the plague but more especially for this work on anatomy. The first edition was published in 1672; it quickly became popular throughout Europe and went through many editions.

6. **Rare Book - Tyler QS 4 B642 1687**

Added engraved title page is illustrated with a dissection scene in an anatomy theatre. This anatomical compendium is useful for its profusion of plates. Added is a short tract on embalming and an interesting section on circulation.

7. **Extra Oversize Rare Books - Level 7 Tyler WZ 260 E91t 1722 & BALL E91t 1722 & Oversize x610.9 E91t 1722**
Eustachi, Bartolomeo, d. 1574. Tabulae anatomicae / Bartholomaei Eustachii; quas è tenebris tandem vindicatis et Clementis XI. Pont. Max. munificentia donos acceptas praehydratione notisque illustravit ... Jo. Maria Lancisius ... - Amstelaedami: Apud R. & G. Wetstenios, 1722.

The vignette on title page to this second edition shows a dissection scene drawn by Pier Leone Ghezzi. The same vignette appeared in the 1714 1st edition.

8. **Extra Oversize Rare Books - Level 7 x610.9 D611 1758**

According to Choulant, Disdier was a professor of surgery and also a drawing master at the Academy of Painting in Paris. The vignette on the title page depicts a dissection in an anatomy theatre.
II. Flap anatomies

9. Rare Book - Level 7 Tyler Extra Oversize Andreae Vesalii ... De humani corporis fabrica ... Basileae, Per Ioannem Oporinum 1555 [12], 824, [48] pages: illustration, portrait; 44 cm.

The uncut parts for the flap anatomy are on X¹⁻² (after page 504). This second edition contains Vesalius's final revisions of the text.

10. Oversize Rare Book - Level 7 BECKER T541 1576
Thurneisser zum Thurn, Leonhard, 1531-1596.

Confirmatio concertationis: oder ein Bestettigung desz jenigen so streittig, häderig, oder zenkisch ist, wie dann ausz Unverstandt die neuwe und vor unerhörte Erfindung der aller nützlichsten und menschlichem Geschlecht der notturtigsten Kunst desz Harnnprobirens ein Zeitlang gewest ist ... in dreyzehen kurtzer Büecher an Tag geben. - Berlin: Im Grauwen Closter, 1576

This is an early medical flap anatomy after Vesalius' Epitome. It has both male and female figures and numerous anatomical and other woodcuts throughout the text. Thurneisser was a follower of Paracelsus, physician, metallurgist, alchemist, astrologist, and private physician of the Elector Johann Georg of Brandenburg. He also attempted to sell tin coated with gold as gold bricks, an offense for which he had to flee from Basel. He contributed to the alchemical literature which had flap books earlier than the medical literature.

11. Archives and Rare Books Stacks - Level 7 BALL B288o 1583 and Oversize Rare Books - Level 7 Becker B288 1583
Bartisch, George, 1535-ca. 1607.


Ophthalmodouleia is the first comprehensive monograph on eye diseases, their cures, and especially on eye surgery -- Garrison-Morton 5817. Another early medical flap anatomy.
12. Oversize Rare Book- Level 7 CID H477 1720
   Hellwig, Christoph von, 1663-1721.
   Nosce te ipsum vel anatomicum vivum, oder Kurtz gefastes doch richtig
gestelltes anatomisches Werck. - Franckfurth (Frankfurt) & Leipzig : H. P.
Ritscheln, 1720. - [8], 42 p., 4 leaves of plates (with several superimposed
flaps) : ill. ; 32 cm.
   Ed. by T. A. von Hellwig.
   The extraordinary plates are flap anatomies based upon those appearing in Johann
Remmelin's Catoptrum Microcosmicum, 1619.

III. Anatomical atlases

13. Extra Oversize Rare Books - Level 7 BALL C344p 1609
   Casseri, Giulio Cesare, ca. 1552-1616.
   Iulii Casserii Placentini, philosophi, medici et anatomici, in vtraque
medicina Patauui versantis Pentaestheseon, hoc est, De quinque sensibus
liber : organorum fabricam variis iconibus fideliter aere incisis
illustratam, nec non actionem et vsum, discursu anatomico &
philosophico accuratè explicata continens. - Venetiis : Apud Nicolaum
Misserinum, 1609.

   This volume on the senses is an early specialist anatomy. The 12 plates on the ear were
published in 1600-1601 in another specialist anatomy by Casseri. The plates were
drawn and engraved by Joseph Maurer, a German painter and etcher.

14. Extra Oversize Rare Books - Level 7 x610.9 C876 1737
   Cowper, William, 1666-1709. The anatomy of humane bodies, with
figures drawn after the life by some of the best masters in Europe, and
curiously engraven in one hundred and fourteen copper plates, illustrated
with large explications, containing many new anatomical discoveries, and
chirurgical observations: To which is added an introduction explaining
the animal_conomy, with a copious index. By William Cowper. Revised
and publish'd by C.B. Albinus ... - The second edition. - Leyden, Printed for
Joh. Arn. Langerak, 1737. - 69 leaves, 115 leaves of plates : ill. ; 51 cm.
15. Extra Oversize Rare Books - Level 7

Originally published in 1685 under the title, Anatomia humani corporis. The chief value of this Bidloo’s Anatomia lies chiefly in the 105 fine copperplate engravings drawn by G. de Laires. When William of Orange came to England in 1688, Bidloo was chosen to accompany him as his physician –Garrison-Morton 385. Engraved plates later were plagiarized and published with text by William Cowper under the title, Anatomy of the humane bodies (Oxford, 1698).

16. x610.9 R985 1721 Ruysch, Frederik, 1678-1731
Thesaurus anatomicus primus -decimus ... Het eerste -tiende anatomisch cabinet ... - Amstelaedami : Apud Joannem Wolters, 1701-16.

Frederici Ruyschii ...Thesaurus anatomicus primus [-nonus]. Thesaurus anatomicus primus [-nonus]. - Amstelodami : Apud Janssonio-Waesbergios, 1721-1726.

Ruysch, professor of anatomy at Leyden and Amsterdam, is notable for his method of injecting the vessels. The recipe for the material used by Ruysch has remained a secret. His discoveries include the first description of bronchial blood vessels and vascular plexuses of the heart and the valves of the lymphatics. His anatomical cabinet exhibited in several houses in Amsterdam was a tourist attraction. This 10 volume Thesaurus anatomicus catalogues Ruysch’s collection which he sold to Peter the Great in 1717. The collection is now at St. Petersburg.-- Garrison-Morton 389; Norman Library of Science and Medicine 1875.


Cowper’s Myotomia is considered one of the most beautiful anatomical atlases of the 18th century. It was first published in a much more modest form in 1694, with only ten plates. Cowper worked until his death on a new and expanded edition, which was finally published posthumously under the supervision of Richard Mead (1673-1754). This new edition featured over sixty plates, many in the style of Rubens and Raphael. The text included a long introduction on muscular mechanics by physician and writer Henry Pemberton (1694-1771), the editor of the third edition of Newton’s Principia. Also of note are the ingenious initial letters with anatomical motifs depicting the muscles discussed in the text in which they are placed.

The two Hunter brothers, William and John, were among the foremost anatomists of the 18th century. William ran an anatomical school out of his home in Covent Garden that he modeled after the practices of the Parisian hospitals and private instructors, meaning that the students would be dissecting an entire human corpse by themselves. This called for an unprecedented number of bodies, which were supplied by William's brother John.

As one of London's pre-eminent male midwives, William had a special interest in the anatomy of pregnancy. The Anatomy of the Human Gravid Uterus was his greatest anatomical publication. The first set of ten illustrations was done by the Dutch artist Jan van Rymsdyk in 1750, but project was not completed until 1774. It is notable for the level of detail and accuracy of the illustrations, which marked a significant improvement in the visual depiction of pregnancy.
The period of Enlightenment arrived in the 18th century, and it was marked by efforts to replace superstition with concrete empirical evidence gleaned from the senses to explain the natural world. In anatomy, this took place in a focus on nerves and the elevation of the brain as the seat of intellect in the body. Also, modelers moved the representation of the human body from the two dimensions used by Vesalius into three dimensional models. One noteworthy modeler that pioneered this transition was Anna Morandi. Working in Bologna which had been revitalized under the administrations of Pope Benedict XIV, she became one of the foremost anatomists of the time in her depictions of the human body in wax. She was of the working class and had no classical education, but she became one of only a handful of recognized women in the academic world. She was awarded a professorship at the University of Bologna by the Pope, and her works were such that her house was a stopping point on the grand tours in Italy. Her work and position reflect the promotion by Pope Benedict XIV of education, particularly in anatomy, and gender equality in an era where there were no women.

During Enlightenment in late 17th and early 18th century, Bologna was became a world-leader in anatomy teaching and learning. Prior to this, in the Renaissance, prisoners would be executed in public, and their bodies were used at night for dissections. These dissections were not just purely academic exercises but also public gathering. Dissectors would cut open the bodies while writing down notes for their own anatomy books. However, after Galileo being condemned for his beliefs, people became reluctant to return to Italy to study anatomy. In order to change this situation, Pope Benedict XIV*, a great fan of human anatomy, tried to re-establish Bologna as the center of anatomical studies. He provided the funding and support for the Anatomical Museum, which contained waxed models of human bodies. In addition, he supported Lady Morandi and other females to take professor positions at University of Bologna. Lady Morandi became the first female professor in anatomy. She and her husband dissected thousands of bodies in their own kitchen. Because of her great work, she became popular among the academic world as well as the upper class. Both Pope Benedict XIV and Catherine the Great in Russia were great admirers of her works.
The stark contrast between anatomy in the Renaissance and anatomy in the Enlightenment was evident upon seeing the illustrations in the texts from the 17th and 18th century. The extent to which the depictions were realistic was particularly striking, and it seemed like anatomists had far more knowledge about the human body. This is certainly a reflection of the focus on reason and truth-seeking brought upon by the Enlightenment period. Such a philosophical atmosphere seemed to be a large contributing factor in the progress experienced by the field of anatomy during this period. Additionally, it was fascinating to learn that there was support from the Church for the development of anatomy as well, as demonstrated through Pope Benedict XIV’s endeavors to advance anatomy. Anna Morandi’s story also shows the extent to which royalty, schools, and even visiting nobles were taking interest in anatomy as a science, not just as entertainment. The changes experienced by anatomy in the Enlightenment and the support of this field by people in all walks of life definitely seems to usher in anatomy of the modern age.

The speaker today described a fascinating story of Morandi, a female foremost anatomist in the 17th century, in Bologna, Italy. Bologna has been the prime center of anatomy for numerous decades, but lost its popularity after Galileo’s trial. The archbishop of Bologna, Prospero Lambertini (later Pope Benedict XIV), a knowledgeable anatomist himself, worked to revive science in Bologna by founding an institute for science and an anatomical wax museum. Although at first linked with the museum, Morandi and her husband later worked from their home, where they conducted over a thousand dissections, taught students and visitors, and showcased their wax models. Morandi gradually grew to international fame; Catherine of Russia ordered a bust of Morandi for her dining table, anatomical models by Morandi were preserved in Bologna, by the Russian royal family, and visitors to Morandi’s home include Lord Byron and Galvani. Morandi’s strived to be seen as a scientist, who could use art to enhance learning and spur interest. Besides her teaching role (after receiving an appointment at the university in Bologna by Pope Benedict XIV) and fabrication of wax models, she also performed autopsies and research.
My major thought from today’s lecture is a continuation of last week’s. It is amazing how quickly history forgets about some of our most impressive people. Last week, we saw how da Vinci’s groundbreaking anatomical works remained un-published and locked away for centuries, potentially delaying the progress of the science. Today we learned about how history erased the story of Anna Morandi of Bologna. In a time when women were the object of dissections, Morandi became the teacher, prosector and ostensor. Urged onward with the help of an unusually enlightened pope (at least, scientifically), Bologna regained its reputation as a center for medical and anatomic mastery. In a city of master anatomists, Anna Morandi built up a reputation as THE master. Morandi’s anatomical models introduced a new way to study anatomy. Moving from the (suspect) text of Galen, to the more correct illustrations of Vesalius, the Morandi’s three-dimensional models represented the next leap forward for visual anatomy.

Tragically, the knowledge of Morandi’s achievements was erased for the greater portion of history. She was not able to make consistent money from her models, and died poor. This is in direct contrast to the good fortunes of Ercole Lelli. Lelli was able to make a living with only the fraction of Morandi’s talent and intellect. Once again, we see how anatomy has simultaneously progressed and regressed when it comes to science and social justice.

Professor Rebecca Messbarger spoke to us about the subject of her research. Bologna was a former center of learning in Italy and all of Europe in the Renaissance era. Public dissections were held during the paradoxical time of carnavale and were designed more as shows for the public rather than didactic lessons. However, around the time of the Enlightenment, Bologna had fallen into decline due to fears surrounding the prosecution of Galileo and lack of international scholars visiting and studying in the city. The future Pope Benedict XIV, at that time the archbishop of Bologna, wanted to rejuvenate the educational vibrancy of the city. Because of the Enlightenment focus on observation and knowledge acquired through the senses, anatomy at that time was gaining scholarly momentum. Therefore, the archbishop primarily supported an expansion of anatomical teaching, and he also supported the education of the first woman to earn a degree in Europe. He commissioned an anatomical museum containing wax figures produced by Ercole Leli that were known for their idealistic portrayals of the human body. At that time, a working class woman named Anna Morandi Manzolini and her husband also began producing their own wax figures. Their house became a tourist destination and they provided models for universities throughout Europe. Although she was until recently mostly erased from history, she was a significant influence, especially for a woman, in science at the time.
Anatomy in the Enlightenment age saw a shift from two-dimensional images to three-dimensional representations of human anatomy. The manner in which anatomy was instructed also shifted from placing the physician above the cadaver and reading to physicians performing the dissections themselves and touching the cadavers. This was a concept that was introduced by Vesalius in *De Humani Corporis Fabrica*, and also facilitated by Pope Benedict XIV, who was an avid supporter of the use of cadavers for studying human anatomy and also allowed female scientists to enter into the scientific field. Anna Morandi was one of the great anatomists involved in the 3 dimensional representation of the human body for the University of Bologna, which was at this time the center of medical education. The wax figures that she created from the dissections she performed in her kitchen were considered to be the best quality of the period, although the prevailing notions of the time concerning women prevented this recognition by some, and also prevented her rendering of the female urogenital anatomy.

Not unlike today, anatomy in the enlightenment era was characterized by a fascination with the brain. The mind and its function was, one could say, all the “scientific rage.” Consequently, when we view the wax bust of the 18th century Bolognese anatomist Anna Morandi, in which she is portrayed dissecting the brain, we can draw one important conclusion: Anna Morandi’s bust was intended to convey a sense of her scientific stature. Upon further investigation, it is clear that the “Lady Anatomist of Bologna” was indeed an important figure for enlightenment anatomy. This was a result of both her skill and her location. Her skill she gained from practice; she and her husband dissected over 1,000 cadavers in their home, and performed demonstrations for countless “grand tourists.” Her location, however, allowed her to gain her mastery. Bologna, formerly a center of medical knowledge in the middle ages, had slowly lost its own standing among medical schools by the turn of the 18th century. But this was not to last. In the years to come, through deliberate measures taken by the Archbishop of the city (who would later become Pope Benedict XIV), it underwent a renaissance of sorts. The town built a new school founded upon experimental practice, and even an anatomical museum. Anna Morandi would thrive in this environment, and even overshadow the more prominent anatomists of the university.
Today's lecture focused on the study of anatomy in Bologna during the Enlightenment. In particular, Pope Benedict XIV was influential in reestablishing Bologna as a strong hold for the study of anatomy during this time. He helped to found an institute of science at the University of Bologna and eventually a museum of anatomy. Perhaps his most substantial contribution to the field of anatomy was commissioning Anna Morandi and her husband to create wax sculptures of dissections. Prior to her career, women were excluded from practicing dissection and studying anatomy with the exception of serving as the cadaver. Morandi soon became one of the most prominent wax sculptors and anatomists in Bologna during this time. Zecchini, her contemporary anatomist, cited her career as an insult to science and stated that women think with their uterus [paraphrased]. Morandi's contributions to the study of anatomy were profound, but because of Zecchini's statement and perhaps other reasons she was excluded from studying the female reproductive system in depth. Her response to this was to become the most preeminent anatomist in the field of male urogenital anatomy. She seemed to abandon the view that men and women are fundamentally different and focused on the material aspects of anatomy that were in front of her.
Dissection in Medical School

Week IV. Wednesday November 13, 2013

Readings: (Bender 2002; Gelfand 1972; Gregory and Cole 2002; Hildebrandt 2010; Reynolds 2002; Stewart and Charon 2002; Tward and Patterson 2002)  
References: (Magner 2005) Chapter 8; (MacDonald 2006; Magner 2005; Roach 2003; Warner and Edmonson 2009)
Bibliography


ARB Displays

Week IV - November 13, 2013

I. Books


II. Archives and Visual Collections


19. Flexner, Abraham. *A report of the Medical Department of Washington University (1909).* Box 51, Folder 2, Central Administration, Washington University School of Medicine. Sub-Group 1: Dean and Executive Vice Chancellor Records.


Three photographs of Barnes Medical College students and the Barnes Medical College dissection lab, circa 1902. Barnes Medical College Gross Anatomy Instruction Photographs. Bernard Becker Medical Library Archives, Washington University School of Medicine. VC060001, VC060002, and VC060003.
Although today gross anatomy, featuring human dissection, is considered a rite of passage for medical students in this country – a foundation of knowledge which every physician should possess – it was not always so. In previous weeks we examined sources documenting the practice of anatomy in the ancient and medieval times, when the “art” of dissection was not deemed necessary for the education of a physician. This week we discuss the transition from the older to newer model. One important article addressing this transition has as its topic the “Paris Manner of Dissection.” In it, the author argues that Paris was the first location to feature a more “hands-on” approach to the study of anatomy. According to the author, this advance was brought about primarily by young, rising surgeons, who practiced at the city’s public hospitals, in their “free” time they taught private courses to paying students. Interestingly, in the early 18th century, Parisian surgeons were considered to be the most capable and effective in the world. The author argues that this was not coincidence, but rather a logical consequence of the intensive study of anatomy that was taking place in the city. The “Paris Manner” of dissection is important not only because it was developed in the first place, but also because it spread and gained acceptance elsewhere in the world. One could argue that our anatomy course here is a descendent of that tradition.

In the early 18th century, the field of anatomy saw a continuation of what Vesalius started. The Paris manner advocated for students to get hands-on experience in dissecting their own body: one per student. However, at this time, there was a lack of bodies leading to a gap in supply and demand as only criminals’ bodies could be used. This led to the “Resurrectionists” who would procure bodies for the medical schools. The methods of procurement were not always legal, leading to public outcry against dissection. Thus, laws and regulations began to appear allowing for donation and proper reclamation of bodies for dissection. Variations on these laws and dissection styles spread through the world of medicine, bringing greater anatomical experience to the average medical student. The styles of schools varied greatly with many proprietary schools and little standardization. The United States’ medical schools generally played catch up to their European counterparts during this time, until the early 20th century, when the Flexner Report detailed the deficiencies of each school in the country. Only six schools were found adequate and these became models for other schools and standardization of anatomy and cadaver donation as put forth in 1968.
Dissection done in Vesalius’ time was very different than it is today. While the Renaissance model of anatomy instruction had a physician performing the dissection, there was a shift to a more hands-on model following this period. The Paris manner of dissection was an example of this method of instruction and had a reputation for high quality anatomical knowledge in 18th century. These dissections didn’t occur at the medical school or public hospitals, but in surgeons’ homes where they would teach dissection for extra money. In addition to this, medical students had to purchase cadavers.

In the United States, this student-based model was highly utilized, although medical instruction changed drastically over time. Early U.S. medical education was based on physicians emigrating from Europe, or emphasized young physicians going to Europe for training. Eventually, prevailing notions changed and it was thought that physicians practicing in the United States should train domestically. A number of medical schools emerged, many of poor quality. However following the Flexner report, the number of medical schools dropped and those that remained were of superior quality. Acquisition of bodies also changed drastically over time. Initially executed felons were used, in addition to cadavers illegally obtained. This shifted to using individuals who expired in public institutions following new legislation and eventually to donations as public opinions shifted.

This week’s discussion focused on the development of medicine in the United States, in the context of medicine in Europe. The first pilgrims who settled in the USA were ill prepared to face the new diseases and poor public health conditions in the settlements. Gradually, numerous medical schools arose, but they often were run as a business and produced unqualified physicians. Nevertheless, the USA medical training gradually developed, for example with Harvard equipping a physiological laboratory in 1871, the aftermath of the Flexner report in 1910, or the University of Michigan spearheading active learning and peer teaching in anatomy. Alongside with the development of medical education, the public’s opinion toward anatomy also changed. Dissections have been traditionally seen as a humiliation and punishment, and only executed criminals (or snatched bodies) where dissected. With the growing needs of bodies, the law changed to allow body donations. Gradually, dissection (and donating one’s body) came to be seen as a way to invest in the next generation.
What struck me most this week was the concept of reputation, and the ways in which reputations are formed. Last week we discussed how Anna Morandi’s reputation was formidable during her life, but was all but forgotten after her death. This week we discussed the "Paris Method" of dissection. During the early 18th century, it was widely believed that the best surgeons were French. The "Paris Manner" of dissection was viewed as superior to other methods of teaching. However, the reality of the "Paris Manner" was much different than its reputation. The real "Paris Manner" of dissection was NOT taught at the Paris Medical Schools, nor was it taught at the Jardin du Roy. It also was not taught at the public or military hospitals. In fact, the "Paris Manner" of dissection was taught in private homes by experienced surgeons. This method, involving a greater degree of student participation, was also somewhat illegal. It was interesting that the manner of dissection, for which Paris was famous, was actually an underground undertaking. Additionally, most medical students in Paris DID NOT learn using this method, because it was much more expensive than the tradition curriculum. Like most things in life, the reputation did not quite match the reality.

This week covered the evolution of anatomy from the Renaissance to the beginning of the 20th century. During a lot of that time period, the Parisian surgeons were renowned as the best in the world, probably because they had access to a lot of bodies. Grave-robbing and corrupt hospital and mortuary workers provided a lot of cadavers for dissection, and there were several public outcries and mobs protesting such practices. Another important influence during this time was the Flexner Report, which criticized American medical institutions. The establishment of American medical schools got off to a slow start as it was not emphasized during the early exploration and expansion of America. By the turn of the 20th century, schools still did a poor job of educating students and were in dire need of reform. Emphasis on rote memorization was discouraged in favor of problem solving. However, anatomy was still highly valued and dissection still continued to play a major role as a didactic instrument. In St. Louis in particular, many low quality schools closed or majorly reformed their structure, both physically and institutionally, including Washington University.
When we first started our anatomy course here, we were told to treat our cadaver as our very first patient; we were instructed to exercise professionalism in the dissection lab – absolutely no photographs of the bodies, no bringing any body part outside the lab; we even felt bad making somewhat crude comments during class. For this reason, it was shocking to see some of the pictures displayed today: medical students from decades ago posed with completely exposed cadavers, clearly with no concern about privacy or propriety; an entire book filled with what appeared to be spoof pictures with cadavers and skeletons. Perhaps this sharp contrast is a reflection of the changes that have occurred over the past couple of centuries with regard to how we acquire bodies. When cadavers were deceased criminals or unidentified bodies, maybe it did not matter as much how they were treated by students. This may have played a role in the strange incidents that caused controversy and even riots in the early 20th century. Since the transition into body donations in the mid-20th century, anatomy lab has become an important way to teach professionalism and ethics. It is fascinating to see how our experience of anatomy lab is a direct result of progress made in society with regard to human anatomical dissections.

After the Discovery of New World, European immigrants had to endure seasickness and malnutrition after trans-Atlantic voyage. After their arrivals, they had to face malaria and yellow fever which they were not familiar with. Due to the shortage of people, clergymen became the most educated men in the colonies and performed both spiritual and medical services. The situation changed in 1847 when American Medical Association was established to act as the medical governing body. As a result, the first physiological and anatomical lab was opened at Harvard in 1871. However, Cadavers were in shortage since the society viewed dissection as a post-death punishment and humiliation. At that time, the only legally available cadavers were those of executed criminals, and the remainder of the demand was met by grave robbing. The most famous example is the case of William Burke and William Hare. They lured people into their lodging house, intoxicated them with alcohol and then suffocated them. They then sold the bodies to a local anatomy lab. The situation changed in 1968 when the Uniform Anatomy Gift Act was passed by all fifty states. It gave people the right to donate their bodies to medical education and research. This reflects the drastic change in the public perception, from dissection as humiliation, to a gift that enables the next generation of physicians to receive medical training and provide competent medical care in the future.
Today's discussion focused on the transition of medical and anatomical education and practice in the U.S. to its modern form from its modest beginnings. Early medical education was primarily done by way of apprenticeship or via propriety medical schools. This practice was substantially inferior to medical education that was being conducted in Europe. In particular, Paris was a hub for excellent anatomical and medical training. Their success was largely due to their emphasis on having medical students actively engaged in dissection. Some anatomists taught courses in anatomy to medical students for a fee. During this time it was common to acquire bodies from either executed criminals or via grave robbery. Eventually, bodies began to be procured via donation rather than grave robbing in order to decrease these occurrences. The Flexner Report was published in the early 1900’s and criticized the state of medical schools in the United States. This led to widespread reform and eventually the U.S. rose to global recognition for medical training. Another interesting point was the fact that the Civil War played a key role in enhancing the practice of medicine here. Key advancements were the use of anesthesia, improved surgical techniques as they relate to amputations, and nursing as a career.

In the early 18th century, France had the world’s best surgeons. This was due, in part, to teaching anatomy to students via hands on dissections-known as the Paris Manner. Classic courses were still taught with professors dissecting the body, but private, extralegal courses provided students the opportunity to personally dissect their own cadavers. In the early 19th century, many for-profit medical “schools/apprenticeships” existed in a society that had loose controls on medical professionals. This led to physicians that were often under-qualified. This era also saw the rise of specialization, which has continued today. Cadavers were traditionally acquired from executed criminals or from grave robbing up until the mid-20th century when people began to donate their bodies for educational dissections. Cadaver donation programs finally provided enough bodies for medical educational institutions and eliminated the illegal activities of individuals like Burke and Hare.
Cadavers, Atlases, Exhibits – Concerns and Impacts

Week V. Wednesday November 20, 2013

Bibliography


ARB Displays

Week V - November 20, 2013

1. Kelly, Howard A. *Operative gynecology* / by Howard A. Kelly ... *With twenty-four plates and over five hundred and fifty original illustrations.* - New York : D. Appleton and company, 1898.


Fascination and Curiosity are endemic to human nature. Few examples embody these characteristics of humanity as well as our obsession with the human body and the study of anatomy since the dawn of recorded history. For millennia, inquisitive minds have dug up bodies, broken laws, changed laws, observed, and dissected in order to understand the magnificent complexity that is the human body. The story of anatomy is one of progressive growth in discovery and conveyance of knowledge through innovation and ingenuity.

The study of anatomy can be traced back to the ancient Greeks in reference to theories on structure and function of the body centered upon the balance of the humors. The earliest name our minds should associate is of course that of Galen. He worked extensively in the study of anatomy, but, as all anatomists and scientists, his work occurred within the culture of his time. In Galen’s case, this meant that he could not perform human dissections. Therefore, his medical text was based entirely on animal dissections. However, due to his thoroughness and detail, this text remained the primary medical text throughout the fall of empires, the migration of culture and knowledge to the Middle East and back, up through the Renaissance. His text did gain additions through commentators, the most notable of whom was the scholar Avicenna, but his writings were those that were being read by professors and medical students as the observed dissections in the universities.

Vesalius brought anatomy to the Italian Renaissance through his renovation of the field. He promoted the performance of the dissection by the professor himself so that he could see the structures he was describing. Through Vesalius’ own experience, he realized that Galen’s text was inadequate in describing the human anatomy. Thus, Vesalius wrote his own anatomical text that included, and was really based upon, illustrations to demonstrate structures and guide dissections. He was not the first to make an illustrated atlas, but he was the first to do it to such a high degree of quality.

With this new style for conveyance of knowledge, anatomy flourished as the years went on. During this growth, a severe lack of cadavers developed. This demand led to profit-minded individuals to provide the supply. Some bodies were obtained legally, but there were many that these Resurrectionists obtained through grave robbing, without consent, and even through murder. These actions led towards hostility from the communities with medical schools and anatomy saw the beginning of legislation to legally provide bodies for study. Conflict continued over this shortage of bodies up through the early 20th century when the general populace began to appreciate the education needed by doctors and donating programs were initiated to provide legitimate sources outside of executions. These programs today provide future physicians with a means of study that has only recently come to anatomy. Still, ethical debate continues as bodies must be treated with respect as anatomy continues to be central to the medical education.

Gobbets

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The final major innovation I would like to mention that made modern anatomical study possible was the development of embalming. Up until the Civil War, dissections were done primarily in the cold months to preserve the bodies and the amount of time that a body was in good dissecting condition was brief. Following embalming practices, anatomists could now take weeks and months to peruse the body and make even more detailed observations that time had previously allowed. In summary, depiction in atlases, embalming techniques, ethical issues, and innovative forefathers have led to the anatomical experience all medical students undertake. For me, knowledge of this past has led me to a greater appreciation of present time in the lab, and hopefully it will lead to guidance in the advancement of this most basic realm in medicine.

Renaissance designates the rebirth of arts and sciences that accompanied the complex economic, social and political transformations that took place in Europe between 1300 and 1650. It was also a time of great importance for medicine. Due to war, famine and epidemic diseases, the death rate in 1500 was about three times the present level, and life expectancy was half of modern Europe. According to Francis Bacon, three important inventions that changed the world were printing, gunpowder and compass. The establishment of printing presses helped to accelerate the spread of new ideas. Gunpowder forced physicians to deal with gunshots and other problems that were unknown to physicians. Compass allowed Europeans to explore the world and bring back new animals, plants and remedies.

During this period, human dissection was practiced to a limited extent until the city of Bologna authorized the provision of two cadavers each year for university dissection in 1442. Prisoners would be executed in public, and their bodies were used at night for dissections. These dissections were also open to the general public and provided entertainment instead of purely academic exercises. However, after Galileo being condemned for his beliefs, people would no longer come to Italy to study anatomy. In order to change this situation, Pope Benedict XIV tried to re-establish Bologna as the center of anatomical studies. He provided the funding and support for the Anatomical Museum, which contained waxed models of human bodies. In addition, he supported Lady Morandi and other females to take professor positions at University of Bologna. Lady Morandi became the first female professor in anatomy. She and her husband dissected thousands of bodies in their own kitchen.

As European immigrants landed in North America, they had to face malaria and yellow fever which they were not familiar with. Due to the shortage of people, clergyman became the most educated man in the colony and performed both spiritual and medical services. The situation changed in 1847 when American Medical Association was established to act as the medical governing body. As a result, the first physiological and anatomical lab was opened at Harvard in 1871. However, Cadavers were in shortage since the society viewed dissection as a post-death punishment and humiliation. At that time, the only legally available cadavers were those of executed criminals, and the remainder of the demand was met by grave robbing. The most famous example is the case of William Burke and William Hare. They
lured people into their lodging house, intoxicated them with alcohol and then suffocated them. They then sold the bodies to a local anatomy lab. The situation changed in 1968 when the Uniform Anatomy Gift Act was passed by all fifty states. It gave people the right to donate their bodies to medical education and research. This reflects the drastic change in the public perception, from dissection as humiliation, to a gift that enables the next generation of physicians to receive medical training and provide competent medical care in the future.

This class focused on the history of dissection and anatomy in the Western world from classical Greece to the 20th century. During that period, dissection more or less retained status as a didactic tool; it was primarily used to teach about structures within the human body. Dissection was founded by schools in the Hellenic world; however, most subjects were animals. These classical texts were relatively unexplored and unchallenged for a long time, until interest was reignited in late medieval Italy. In the early 13th century until around the Enlightenment, when medicine was less advanced and less effective, the showy part of dissections was emphasized and a dissection was a public spectacle. Criminals and other fringe members of society were used as cadavers, and grave-robbing was also frequent. As medical ethics as a field emerged and evolved, the public view toward dissections was changed, and they became the domain of physicians and medical students. Body donors became respected, and medical schools cleaned up their practices in response to public pressure.

I really liked that this class blended several learning styles and media. The didactic presentations put on by the historians really sparked my interest and put meaning into the complementary readings. It was impactful to see the transition over time as knowledge, styles, and even bookmaking techniques evolved. I am far more likely to remember the trends that I saw and felt compared to the readings that I did, although those were interesting as well. My second favorite part of the class was when Ms. Messbarger talked to us about Anna Manzolini. From her, I got a great idea of the kind of effort and challenges that go into researching and writing a book. It made me curious to think how many other mysteries of history are buried in personal anecdotes, institutional knowledge, and forgotten libraries.

I think the class could have been improved in a couple ways. First, the readings were not balanced that well. Some people were assigned very long passages on multiple days, and others only had short readings throughout. Second, I think it would have been really fun and informative to have to find our own readings, perhaps for the last class. I know I would have learned a lot from researching a particular topic and sifting through literature on it to find a good article to present. Each student could show up on the last day and give a 5 minute summary on what they were looking for and what they found. Other than that, it was a great class!
Today, dissection of the human body is widely accepted by both physicians and Western society as a whole as a useful means for teaching certain aspects of medicine. It was not always so. In this course, we have examined the history of anatomical learning, at least in the Western world, and seen how that revolution was brought about. In the process, several themes have risen to the surface. Some of these are: society's estimation of the practice of anatomy, the culture of medicine and how physicians' objectives aligned with those who encouraged dissection of the human body, the acquisition of anatomical material, namely human cadavers, and finally the representation and propagation of anatomical knowledge. In summarizing the findings of this course, it is helpful to proceed in a somewhat chronological fashion, as this “revolution” may really only be considered to be one if considered in fast-forward. In reality, anatomical knowledge progressed slowly.

The history of anatomy may be divided into three eras for the purpose of this summary: pre-renaissance, renaissance, and post-renaissance. Pre-renaissance anatomy was characterized by a lack of willingness, or desire, to dissect human bodies. It was not until the 3rd century BC that human dissection was first performed for the purposes of education. This was in Alexandria, Egypt. The dissections involved both cadavers and live criminals sentenced to death by vivisection. John of Alexandria made significant strides at this time to “rationalize” the study of anatomy, by emphasizing precise documentation of observations.

A great deal was learned from these, however whatever itch that first made Egyptians dissect the body soon was scratched, and it would be thousands of years before the act was performed again and recorded for posterity. In the meantime Galenic anatomy predominated. Galen, in contrast to his predecessor, Hippocrates, believed that the study of anatomy was useful for physicians. However, instead of dissecting human bodies he took to dissecting animals. This was a significant advance, yet it also brought with it a downside. For a millennium after Galen's death his reputation was so great that few physicians felt it necessary to climb up on his broad shoulders and see further.

That changed with the Renaissance, when the dissection of animals, namely pigs, was resumed at the Medical school of Salerno, Italy in the 12th century. Italy is considered today to be the center of the high renaissance for fine art. In anatomy this is also true. Italian universities offered the legitimacy necessary for anatomists to pursue their craft with popular approval. Moreover, the residence of the Catholic administration in Italy offered the opportunity to cooperate with the church. Eventually, that institution endorsed the practice for educational purposes as well. Notable during this time were anatomists like Andreas Vesalius and Leonardo Da Vinci, as well as lesser known anatomists like Fallopius.

After the Renaissance, knowledge of human anatomy had advanced immeasurably, if only because now the relevant dissections were of humans, and not of other animals. (Between these there was significant "anatomic variation.") Furthermore, the means by which anatomists propagated and published their work also improved. Whereas Galenic anatomy had mostly produced rather crude drawings of skeletons, renaissance anatomists collaborated with master artists (i.e Titian and Vesalius). This improved the ability of other
anatomists across the continent of Europe to replicate the findings of masters, and contributed to a greater overall knowledge of human anatomy.

The practice of anatomy in medical schools today can, in my opinion, be traced to the dissections of 18th century Paris – colloquially referred to as “the Paris Method” of dissection. This was dissection performed by students, rather than professors. During the high renaissance anatomy was performed publicly and for educational purposes, however it was a very passive experience for students. The “Paris Method” encouraged student performance of dissection, and thus set the stage for the study of anatomy as we know it at this school, today.

The history of human dissections is a story of public relations. The way the public perceives anatomy and human dissection strongly impacts the ability of anatomists to acquire cadavers; anatomists resorting to desperate measures often lead to the very scandals that hurt public perceptions. From Medieval times up through the modern era, acquiring bodies for dissection has been a point of controversy. This tension between anatomists and the public has eased more recently as the value of the medical profession and the importance of dissection in medical education has been appreciated.

One of the most contentious aspects of human dissections is the source of the bodies. Centuries ago, bodies used for dissections were those of criminals, foreigners, or unidentified persons from public institutions, lending a shameful air to the practice of dissecting. Society at large did not have a problem with using these bodies for this purpose, but certainly no respectable person would want to have their bodies treated in such a way after death. When these sources of bodies were insufficient, anatomists resorted to grave robbing and even murder, causing the practice of human dissection to sometimes become sensationnally scandalous. Over the past three centuries, increased demand for bodies — sometimes in the context of stricter laws concerning body acquisition — resulted in especially disturbing acts by both body suppliers and the public. The murders committed by Burke and Hare in mid-19th century Scotland are a particularly gruesome example of what body suppliers have done. Urban riots over alleged body snatching cases show that the public was not only suspicious of the practice of human dissection but would react suddenly and violently to suspected foul play.

Public perception of dissecting human bodies is strongly linked to the relationship between doctors and the public. Before the late 19th century, doctors were not particularly effective. In Medieval times, for examples, doctors did exist, but treating illnesses often involved religious figures and superstitious practices. During this period and in the centuries that followed, human dissection was not a respectable practice but was generally associated with taboo and an air of mystery and fascination. The taboo largely stemmed from the source of bodies, and the fascination was fueled by public dissections and the general paucity of knowledge about the human body. With the immense
advancements in medical knowledge over the past century and a half, medicine has become a far more established and respected profession; human dissection is seen as an integral part of the path to becoming a doctor, thereby making dissection a more respectable activity. Instead of having to acquire bodies through unscrupulous means, medical school students and instructors are given cadavers by individuals who honorably and generously donate their bodies. This completely different paradigm of body acquisition for dissection is in large part due to changing public perceptions of medicine and the practice of dissection.

Over the course of our 5-week selective on the History of Anatomy, three over-arching themes have stood out to me: 1) the role of women in Medicine and Anatomy 2) “historical oversimplifications” and 3) ethical implications of dissection.

The Changing Role of Women in Medicine and Anatomy. No road has been more winding and tortuous in the history of Anatomy than that of the female scientist. I was surprised to learn during our first session that both Ancient Mesopotamia and Egypt educated their women substantially, and that female physicians were commonplace. With the rise of Christianity and its male-oriented dogma, female scientists were relegated to role of object in the study of anatomy. This persisted throughout the Middle Ages until the time of the Renaissance. In our third session, we learned about a trailblazing female anatomist named Anna Morandi. Morandi was THE preeminent anatomist in Bologna during the 1700s. Morandi pioneered a 3D approach to anatomy using wax models. Morandi asserted herself (a woman) as the subject rather than the object of dissection. Unfortunately, Morandi’s memory was all-but erased after her death and the medical patriarchy was reasserted. Although we did not discuss the role of women in anatomy during more modern times, it is obvious that women are every bit as skilled and proficient as men. Wash U Med’s JPC and Susan MacKinnon exemplify this fact.

“Historical Oversimplifications.” The second theme that caught my eye during this selective is something I call “historical oversimplifications.” That is, history’s tendency to smooth out the edges. One example of this concept would be the dogged adherence to Galenic anatomy. Galen, no doubt the father of modern anatomy, worked mostly by analogy. Instead of dissecting humans, he dissected animals that resembled humans. For nearly 1300 years, this important caveat was conveniently forgotten by anatomists. Thus, more than a century of human anatomical knowledge was not based on humans. Another example of this would be the concept of the “Salernian Medical School.” Many texts refer to this school as the mecca of anatomical knowledge during the 10th-13th centuries. However, the “Salernian Medical School” probably never existed. Instead, the “School” most likely refers to the group of medical professionals residing in and around Salerno during that time. (However, I must admit that the “Salernian Medical School” is much catchier). Thus this loosely affiliated group was simplified by history to a specific school. The final example of “historical oversimplification” is the idea of the “Paris Method” of Dissection. During the 18th century, the skill of French surgeons was known throughout the world and many texts refer to the “Paris Manner” with reverence. This is, again, an oversimplification. The “Paris Manner” of
Dissecting a human body is currently a rite of passage for many first year medical students including myself. Groups of students are designated bodies from anonymous donors and over the course of weeks or months, explore their cadavers to gain a better understanding of human anatomy and physiology. A certain human curiosity with the anatomy and physiology has always been present, however the study of anatomy, and in particular dissection has drastically changed from Antiquity to current times and is largely subject to scientific discovery and the prevailing ideas concerning the body.

The first records of any dissections date back to the third century and were performed in Alexandria. These were performed on the dead and occasionally some living criminals in an effort to cure illness and understand nature. During Antiquity, possibly due to a dearth of cadavers, many animals were used as an analogy to human anatomy in response to Aristotle's ideas on the value of the animals. One remarkable feature of the texts of this
time, were that there were no illustrations to supplement the writing of the founders of anatomy like Galen, Aristotle, and Hippocrates.

The Renaissance period revolutionized anatomy, and it began to look more like the anatomy studies of today. Leonardo Da Vinci and Vesalius were two prominent figures in anatomy during this period. Da Vinci focused on understanding the physiology of the body, and contributed drawings that were based on human and animal dissections. Vesalius published his *Fabrica* during this period as well, which included illustrations to supplement his text. During this period medical schools would hold public dissections, structured very differently than today; the physician would sit high above the cadaver and read, while a surgeon would perform the dissection. Eventually, this transitioned to a dissection where students would crowd around the physician dissecting and students able to hold the organs. The cultural values of the time allowed for this type of dissection, because Renaissance ideas emphasized learning about the human body. However, there was not an established channel through which to obtain bodies, and they relied on grave-robbing and executed criminals.

Moving forward to contemporary times, dissection looks very different, however the prevailing social attitudes permit the public display of bodies through exhibits like Body World. This hearkens to the times of public dissections, with bodies displayed for anyone willing to pay an admission to wonder at. There has always been a human fascination with what lies within the boundaries of the body, and the methods of its exploration have been present from at least the 3rd century B.C. although they have changed drastically over time.

To follow the progress in anatomical knowledge is to embark on a journey through two millennia, wander in the East and West, and become acquainted with extraordinary characters. Organized medicinal arts have been practiced in early civilizations such as Egypt, Mesopotamia, China, & India for over two millennia, with their respective theories of disease and health, pharmacopeia, spiritual practices, and procedures, although usually lacking precise physical examination skills and systematic anatomical knowledge (the observation of the course of disease was deemed more relevant). In the West, anatomical writings and speculations may be traced back at least as far as Hippocrates (5th century BC) and Aristotle (4th century BC) who emphasized natural causes of diseases and careful observations and investigations. Arabic scholars (e.g. Avicenna) then preserved and built upon this tradition, and the subsequent rediscovery of the classical texts during and toward the end of the middle ages in Europe resulted in the development of dedicated centers of learning such as Bologna, Padua, or Paris during the renaissance.

It appears that all significant advances in anatomical knowledge have been the result of careful dissections (Galen mostly with animals, Morandi, Leonardo da Vinci, or Vessalius with animal and human cadavers). In the West, dissections of cadavers of common citizens were usually shocking and frowned upon because of ethical and religious concerns. Dissections were in fact performed in secret (preceded by body snatching) and, during the middle age, also on criminals as part of their punishment (during public dissections). Although anatomical knowledge improved the fine arts (Michelangelo performed
dissections) and the surgical art, dissections were thus primarily a social practice. In spite of these difficulties, great breakthroughs in anatomical knowledge were made (e.g. Leonardo da Vinci described the valves of the heart and the extraoccular muscles).

The invention of the printing press (with woodcutting and later lithographical techniques which allow precise and beautiful representations) and the development of university centers greatly contributed to the progress and dissemination of anatomical knowledge. The factors that gradually led to an social acceptance of dissection are varied, ranging from progress in medical knowledge that legitimized dissection as a tool to train effective physicians, to the realization that anatomical knowledge gained primarily through dissection leads to real surgical progress, a desire to curb body snatching (or even crimes), and the development of chemical techniques for the preservation of bodies. Nowadays, exhibitions and beautiful anatomical atlases are two heirs of this long tradition. Nevertheless, besides the scientific (anatomical knowledge), societal (the public view and opinion on anatomy and the human body), and cultural (e.g. artistic representation of the human body), one also ought not to forget the ethical dimension in the history of anatomy and dissection (e.g. the Pernkopf controversy).

Over the duration of our course on the history of anatomy, it has become evident that a number of shifts in the practice of anatomical dissection and the study of medicine have occurred since the inception of the study of anatomy. Notably in early periods of anatomical discovery, acquiring bodies for dissection was difficult and often unlawful. In order to fill this void, anatomists often resorted to grave robbery or murder to yield cadavers for dissection. Later, when the study of anatomy became slightly less taboo bodies for dissection began to be acquired from those condemned to death. In addition to serving the function of providing bodies for dissection, this also served as a second form of punishment for those sentenced to the gallows. Eventually, the study of anatomy became essential to the study of medicine, and anatomists began using grave robbery and murder to acquire extra bodies for dissection. Finally, we moved into our modern method of acquiring bodies for dissection at medical schools, which is regulated by the federal government. It's interesting to consider that at one point in time a person might not have had a choice as to whether or not their body would be used for dissection.

Another interesting aspect of our discussion over the past several weeks, centered on how social environments played key roles in the development of anatomical studies. A key example of this was how religious structures were important in regulating early dissections and how philosophical and political movements changed the way we do anatomy. Anna Morandi was also an interesting study on how the work of women in science is largely unnoticed by modern historians despite their key contributions at the time. Da Vinci was also an interesting subject to study because of the fact that he discovered many anatomical structures, but his contributions to the study of human structure were never realized because he did not publish. I think this emphasizes the point that publishing is essential for those vested in the sciences. Finally, we talked about the role of Body Worlds in studying
anatomy today, and it was interesting to consider the ethical framework of such a display through the context of someone who has studied the history of anatomy.

In this selective I was very surprised by the complex and often sublegal methods that were taken to study anatomy via the use of human cadavers. From ancient times up until quite recently, grave robbing was a common way of acquiring bodies for medical education. I found this quite interesting because the ethics of these actions were very much in the grey. However, the knowledge acquired was very important in medicine of the time and the knowledge we have today.

Donation programs of the modern era have solved the dilemma of how to acquire bodies, but much of our understanding still relies on the old system. This brings up ethical dilemmas such as using the anatomical knowledge acquired from ethically corrupt individuals like Nazi Dr. Pernkopf.

Finally, I was surprised by how much dissections themselves have changed. Thanks to novel preservatives dissections can last for longer periods of time with better quality anatomy being studied. In addition, the style of learning has shifted greatly from auditorium style dissections to underground group dissections to the modern hands on dissections done in medical schools. Overall, the study of human anatomy has always been important and medically relevant, but the methods have varied greatly over history.