# Table of Contents

Foreword.................................................................................................................................3

Medical Papyri of Ancient Egypt ..........................................................................................5

*The Susruta Samhita*: A Compendium in Medicine and Surgery by Susruta, Surgeon of India .........................................................................................................................7

From Medieval Manuscripts to the Printing Revolution .........................................................9

What and when were the Middle Ages? ..................................................................................10

Hunayn ibn Ishaq (808 – 873), known in the West as Johannitius ......................................10

Articella (Small Art) / Isagoge Johannitii in Tegni Galeni (Introduction by Johannitius to the Art of Galen) (Ninth century) ..................................................................................10

Ibn Sina (ca. 980 – 1037), known in the West as Avicenna ..................................................10

*The Canon of Medicine* (1025) ..............................................................................................11

Hildegard of Bingen (1098 – 1179) .........................................................................................11

Causae et Curae (Causes and Cures) (middle of the 12th Century) ....................................11

Gart der Gesundheit/Ortus sanitatis (Garden of Health) (1485) .......................................12

*The Badianus Manuscript* .....................................................................................................13

Emily Walcott Emmart...........................................................................................................13

Medical Illustration: The Art of Medicine..............................................................................15

Medical Photography.............................................................................................................16

Medical Texts Published in the Renaissance: The Opera Omnia of Hippocrates and Galen ..18

Hippocrates ...............................................................................................................................18

Urological aspects of Hippocrates’ work..............................................................................19

The first publications of the complete works of Hippocrates in Latin and Greek 1525/1526 and their perception in the 16th century .................................................................19

Galen........................................................................................................................................20

Urological aspects of Galen’s Work......................................................................................22

The first publications of the complete works of Galen in Greek (1525/1538) and Latin (1549) and their perception in the 16th Century .................................................................23

William Osler’s *Principles and Practice of Medicine* .........................................................26

William Osler and the *Principles and Practice of Medicine* .............................................28

*Campbell’s Urology* .............................................................................................................29

Medical Journals: A History ..................................................................................................32

A History of Selected European Urological Periodicals......................................................35

A History of *The Journal of Urology®* ................................................................................37
A History of Urology Histories...................................................................................................... 39

History of Urology, edited by Edgar G. Ballenger, William A. Frontz, Homer G. Hamer and Bransford Lewis (1933) .............................................................................................................. 39

The History of Urology by Leonard Murphy (1972) ........................................................................ 39

Urology: A View Through the Retrospectroscope by John R. Herman (1973) ......................... 40

Perspectives in Urology, edited by Ralph Landes, Ronnie Bush and Adrian Zorgniotti (1976) ...... 40


Index Medicus: Making Data Useful and Available ..................................................................... 43

Electronic Medicine: The Future .................................................................................................. 46

Conclusions: The Appeal of Books in the Age of the Internet ....................................................... 49
FOREWORD

Michael E. Moran, MD
Curator, William P. Didusch Center for Urologic History

According to an old Latin proverb, “knowledge is power.” Though often attributed to Francis Bacon from his Meditaciones Sacrae of 1597 or to his secretary, Thomas Hobbes, from his 1658 work De Homine, it is likely they borrowed the notion from the Old Testament, Book of Proverbs (24:5), “A wise man is strong, a man of knowledge increaseth in strength.” Such sources appear to support the notion that knowledge is a good thing, increases over time and includes a lasting legacy from those who added to our understanding of the universe. In the history of medicine, there are recognized giants – Hippocrates, Claudius Galen, Andreas Vesalius, William Harvey, Joseph Lister – whose contributions have added to our universe of knowledge and understanding. This legacy of knowledge through to our modern understanding of health and disease is the subject of the William P. Didusch Center’s 2014 history exhibit, Knowledge Unbound: Literature of Medicine.

Our journey through time begins with the very foundations of script and first written medical treatises, which were documented on clay tablets from the Fertile Crescent. Papyri followed, becoming the written repository for the early Egyptian dynasties. Writing was extremely important to the Egyptian empires. Rulers often mandated that every book brought into the country be copied for the library, and scribes were educated individuals who came from elite families. The evolution of Egyptian hieroglyphics is a contentious fragment of historical research, but most believe it evolved synchronously with Sumerian script. From these scripts, libraries evolved – most notably the Library of Alexandria, which held an estimated 400,000 manuscripts or papyri. Despite the rise of art, history, literature, philosophy and science, there were no extant Greek medical documents with illustrations. Medicine had to wait for the Dark Ages before illustrated manuscripts appeared.

The printing press revolutionized literature, making dissemination of knowledge, including medical instruction, possible. Johannes Gutenberg (1400 – 1468) is credited for being the first to develop this movable type printing, though in reality, the Chinese had performed the feat sometime earlier for governmental printings. Gutenberg’s printing method was rapidly copied, and the growth of the printing industry was phenomenal. In 1480, only 1,000 books were published; however, by 1501 between eight and 24 million books had been printed.

Jacopono Berengaria de Carpi (1460 – 1530) was the first to include figures to illustrate his text, but it was Andreas Vesalius’ 1543 dramatic publication of illustrated anatomy, De humani corporis fabrica libri septum (On the fabric of the human body, or Fabrica), that changed the landscape of medicine itself by allowing physicians to explore all areas of medicine. This textbook derailed almost 1,500 years of Galenic-dominated medicine, anatomy and philosophy, and began the events that would lead to William Harvey’s monumental De motu cordis et sanguinis in animalibus. Now anatomy and physiology were available for curious physicians to open the locked secrets of health and disease.
As time progressed, Louis Pasteur rediscovered the germ theory of disease and Robert Koch developed the science of microbiology, but it was the struggling young surgeon Joseph Lister who applied this knowledge clinically and began to save literally millions of lives by antisepsis. These remarkable findings are now shared for all to read.

Today’s physician has at his or her fingertips information on every topic imaginable. A veritable tidal wave of data is now available with a simple click of a computer key, and it seems unimaginable the answers to the greatest secrets of medicine are not yet available to us.

Where would we as urologists be today if not for the knowledge we share so freely around the world?

“I like to think of my books in an alcove of a fire-proof library in some institution that I love; at the back of an alcove an open fireplace and a few easy chairs, and on the mantel piece an urn with my ashes, through which my astral self could peek at the books I have loved, and enjoy the delight which kindred souls still in the flesh would handle them.”

—Sir William Osler
Papyrus is a particular medium for writing that was prepared from the papyrus plant in ancient Egypt. The medical papyri were documents much like our modern day medical textbooks. As a collective, these scrolls discuss medical conditions, diagnosis and treatment of disease. Hieratic script in red and black ink was used for these documents. The medical papyri were copied from one scroll to another, enabling the information to be distributed and passed down through history.

Much of the knowledge of ancient Egyptian medicine has been gained through the study of medical papyri. To date, 10 medical papyri have been discovered from ancient Egypt, and numerous urologic issues have been described in five of these documents. The *Ebers Papyrus*, discovered in a tomb at Thebes in 1862, is the longest of the medical texts. The discovered papyrus was written in 1550 BCE, but it is believed to have been copied from books that date back to 3400 BCE. Unfortunately the author remains unknown; it is named for its discoverer, German Egyptologist Georg Ebers. The papyrus consists mainly of a compilation of recipes for the treatment of various diseases. The treatment of urologic disorders makes up 6.8 percent of all the recipes found in the *Ebers Papyrus*. Urinary problems were treated with dates, grapes, gum, rush-nuts, wheat, celery, figs, carob and yellow ochre. Impotence and priapism were treated with carob, juniper, *Hyoscyamus*, oils, pine, salt, watermelon and flax. Honey, which has intrinsic antibacterial properties, was the ingredient prescribed most often in the *Ebers Papyrus*.

The medical papyri show evidence that the ancient Egyptians practiced medicine using a scientific method based on the clinical observation of disease, as exemplified by the *Edwin Smith Papyrus*. This papyrus was purchased from a merchant in Luxor by the American Egyptologist Edwin Smith in 1862, and the current copy is thought to have been written around 1600 BCE. The original document was written about a thousand years earlier, between 3000 and 2500 BCE. The manuscript does not disclose the name of the unknown author, though it is possible that a surgical treatise of this importance created during the Pyramid Age may have been written by Imhotep, a great physician who lived in the 30th century BCE; but this is purely conjecture. The *Edwin Smith Papyrus* is a surgical text that contains 48 cases of trauma. Each case is presented with a description of the history and physical examination, a diagnosis of the medical condition, and the prognosis for the patient. This papyrus provides written evidence of the beginnings of deductive scientific reasoning in Ancient Egypt.

No convincing evidence has shown that anything other than minor surgery was practiced in Ancient Egypt. However, the medical papyri do make references to the surgical treatment of abscesses and tumors using “knife treatment.” The ancient Egyptians had at least four words for knives used in surgery: “des,” “khepet,” “shas” and “hemem.” It is thought that flint knives were used well into the Bronze Age and may have been used as a disposable surgical instrument. A passage in the *Ebers Papyrus* also talks of using a reed “for making the knife-treatment.” Two types of cauterization have been described in the medical papyri. The
“hemem” is described in the Ebers Papyrus and is thought to be a metallic cautery or fire-heated lancet. The “dja” (fire stick) is a drill that was rotated against wood to create enough friction to create sparks. The heat produced on the tip of the drill could then be used to cauterize wounds. Descriptions of suturing are found in seven cases in the Edwin Smith Papyrus. Needles have been discovered in Egypt dating back to the Predynastic Period (before 3100 BCE), and skilled needlework dates back to the Early Dynastic Period. Despite this skill, references to sewing are uncommon in the medical papyri, and most lacerations were treated with bandages and topical remedies. Additionally, there is a surprising lack of reference to catheters. No evidence has shown that catheters were ever created or used. Urinary retention is documented in the Ebers Papyrus, but the treatment to “force out the urine” was a medical remedy.

References:


The *Susruta Samhita*: A Compendium in Medicine and Surgery by Susruta, Surgeon of India
Sakti Das, MD

“All in all, Susruta must be considered the greatest surgeon of the pre-medieval period.”
—A.O. Whipple

In the great Indian epic *Mahabharata*, the surgeon Susruta is mentioned as the son of saint Viswamitra. His lifetime is debated today: In light of modern archeological knowledge, the period of *Mahabharata* has been fixed around the ninth century BCE. The original Hindu religious doctrines, in Sanskrit called Vedas, were compiled in successive generations from 3000 to 1000 BCE. In the latter Atharva Veda, a hymn about the creation of man includes a description of human skeleton according to the osteology presented in the *Susruta Samhita*, thereby placing Susruta in that era. Johnston Saint opined that the linguistic style of Susruta belonged to the period of Buddha in 600 BCE, but Wise believed that the ancient form of Sanskrit language used in the *Susruta Samhita* was prevalent around ninth century BCE. For these reasons, most scholars of ancient Indology now place Susruta in the era between 600 and 800 BCE.

The *Susruta Samhita* was first translated from Sanskrit to Arabic as *Kitab-I-Susrud* by Abul Saibib in eighth century CE. It was later translated into Latin by Hessler, German by Vellurs and English by Jones and Hoernle. Most recently, Bhisagratna provided a modern English translation in three elaborate volumes in 1963. The work is divided into five principal sections: 1) Sutratrana, or primary principles; 2) Nidana, or pathological concepts; 3) Sarirasthana, detailing anatomy; 4) Chikitsasthanam, dealing with medical and surgical treatment of various disease processes; and 5) Kalpastyhana, or toxicology.

The author Susruta stipulated the necessary qualifications for students seeking medical education. The initiation was marked by elaborate ceremonial rituals ending in the preceptor reciting solemn injunctions to the student that in many aspects are comparable to the Hippocratic Oath of the later classical Greek period.

The *Susruta Samhita* provides critical details on pre- and post-operative care, diet, indications, contraindications and surgical techniques. Surgical procedures are classified in eight kinds: incision, excision, scarification, puncturing, probing, extraction, drainage and suturing. The *Samhita* contains details of manufacture and maintenance of at least 125 surgical instruments, including 28 types of catheters, sounds and syringes. A total of 13 types of alcoholic decoctions and soporific agents, like henbane (*Hyoscyamus niger*) and Cannabis *Indica*, were recommended for anesthesia. Advice on fumigating the surgical suite with salt, mustard and clarified butter is given. Though this has nothing to do with our modern concept of bacterial antisepsis, it shows a similar concern with spiritual cleanliness.
Probably the highlight of surgical repertoire in the Susruta Samhita is the procedure for nasal reconstruction or rhinoplasty. The technique was revived much later in Italy by Tagliacozzi that appeared in the British periodical Gentleman’s Magazine in 1794. Ackernecht aptly observed that plastic surgery in Europe that flourished first in medieval Italy is a direct descendant of classical Indian surgery. Even today, plastic surgeons refer to Susruta’s pedicled forehead flap as the Indian flap. The Susruta Samhita also contains descriptions of laparotomy in order to repair intestinal perforations, which centuries later by Hippocrates were still considered invariably fatal. There are numerous other texts on management of anal fistula, fractures, amputations, cataract couching, obstetric emergencies, etc.

Among the urologic ailments detailed in the book, there are several chapters on etiology and management of lower urinary tract infection, penile sores, and sexual hygiene, and elaborate discussion on treatment of erectile dysfunction with Vaji Karana (aphrodisiacs). Urethral stricture disease (Niruddha Prakasa) was managed by dilation with dilators of gradually increasing caliber introduced every third day. For recalcitrant cases, external urethrotomy surgery is discussed. Probably the most fascinating chapters on urologic disorders deal with urinary calculus diseases. Several varieties of calculi are mentioned with dietary indiscretions as the main etiology. Then in Chikitsa Sthanam (therapeutic measures), initial medical measures with diet, fluids and alkalies are recommended. This is followed by exquisite details of the steps of the pioneering surgery of perineal vesicolithotomy, starting with a description of the anatomy and at the end the postoperative care and potential complications.

The medical and surgical concepts presented in the Susruta Samhita prevailed in the early era of civilization in India. They spread later to China through the Buddhist pilgrims and also influenced the Arabic world through established trade routes. Sir William Hunter stated that Arabic medicine was founded on translations from Sanskrit treatises and, in turn, European medicine down to the seventh century was to some degree based on the Latin versions of those Arabic translations of Indian medical texts.

The Susruta Samhita laid the foundation of surgical education about three millennia ago in India. We are indebted to the pioneering descriptions of the primary principles of medicine and surgery, including descriptions of surgical and urological procedures of unparalleled ingenuity and brilliance, many of which remain valid in our contemporary understanding.

References:


From Medieval Manuscripts to the Printing Revolution
Matthis Krischel, PhD

After the fall of the Roman Empire, monasteries became centers of scholarship in Europe. Texts by classical authors were studied, copied and often beautifully illustrated by monks. Many books had religious themes, but philological works, natural history and medicine were also found in monasteries. Most abbeys had a physician and many an apothecary and other caregivers so they became centers of medical practice as well. Initially, only few classical texts had survived in Europe. Original Greek manuscripts were first translated into Arabic by scholars in the Middle East, then from Arabic into Latin and, finally, when the knowledge of Greek had returned to Europe, authors like Hippocrates, Aristotle and Galen were translated directly from the originals.

Hospitals, which had existed in Byzantium and Baghdad since the sixth century, spread to Europe in the 13th century. At that time, the Hôtel-Dieu in Paris and the Santa Maria Novella in Florence both had more than 200 beds. The Middle Ages also saw cathedral schools grow into universities, first in Italy, England and France. Around the same time, the first European medical schools were established, the first one notably in Salerno in Southern Italy, where Latin-speaking Western Europe bordered its Greek- and Arabic-speaking neighbors. Salerno became both a center of translation and medical education. Other influential medical schools were subsequently established in Montpellier in Southern France, where the medical school predates the university, itself founded in 1289, and Padua and Bologna in Northern Italy.

During the Middle Ages, Western medicine split sharply into the two branches of internal medicine and surgery. The first followed the teachings of Hippocrates, Galen and eventually Ibn Sina, while practice of the latter was forbidden to priests from the year 1215. This meant that lay surgeons and barbers, many of whom were not university educated, started to dominate this branch. The two main diagnostic tools for physicians were uroscopy, in which color, smell, taste and concernment of the patient’s urine were analyzed, and pulse diagnosis. This led to the uroscopy flask to be established as a symbol of physicians.

Books remained rare, handwritten objects until around 1453, when Johannes Gutenberg developed a printing press with movable, lead-cast type. Block printing had existed in Europe before that time, and similar presses had been developed in Asia centuries earlier; but neither had a similar effect. The invention spread through southern Germany, northern Italy and soon all of Europe within just a few years. Early prints, called incunabula (“cradle prints”), such as the famous Gutenberg Bible, were still designed to look like manuscripts, many containing woodcut illustrations and the same kind of abbreviations used by scribes. By the year 1500, printers’ shops existed in about 200 European cities, supplying books to the church, a developing middle class and the more than 50 universities that had been established in the meantime. Printing made possible the rapid spread of information that not only led to the proliferation of classical authors, but also of new scientific, political and religious ideas.
What and when were the Middle Ages?

The Middle Ages is the time period between antiquity and the renaissance ("re-birth") of classical knowledge and culture. Start and end dates are not universally agreed upon, but many historians see the Sack of Rome in 410 CE or the closing of Plato’s academy in Athens in 529 CE as its starting point. The Middle Ages saw the spread of Christianity through Europe and of Islam through the Middle East and North Africa, as well as the foundations of the first universities. Its end point, too, is controversial. The fall of Constantinople in 1453, the development of the printing press with movable type around the same time and the discovery of the Americas by Christopher Columbus in 1492 are often seen as its close.

Hunayn ibn Ishaq (808 – 873), known in the West as Johannitus

Hunayn ibn Ishaq was a Nestorian Christian born near and educated in Baghdad, at that time the capital of the Abbasid Caliphate and the center of scholarship in the Islamic world. Hunayn ibn Ishaq studied medicine and was eventually appointed personal physician of the caliph. He spoke and read not only Syriac and Arabic, but also Latin and Greek. Hunayn ibn Ishaq became one of the chief translators of Greek works into Syriac and Arabic, including Plato, Aristotle, Hippocrates and Galen. His translation style was superior to many of his contemporaries because he did not seek overly literal translations and because he compared (and often tracked down) different manuscripts of a text to have available the best basis for translation. During his lifetime, he translated more than 100 foreign books and published original work on theology, medicine and specifically ophthalmology.

Articella (Small Art) / Isagoge Johannitii in Tegni Galeni (Introduction by Johannitus to the Art of Galen) (Ninth century)

The Articella by Hunayn ibn Ishaq became one of the earliest European textbooks of medicine. It was a collection of short medical treatises bound together, including, at its core, Hunayn ibn Ishaq’s translation (from the Greek) and commentary of Galen’s Ars medicina. When the book was first translated into Latin by Constantinus Africanus in the 11th century, Hippocrates’ Prognostics and Aphorisms and treatises on urine and pulse diagnosis were included with the Ars medicina. The resulting book became the first major medical textbook at the Salerno medical school, where students studied it and professors wrote commentaries on it. The Articella remained in use until the first half of the 16th century.

Ibn Sina (ca. 980 – 1037), known in the West as Avicenna

Ibn Sina was born near the city of Bukhara in Central Asia (today Uzbekistan) into an educated family. Growing up speaking Persian, he learned Arabic at an early age and studied the Qur’an, Islamic jurisprudence and Greek philosophy. Ibn Sina turned to medicine at the age of 16 and was regarded a qualified physician at 18. As an adult, he sought the patronage of rulers, which allowed him to devote his time to scholarship, but meant that he had to move when he fell out of favor at court. Among his more than 300 works are books on medicine, natural philosophy, theology, logic, astronomy and astrology. His writings influenced styles
of scholarly writing in Persian and Arabic. Today he is best known as interpreter of Aristotle and for his medical writings.

**The Canon of Medicine (1025)**

Chief among Ibn Sina’s medical writings is *The Canon of Medicine*, originally written in Arabic. The book is a compilation of Greek medical knowledge and its author’s practical experience. Ibn Sina’s physiology is deeply rooted in Hippocrates, Galen and Aristotle: He describes a balance of the four humours as the key to a healthy life. More than 700 simple and compound medications are described to restore this balance, and rules for the development and testing of pharmaceutics are presented. Two additional chapters describe diseases of single organs or parts of the body, from feet to head, and diseases of the whole body.

*The Canon of Medicine* was first translated into Latin by Gerard of Cremona, who chaired a school of translation in Toledo in the 12th century. *The Canon of Medicine* soon spread all over Europe and became the standard textbook of medicine. This brought its author the title “prince of physicians.” *The Canon of Medicine* was first printed in 1472, and within the next 30 years, 15 printed editions were published. It remained in use in medical education until the middle of the 17th century and has been called by William Osler "the most famous medical textbook ever written.”

**Hildegard of Bingen (1098 – 1179)**

Hildegard of Bingen was a member of the Order of Saint Benedict and founder of two monasteries in the West of Germany. She was a Christian mystic who experienced visions, a religious leader, a healer and an author. She is today recognized as a saint by the Catholic Church and is one of only a handful of women named as Doctor (teacher) of the Church.

*Causae et Curae (Causes and Cures) (middle of the 12th Century)*

*Causae et Curae* is probably a compilation of the knowledge Hildegard collected during the first half of her life before she became a religious leader. During that time, she led the infirmary of the women’s side of her monastery and gained experience in treating nuns and visitors. When Hildegard prepared to leave, she trained her successor; and *Causae et Curae* is most likely the compilation of this training.

The book is structured into five chapters. The first chapter is about the creation of the world and cosmology. The second is about the human body and its parts, containing entries on the liver, lung, heart, sexual organs, and also on bleeding and cupping. Chapters three and four give recipes for pharmaceuticals to treat a variety of different maladies. Finally, chapter five contains diagnostic techniques, including taking the pulse and looking at the patient’s excretions. The book contains a mixture of medieval medical knowledge based on the few classical sources available in Germany at the time, and folk remedies. Hildegard possessed great knowledge of local plants and animals, and some of the plants she prescribed are still used today.
Gart der Gesundheit/Ortus sanitatis (Garden of Health) (1485)

The Garden of Health had a number of people involved in its creation. The impetus came from Bernhard von Breidenbach, canon in Mainz; the text was compiled by the physician and botanist Johannes de Cuba; and many of the woodcut illustrations were created by Erhard Reuwich, an artist and friend of Breidenbach’s. The book was first printed in Mainz by Peter Schöffer, an associate in Johannes Gutenberg’s original print shop, in 1485.

The Garden of Health is remarkable in many ways. At its core, it is an herbal — a collection of information on plants, their Latin, Greek and Arabic names, their natural histories and medical applications. In addition, the book contains information on smaller sets of animals and minerals, as well as a part on uroscopy. It contains everyday plants and animals like hares and wild clover, but also exotic ones like elephants and human-shaped mandrake roots. The book was the first herbal to be printed and was first published in German, which was unusual at a time when most learned books were still published in Latin. Only a few years later, editions in Latin and many other European vernacular languages followed. At the time, the woodcut illustrations, printed in black and white and hand-colored later, were of superb quality. This is because the illustrator did not just copy drawings from older manuscripts, but either created them from real examples or copied them from a Venetian painter’s shop.

References:


The Badianus Manuscript
Rainer Engel, MD

For millennia, medical therapy consisted of herbal preparations and incantations. Recipes for such medicines were transmitted through the generations by word-of-mouth. It was not until into the Middle Ages that the first written document on herbal therapy was created. Hildegard von Bingen, Abbess of a cloister at the Rhine in Germany, dictated books on the healing powers of certain herbs in 1150. Her books discussed both the causes and cures of diseases, and many Europeans still follow her advice on herbal therapy for their illnesses.

In the Americas, it was much longer before anything was written. In 1525, an herbal was written by two Aztec Indians: Martinus de la Cruz, a native and prominent physician at the College of Santa Cruz in Tlatelolco, who composed the work, and Juan Badianus, who translated the text into Latin. De la Cruz produced beautiful colored images of 204 native herbs and trees, and described the plants, their properties, and preparation. The manuscript consists of 63 folios approximately 6 by 8 inches in size, clearly written in Latin and Aztec. An herbal, it deals with the pharmacological treatment of diseases and does not include any text on surgery. It is divided into 13 chapters, each grouping maladies by either similar type or similar location in the body.

The original Badianus Manuscript was sent to Charles V, who was both Emperor of the Holy Roman Empire and (as Charles I) king of Spain; but there is no record whether Charles or his personal physician Andreas Vesalius ever read it. The manuscript eventually landed in the Vatican library, where it was found in 1929 by the historian Charles Clark, who told of his discovery at a dinner with Johns Hopkins University faculty. Everyone believed this book should be translated, as it was the first medical manuscript of the Americas. Eight years passed before Johns Hopkins biologist and faculty member Emily Walcott Emmart translated the Latin text of the book and included commentary on that text from her biological perspective.

The Aztec herbal is amazing, with multiple contributions on treating urinary problems, such as discoloration of urine or difficulty in passing urine. It also discusses the treatment of condylomata, fever or “excessive heat,” and includes beautiful illustrations that were copied in fine detail in Emmart’s 1940 publication.

Emily Walcott Emmart
Born in Baltimore, Dr. Emmart attended Goucher College and later Hopkins, where she received both her Master’s degree and PhD.

Publishing the manuscript entailed raising a great deal of money. Dr. Emmart wrote to one of her supporters that lithographing the colored plates of the facsimile would cost $9,744. The printing and binding of the book would cost another $2,000, bringing the total to $11,744. Though it was estimated that $7,500 would be collected as 1,000 books were sold at $7.50 each, there was still a shortage of $4,244 to be found. The American Pharmaceutical
Association and the Smithsonian provided an initial $7,500 from their revolving publishing funds – to be repaid after the sale of the book. Through the support of numerous smaller associations, such as *the Amateur Gardeners’ Club of Baltimore, the Herb Society of America* and *the Garden Club of America*, Dr. Emmart obtained the necessary funding.

Dr. Emmart was engaged for over four years in the translation and editing of the manuscript. From the point of view of the history of botany in America, the original drawings in the manuscript represent the earliest illustration of American flora. The hand-colored copies of the originals were done by a Mme. Missonier, a niece of the Pro-Prefect of the Vatican Library and a graduate of the Academy of Fine Arts in Rome. Emily Emmart checked her copies with the manuscript in the Vatican and declared them to be exact in every detail.

**References:**

Cruz, Martin De la., Emily W. Emmart Trueblood, and Juan Badiano. *The Badianus Manuscript (Codex Barberini, Latin 241) Vatican Library; an Aztec Herbal of 1552.* Baltimore: Johns Hopkins, 1940. Print.

Emmart, Emily W. Chesney Archives. Emmart Files, Baltimore.

“Primitive man, newly equipped with the knowledge of how to make and use fire […] and somehow aware that the wheel and the lever worked to advantage, gave medical illustration its roughhewn beginning.”

—William E Loechel, The History of Medical Illustration

Mankind has long been fascinated with illustrations and artwork. The cave paintings in Southern France are truly works of art. Sadly, they have now been closed because tourists visiting them pose a threat to the art. A figure possibly representing a shaman or medicine man is depicted in these paintings that date from 75,000 years ago, and subsequently, similar pictures by cave artists appeared all over the globe. In a rock painting from 6,000 BCE in Kakadu National Park in the Northern Territory of Australia, we can see an anatomical illustration that appears almost like an x-ray, an early Mayan bust shows flesh on one side and the skull on the opposite. Mysticism and medicine are still intricately linked in these early illustrations.

“The taproot of western civilization sinks deep in Greek soil, the astounding fertility of which is one of the outstanding facts of history.”

—William Osler: The Lessons of Greek Medicine

Despite the rise of art, history, literature, philosophy and science, there are no extant classical Greek medical documents with illustrations. Herophilus of Chalcedon of the famous Alexandrian medical school of the third century BCE allegedly utilized two articulated skeletons in his teaching. Even Galen of Pergamum, whose legacy remains extensive, had no illustrated works. Around the same time, the Gynaeica by Soranus of Ephesus supposedly contained illustrations of female reproductive organs, but no copy of the work survived. Medicine had to wait for the turn of the Middle Ages to the renaissance before such illustrations appeared again, crude as they were in comparison to the classic statuary and pottery art that had flourished for centuries in the classical period. The earliest medical illustrations are anatomical, and anatomical art and medicine have been and continue to be closely intertwined. The very first illustrations appear to be anatomical in the works of Mondino dei Luzzi, also known as Mundinus. He performed human anatomical dissections in the 14th century that resulted in crude first attempts at showing students viscera, which to us today seem almost cartoon-like. The English surgeon-anatomist John Ardene recognized the value of adding illustration to his work De Arte Physicali et de Cirugia in 1412.

“With what words, O writer, can you with like perfection describe the whole arrangement of that of which the design is here?”

—Leonardo da Vinci
Early medical illustration was most profoundly influenced by the original Renaissance man Leonardo da Vinci. He went from the transcendence of oil painting to the gruesome sights and smells of the morgues in order to foster his desire to understand human anatomy. Leonardo depicted each topographical area of the body from at least four views and was the first to render cross-sectional anatomy, as well as longitudinal images. He developed cut-away views and partial morselment of viscera to illustrate them better. Some have mourned his inability to complete this work, but in his lifetime he was widely heralded, and the reputation of his anatomical work did in fact inspire others. The physician Jacopo Berengario da Carpi followed in da Vinci’s footsteps; he performed hundreds of dissections and authored the oldest surviving medical anatomical textbook including illustrations. Now the stage was set for a dramatic publication of illustrated anatomy that changed the landscape of medicine itself. A major publication that allowed physicians to think again on their own and to explore all areas of anatomy appeared in 1543 with Andreas Vesalius’ *De humani corporis fabrica libri septi* (*On the fabric of the human body in seven books, or Fabrica*).

Medical illustration from the time of the *Fabrica* was now open to expansion and improvement. The Dutch masters of anatomy as well as illustration came from Leiden and Amsterdam. The anatomical works of the rivals Frederick Ruysch (1638 – 1731) and Govard Bidloo (1649 – 1713) exemplified this trend. Bidloo published his magnum opus *Anatomia Humani Corporis* in 1685 with magnificent illustrations that were promptly pirated by the English anatomist William Cowper’s (1666 – 1709) *Anatomy of Humane Bodies* (1698). Cowper influenced his protégé William Cheselden, who also produced great illustrated anatomical works.

The modern era of illustration arrived in the United States embodied in the great Max Brödel (1870 – 1941), who was lured to Johns Hopkins by the institution’s founding fathers. Brödel started the Department of Art as Applied to Medicine and trained over 200 medical illustrators. “There is no better way to learn a subject thoroughly than by teaching it to others,” he noted. Brödel himself produced works for many of the staff, most notably for Howard Kelley and Harvey Cushing. He trained William P. Didusch (1895 – 1981), who illustrated many of the works on urology from Hopkins prior to becoming the executive secretary of the American Urological Association. Frank H. Netter, MD (1906 – 1991) was a surgeon-turned medical illustrator. For him, medical illustration was part of medical research itself. He pointed out: “As I delved a little into the history of medical illustration I came to realize that pictures have played a vital role not only in teaching but in the actual development of surgery to its present high levels, and there is good reason for this.” Frank Netter has been likened to da Vinci in his preparation of each painted work with a thorough understanding of the task of the illustrator.

**Medical Photography**

Photographic medical illustration has rapidly been introduced into medical textbooks. It has a fascinating history connected with the origins of photography itself. Patients have been photographed and videotaped as have been operations since Alfred Donné in 1840 first photographed bones. Countless photographs of war wounds and the wounded were taken...
during the American Civil War. Albert Londe published *La Photographie Medicale* in 1893, the first book devoted to medical photography. Computers have completed the evolution of medical illustration in many ways, but they have not quite supplanted truly talented artists. In fact, it can be argued that the best computer graphics folks are themselves highly skilled artists in this digital medium.

Medical illustration—whether it is additive to text for education, a stand-alone method of teaching, a reference source for archival purposes or works of art—is a keystone to our medical epistemology with a fascinating history in its own right.

References:


Medical Texts Published in the Renaissance: The Opera Omnia of Hippocrates and Galen
Franz J. Marx, MD

In the Middle Ages, Hippocratic and Galenic writings were not available in their completeness in Western Europe. Before the 10th and 11th centuries, only few medical texts could be tracked down. At Salerno (11th/12th century), a wealth of manuscripts was translated from Arabic into Latin. The most illustrious representative of the Salernitan school of translators (“schola medica salernitana”) was Constantine the African (1017 –1087), a lay brother of the Benedictine order of North African descent. Mainly based on Arabic translations of classical Greek medical writings implemented by Hunain ibn Ishaq (808 –873), a canonical anthology of medical texts arose called the Articella (“little art”). From about 1250 until the 16th century, it served the medical students at the newly founded universities as compendium and book of reference. In the beginning, emphasis was laid on works written by Galen. Gradually – above all by the school of translators at Toledo (12th/13th century: Gerard of Cremona 1114 –1187) – texts of the Corpus Hippocraticum were incorporated into the Articella, yet mostly in the form of commentaries on Hippocrates penned by Galen. In the 13th and 14th centuries, a second wave of transmitting Galenic texts from Greek into Latin set in, but they did not gain the same reputation as the earlier translations.

However, the crucial event for the reintroduction of the “original” ancient medical writings in the West was the fall of Byzantium in 1453. Greek exiles settled primarily in Northern Italy (above all at Bologna and Venice) and formed the breeding ground for the spreading of the Greek language, culture and medical tradition in the West.

Hippocrates

Very little is known about Hippocrates (b. 460 BCE) with any degree of certainty. He came from a family of physicians residing on the island of Cos who traced their origins back to the Asclepius, the Greek god of healing, and therefore called themselves “Asclepiads.” From 420 BCE onwards, after the death of his father, who was also his teacher, Hippocrates practiced medicine as an itinerant physician travelling across most of the Greek world and its eastern neighbouring countries. He died in old age around 375 BCE at Larissa in the region of Thessaly.

There is only little verifiable information about Hippocrates’ life and work. Plato refers to him in two of his dialogues – Protagoras and Phaidros; Aristotle called him “the Grat” in his Politeia. Thus Hippocrates was already during his lifetime a recognized physician and a symbolic figure of the medical profession. Celsus (first century CE) addressed him in his preface to the seventh book of his work, De Medicina, as the “father of medicine” (parens medicinae).

Three biographies dating back to the first/second century CE (Soranus), the 10th century (Byzantine Encyclopedia Suda) and the 12th century (Byzantine philologist Tzetzes) give a
rather idealizing and unrealistic portrait of the man. Hence Hippocrates is as well a historical figure as a myth\(^1\).

The writings ascribed to Hippocrates are summarized as “corpus hippocraticum.” This body of work encompasses a collection of nearly 60 texts compiled in the Library of Alexandria in the middle of the third century BCE; its nucleus was probably the library of the medical school of Cos. The writings had a great number of authors, and were written between 430-350 BCE; a quarter of it, however, stems from Hellenistic and Roman times (first/second century CE). It is not proven that any of these texts were composed by Hippocrates himself; his personal contributions remain uncertain. The collection contains texts of different literary forms: elaborate teaching documents, speeches, notes, case histories and philosophical treatises about a variety of topics without obvious structure or system. This multifarious character of the Corpus with often contrasting viewpoints reflects the state of Greek medicine between 450 and 350 BCE in its chronological evolution. A common feature of the writings is their tendency to let the world and the human beings appear as rationally perceivable phenomena.

**Urological aspects of Hippocrates’ work**

- pathogenesis and symptomatology of the urolithiasis in children (in: “On Diseases”): impure milk, stranguria, hematuria
- epidemiology and predisposing factors of urolithiasis (in: “Airs, Waters, Places”)
- description of several urine qualities (in: “Aphorisms”)

**The first publications of the complete works of Hippocrates in Latin and Greek 1525/1526 and their perception in the 16\(^{th}\) century**

In earlier times, various works in Latin attributed to Hippocrates formed only part of the often republished and extended collection of the “Articella.” The first Latin edition of the complete *Corpus Hippocraticum* was to come out only in 1525/1526. It was published in 1525 in Rome in the house of the printer and bookseller Franciscus Calvus. The translation was rendered by the Grecophile physician and author Marcus Fabius Calvus from Ravenna. His translation is mainly based on a Greek manuscript from the 14\(^{th}\) century, as well as on a notable codex from the 12\(^{th}\) century.

The first edition of the Greek “original text” was published in 1526 in Venice by the famous printer, editor and humanist Aldus Manutius (1449 – 1515). Aldus had made a name for himself as the printer of various Greek and Latin works of antiquity – originating from the looting of Constantinople in 1204 perpetrated by the Venetians – that were at his disposal in the Biblioteca Marciana. After Aldus’ death, his brother-in-law Andreas Asulanus took over as editor-in-chief. Another “corrected” complete edition of the *Corpus Hippocraticum*, grounded on revised manuscripts, was published in 1538 in the *Editiones Frobenianae* in Basel. Its translation in Latin had been done by the Saxon humanist and philologist Janus Cornarius, a friend of Erasmus of Rotterdam.

\(^1\) Golder W. (2007)
Since the 12th century, Western medicine had been dominated by Galen, who in the second century CE had commented and assimilated those texts of the *Corpus Hippocraticum* that suited his own ideas best. Notably, the publication of the complete Hippocratic collection in 1526 in Greek made it possible to compare the original texts with their Galenic versions and interpretations. However, in the Renaissance at the beginning of the 16th century, the concern with the original writings was rather a literary-philological than a medical phenomenon.

For the time being, the dominance of the Galenic doctrine (“Galenism”) was not threatened by the increasing proliferation of the – now available – complete *Corpus Hippocraticum*. Hippocrates as the leading medical figure and the “father of medicine” was still more praised than read². Furthermore, it has to be stressed that the higher perception of Hippocrates in several fields of medicine, as in traumatology and gynaecology, may be ascribed to the fact that these specialities were somewhat neglected in the existent works of Galen.

The situation changed when in the course of the 16th century the orthodoxy of Galenism began to be unsettled after the discovery of numerous errors in his anatomical and physiological doctrines. In this context, only the best known “revolutionary” protagonists will be mentioned here: Paracelsus (1493 – 1541), with his “iatrochemistry;” Vesalius (1514 – 1564), with his dissection of human bodies that improved the knowledge of anatomy; and eventually Harvey (1578 – 1657), with his experimentally founded physiology. All these representatives of “medical progress” criticized more or less emphatically Galen, but they all restrained from fundamental criticism or polemics against Hippocrates, who, in their writings, always remained present as “both the origin of medical progress and its ultimate goal”³. The *Corpus Hippocraticum* was regarded as the canonical original. In contrast, the writings of Galen were only regarded as a commentarial interpretation, analogous to the relationship between the gospels and the exegetical writings of the church fathers. At the same time, medical innovations of the 16th/17th century were anachronistically correlated with Hippocratic writings: It was then when the idealization and idolization of Hippocrates began, an attitude that is still potent today.

**Galen**

In contrast to Hippocrates, we have a thorough knowledge of Galen’s life. This is a consequence of his penchant for self-display in his own writings. At the same time, much of the biographical data cannot be confirmed by independent sources. Galen (Greek: galenos = the gentle one) was born around 129 CE in Pergamum, an intellectual center in the Roman province of Asia Minor. He was the only son of Nicon, a well-educated, affluent patrician and architect, who ensured that his son received a comprehensive education. Galen was taught in mathematics, dialectic and philosophy by the adherents of the leading schools of the time: Stoic, Platonic, Aristotelian and Epicurean. According to his own account, Galen started his medical studies at the age of 17 as an assistant at the local temple of Aesculapius, where he frequented the courses of various anatomists. Already at this early stage of his career, he succeeded in establishing contacts with renowned physicians. After the death of his

---

³ Rütten Th. (2002)
father, 19-year-old Galen visited medical centers, including Alexandria, which was the leading medical school at that time with a long tradition in anatomical and physiological research dating to the third century BCE.

At the age of 28, he returned to Pergamum, where he was appointed physician to the gladiators. By his own account, Galen was very successful and held this position for four years. Thereby he acquired essential surgical and anatomical experience, above all of the extremities and the trunk. Alongside his practical activities, he continued his theoretical and philosophical studies.

With his reputation rising, Galen left Pergamum to move to Rome in 162. His partly sensational therapeutic successes won him influential patients in the Roman upper class, and his public anatomical-physiological demonstrations, often on living animals, added to his prestige. These displays often took on the character of spectacles, turning sometimes into “anatomical duels” with the purpose to contradict the theories of opponents and rivals. Probably for these reasons, as well as for his self-assertive and provocative-polemical manners, Galen aroused the enmity of influential circles, prompting him to leave Rome in 166. The outbreak of the “Plague of Antoninus” may also have influenced his decision. At the end of the year 168, emperor Marcus Aurelius called Galen back to Rome. On his return, he was appointed personal physician of the emperor’s son Commodus. The esteem Galen enjoyed and the good relationship with the political class strengthened his position at the imperial court, where, under the emperors Marcus Aurelius, Commodus and Septimus Severus, Galen had the status of an academic “star,” enabling him to pursue his research and publishing work. The last years of Galen’s life are shrouded in obscurity, but he continued his scientific and literary activities. The year of his death is still discussed: it appears likely now that it occurred in 216 or 217. Hence Galen reached the old age of 87 or 88.

The writings of this vast oeuvre, now subsumed under the title “corpus galenicum,” comprise approximately 170 works, or about one-eighth of the total extant Greek literature between the time of Homer and the end of the second century CE. This number does not include apocryphal and lost texts from which only the titles are extant. Some of the writings have been transformed by repeated copying and revisions, which renders the assessment of their authenticity difficult, controversial or even impossible.

Galen was as well an intellectual with a thorough philosophical education and great rhetoric skill as a physician with excellent practical knowledge and craft in anatomy, surgery and pharmacotherapy. Concerning his basic philosophical attitude, he cannot be assigned to an established special “school of thought.” Galen’s pioneering achievement was a synthesis between philosophical thinking and the medical perspective of the Hippocratic tradition, in particular the likewise systematic and flexible adaptation of a combination of rationality (“logos”) and experience (“peira”) to all fields of medical theory and practice.

Galen explained the etiology of diseases by shifts in the proportion of the four humours. In therapeutics, he differentiates between preventive, causative and symptomatic treatments. He ascribes particular importance to the Hippocratic principles based on the promotion of the
healing forces of nature and the regulation of all external influences acting on the human condition (“dietetics”). Further Galenic therapies include pharmacological drugs and the evacuation of noxious humours by way of blood-letting, purging and the use of diuretics.

Surgical therapy was recommended by Galen “only in case of irrefutable necessity” – thus in case of absolute indication. He did not leave an exclusively surgical monograph, which astonishes a bit because, as a physician to the gladiators in his youth he would have had the opportunity to gather specific knowledge on the topic. In addition, dissections and vivisections of animals gave him a good insight into anatomy. According to Galen, “the best physician was the one most capable of treating surgical conditions by means other than the knife and particular by diet and drugs”⁴. Nevertheless, he understood surgery as a constituent part of the art of healing and regarded the work of organ specialists like oculists, stone cutters, etc., as belonging to the “art of medicine.” In his therapeutical main work “De Methodo Medendi,” he does explain at length how to control bleeding and treat wounds and abdominal injuries by means of sophisticated stitching techniques in order to restore the abdominal wall.

The range of Galen’s opus is extensive: it encompasses writings on philosophy, rhetoric, logic, hygienics, anatomy, physiology, nosology, etiology, symptomatology, general and pharmacological therapy, and multifarious commentaries on other medical authors, above all on Hippocrates, the man he revered most.

**Urological aspects of Galen’s work**

In Galen’s medical texts, there are a total of more than 350 mostly short case histories. At least 10% (n=33) are devoted to urological aspects in the broadest sense. The case reports are always incorporated into a treatise dealing with a specific topic. Hence, they constitute anecdotic accounts with a realistic background, but presumably also with fictional elements. They illustrate the broad spectrum of Galen’s medical practice and thinking revealing that he was not only a prolific scholar, but also a practitioner.

Significant and original contributions of Galen to the field we today define as “urology” include:

- Theory of *uropoiesis*: urine resulting from the interaction of attractive, transformative and specific expelling faculties of the kidney
- Nosology of various *kidney diseases* (i.e., urolithiasis, renal abscess)
- Verification and first report of *vesico-ureteral reflux* by animal experiments
- Differential diagnosis of *voiding disorders*
- Anatomy and (patho-)physiology of *male genital organs* (e.g., priapism, spermatogenesis)

The first publications of the complete works of Galen in Greek (1525/1538) and Latin (1549) and their perception in the 16th Century

In 1525, the complete works of Galen were published in Greek by the Aldine Press, the notable printing house founded by editor and humanist Aldus Manutius (1449 – 1515). This Editio princeps In Aedibus Aldi consisted of five volumes in folio. Its publication was possible due to the professional expertise in the Greek language and philology of immigrated Byzantine scholars from the mid-15th century onwards, as well as the rediscovery and revision of Greek manuscripts, and finally to the introduction of Greek book printing. Before this edition, different texts of Galen had already been accessible as indirect translations from Arabic sources and in Greco-Latin versions transmitted by medieval authors.

A central figure of the “Galenic revival,” prompted by the publication of the Editio princeps in 1525, was the physician, philosopher and translator Niccolò Leoncino (1428 – 1524) of Ferrara. He was also the owner of a huge library replete with Greek medical manuscripts. Leoncino was in close contact with the Greek community of Venice and was part of the inner circle around the editor Aldus Manutius. The first collective edition of Galen’s oeuvre in Greek was the conjoint work of a great number of humanists and physicians – among them three Englishmen and one German – under the guidance of the physician Giovanni Battista Oppizzoni of Pisa. Codices of varying quality from the 15th century served in general as setting copies. Each of the five volumes is dedicated to a friend or sponsor of this venture; the complete work was devoted to Pope Clement VII. The systematic arrangement of the Corpus Galenicum reveals the medical perspective of the main editor G. B. Oppizzoni: the first volume was devoted to physiology and anatomy; the second volume to pharmacology; the third volume to diagnostic, prognostic and “internistic” treatises; the fourth volume to therapy and hygiene; and the fifth volume contained comments to Hippocratic texts. For the first time, the Aldinean edition of 1525 gave access to the Corpus Galenicum in its entirety, laying the groundwork for numerous later, partly philological-critical Latin editions. Especially important among those were the Editio Juntina I of 1541 (Venice) and the Editio Frobeniana of 1549 (Basel).

Galenic anatomical writings proved to be massively influential on the learned medicine of the early 16th century. Anatomy was now in the focus of the medical curriculum, and dissections became common practice in university teaching. Paradoxically, this triumph of Galen’s anatomy sowed the seeds of its gradual decline. Galen’s followers in anatomy took seriously his instruction to carry out dissections with their own hands and to “see with their own eyes.” In doing so, they found that not all of Galen’s findings agreed with their own observations. The protagonist of this generation of anatomists was Andreas Vesalius (1514 – 1564). He made out that Galen’s anatomy was completely grounded on dissections of animals. In his Fabrica of 1543, Vesalius had the temerity to point out Galenic errors and consequently incurred the orthodox Galenists’ harsh criticism and animosities. Still, the perseverance of Galen’s influence and prestige was shown in Vesalius’ writings in which numerous Galenic

---

5 Mani N. (1956)
errors were still reproduced. Daremberg goes as far as to state that Vesalius’s Fabrica “was nothing but a revised, corrected and much improved edition of Galen’s anatomical writings”\(^6\).

It took until the end of the 16\(^{th}\) century for Galen’s anatomy to become outdated, and it was only in the middle of the 17\(^{th}\) century that the first description of the blood circulation by John Harvey (1628) sounded the death knell of Galen’s physiology. Paracelsus’ iatrochemistry and later iatromechanical ideas further weakened the traditional doctrinal system. Nevertheless, Galen continued to be present at the universities until the 18\(^{th}\) century, above all in the fields of medical terminology and semiology, as well as in hygienic and “general medicine.”

The Greek-Latin edition (1821 – 1833) of Galen’s complete medical works by the Leipzig surgeon C. G. Kühn, based on the first edition of 1525, continues to be an indispensable work of reference, even today. The primary purpose of this edition might have been to provide potentially still valuable therapeutical knowledge to a medical public no longer versed in the Greek language. But from the end of the 19\(^{th}\) century onward, the philological interest in Galenic texts came to the forefront, resulting in the publication of text-critical editions. In the last third of the 20\(^{th}\) century, research eventually focused on historic and cultural aspects in the works of Galen which, until these days, keep on attracting the attention of scholars worldwide.

**References:**


\(^6\) Cit. by Temkin O. (1973)


William Osler’s *Principles and Practice of Medicine*
Michael Moran, MD

“In the English Who’s Who, Osler himself assigns bibliography as his recreation. But historical and bibliographical knowledge and interest were far more than a mere recreation or cultural embellishment – they constituted an essential part of his rich equipment as an inspiring teacher and student of medicine.

“As great a lover of books as he was of men, his great library of 7,600 volumes was collected and catalogued, not as a series of treasures by reason of their rarity, but as instruments for the advancement of knowledge, and with this end in view the collection was bequeathed to McGill University.”

—William Welch

Born in rural Ontario in 1849, young William Osler had a penchant for pranks and jokes (one of which kept him in jail overnight), and went on to become known as one of the most influential physicians in modern medicine. Sometimes referred to as the “Father of Modern Medicine,” Osler is not known for any major medical discoveries, no breakthroughs in knowledge, nor legendary papers, but rather for a variety of accomplishments, such as his textbook *Principles and Practice of Medicine*, which not only became a bestseller, the book also became the iconic link to his philosophy of medicine and developed him into the towering medical figure of his era.

Much has been written on Osler and his textbook. In fact, his Pulitzer-Prize-winning biographer Harvey Cushing stated, “Someone, some day, could well write a volume devoted to a study of the successive editions of this famous work, which continues to exert an enormous influence on students of medicine.” Osler had recently become Professor of Medicine at the fledgling Johns Hopkins Hospital and allowed himself the precious time for the culmination of his “inkpot career” when he wrote his magnum opus. The *Principles and Practice of Medicine* has been called “one of the great accomplishments of his life and one of the great books in the history of medical education and publishing.” The book became an instant bestseller—the first edition sold 23,500 copies (the first print run had the superfluous ‘e’ in Georgias of the Platonic inscription). He legendarily gave the first copy to Grace Revere Gross and asked her what she was to do with its author: they were married in May of 1892. According to Richard Golden, “Osler’s textbook was a marvel of precision, clarity, and up-to-date information based on a solid foundation of pathology.” Falconer Madan, librarian of the Bodleian Library of Oxford University, said of Osler’s book that it “succeeded in making a scientific treatise literature.”

The second edition was issued in 1895 and sold 17,500 copies; the third through seventh editions were published approximately every five years. The sixth edition came out in 1905, and the 100,000th copy was given by the publisher (Appleton) to Osler’s son Edward Revere. The seventh edition was Osler’s last sole-author edition and is considered the zenith of his work because he so ably encompassed all of the most recent scientific advances in medicine.
since the first edition of 1892. His textbooks were translated all around the globe in French, German, Spanish, Portuguese, Russian, Chinese and Japanese.

Osler was a therapeutic nihilist because there were no antibiotics to treat infectious diseases and only few proven efficacious medicines available during his lifetime: there were iron for anemia, quinine for malaria, nitroglycerine and amyl nitrite for angina pectoris, and ‘G.O.M.’ (God’s own medicine) morphia (morphine) for pain.

Osler’s textbook had far ranging consequences outside of its core purpose of medical education because it was read widely, even by laypersons. One of the most significant readers was Frederick T. Gates, advisor to John D. Rockefeller’s philanthropic endeavors. In July of 1897, Gates read *Principles and Practice of Medicine* during his summer holiday and reported back to Rockefeller the need to fund medical education and medical scientific research. Harvard Medical School first benefited from Rockefeller’s largesse with an endowment of $1 million in 1902; Johns Hopkins Hospital was next with a donation of $1.5 million for the establishment of the full-time staff system in 1913. Rockefeller also funded the Johns Hopkins School of Hygiene and Public Health in 1918, the Institute of the History of Medicine and the Wilmer Institute in 1929. In the meantime, the Rockefeller Foundation had been established in 1914, as well as the Rockefeller Institute of Medical Research. Gates later wrote on the importance of Osler’s book:

> Filled with these thoughts and enthusiasms, I returned from my vacation […] and […] dictated for Mr. Rockefeller’s eye a memorandum in which I aimed to show to him the actual condition of medicine in the United States and the world as disclosed by Dr. Osler’s book.

Osler also left a lasting legacy of literary and historical gems within the confines of his textbook. He insinuated that chlorosis was described in Maudlin's song from Issak Walton’s *The Complete Angler* describing the “green sickness.” He used Lord Byron’s “oily dropsy” to describe obesity and Dickens use of the uncontrollable sleep in the obese as “like the fat boy in Pickwick.” In 1902 a mock examination using his historical musings from his textbook was published in the *St. Thomas Hospital Gazette* and expanded in 1907. A poem referring to Osler’s esoteric references was printed in the *Guy’s Hospital Gazette* in 1909:

```
For why should it matter to usward,
   If Osborn has sent you a screeed,
Or why have you sought a brief mention of Porter,
   Or Barker, or Caton or Reed?
I sometimes am seized with a yearning,
   In Appleton’s ledger to look,
What fun it would be if only we could see
   Whether each of them purchased the book?
```
William Osler and the *Principles and Practice of Medicine*

- Osler’s textbook, the *Principles and Practice of Medicine*, was the standard teaching text in both North America and England for more than 50 years.
- Osler became a worldwide leader of medicine and medical education from this work.
- In the book, he famously writes: “To know what has to be done, then do it, comprises the whole philosophy of practical life.”
- Osler’s style, which included bedside teaching, discussing diagnostic errors and spending time with patients, was considered radical. Until Osler, medical education consisted of textbook-reading, lectures and studying illustrations; there was no contact with patients.
- The tenet of Osler's teaching methodology was that the best teachers are those who are perpetual students themselves, and he frequently put himself in the place of students during his classes. This philosophy would leave an indelible mark on the medical world, as it did on McGill University.

References:


Training in urology involves accumulation of knowledge, as well as experience that includes both observation and participation. The surgical residency of reading and apprenticeship developed by Bernhard von Langenbeck in Berlin in the second half of the 19th century involved medical graduates remaining in the hospital to observe and supervise day-to-day care. His most famous house officers included Billroth and Kocher. Osler and Halstead modeled their residency programs at Johns Hopkins University later that century on Langenbeck’s principles. There were multiple personal treatises to impart knowledge to urology residents. Most involved specific areas of urology, such as stones (Thompson, Bigelow), testis (Cooper), bladder and prostate (Gross) and venereal disease (Hunter). In 1926, Young published his two-volume Practice of Urology, the first complete textbook of the specialty. Practical texts like McCrea’s Clinical Urology were also helpful to trainees as ‘how I do it’ books. But it was not until 1954, when Campbell’s Urology was first published, that residents had available the most comprehensive text for their specialty.

Meredith Fairfax Campbell (1894 – 1969) was born and raised in Wisconsin. He received bachelor’s (1916) and master’s (1917) degrees at the University of Wisconsin. In 1919, he received his medical degree at Columbia College of Physicians and Surgeons and began his internship at Bellevue Hospital. Shortly thereafter, he contracted tuberculosis and was treated in a sanatorium for two years. Fully recovered, he completed his urology residency at Bellevue. Campbell joined the faculty at the New York Post Graduate Medical School as instructor in urology in 1925, advancing to become Professor and Chair of the department from 1937 – 1949. He remained Professor Emeritus until he retired in 1964. He held additional faculty appointments at Columbia University, New York Polyclinic Medical School and the University of Miami, as well as Bellevue Hospital. A prolific writer, Campbell authored or co-authored more than 250 journal articles, in addition to numerous textbooks. Known as the “Father of Pediatric Urology,” he published his two-volume Pediatric Urology in 1937, authoring 11 of the 12 chapters of the over 500-page text. It was extensively referenced and had more than 1,300 illustrations. This text also included a chapter written by a nephrologist, because Campbell stated: “The urologists should be as conversant with medical as with surgical diseases of the kidney.” In the preface, Campbell stated that the book took 10 years to prepare. In 1951, he published Clinical Pediatric Urology. This text of more than 1,000 pages included 14 chapters, 13 written by Campbell himself. Extensively referenced, it was now the standard reference and included chapters on physical examination and diagnosis, embryology, infections, tumors, trauma, enuresis, neuropathy and surgical techniques.

Meredith Campbell was the first president of the Society for Pediatric Urology, secretary and president of the New York section of the American Urological Association, and vice president of the American Association of Genito-urinary Surgeons. A member of numerous additional societies, he was the recipient of innumerable honors. In 1964, the Society for Pediatric Urology established the annual Meredith Campbell Lecture in his honor.
In 1954, Campbell published his comprehensive three-volume textbook *Urology*. This promptly became the “bible of urology” and was divided into 18 sections with 51 chapters, all heavily referenced. Campbell, at this time Emeritus Professor of Urology at New York University, edited this text of more than 2,300 pages with more than 1,100 illustrations. The list of 51 contributing authors was a veritable ‘Who’s Who’ of urology. Campbell himself wrote three of the chapters. Campbell did not live to see the actual publication of the third edition in 1970. Dr. J. Hartwell Harrison, Professor of Urology at Harvard and Chief of Urology at Peter Bent Brigham Hospital in Boston, was the co-editor for this updated edition, which now included 74 contributing authors and was more than 2,800 pages. There were now 70 chapters, including new chapters on radioisotope imaging, transplantation and reno-vascular surgery, urosepsis, vesicoureteral reflux, and uropharmacology. When the fourth edition, titled *Campbell’s Urology*, came out in 1978, there were now five editors, including Dr. Harrison; Dr. Reuben Gittes now Professor of Urology at Harvard and Chief of Urology at Peter Bent Brigham Hospital; Dr. Alan Perlmutter, Chief of Pediatric Urology at the Children’s Hospital of Michigan and Professor of Urology at Wayne State; Dr. Thomas Stamey, Professor and Chair of Urology at Stanford; and Dr. Patrick Walsh, Professor and Chair of the Department of Urology at Johns Hopkins. The list of contributing authors had now expanded to 105, of whom 87 were new contributors. The text was greatly revised and updated. The scientific and physiologic basis was extensively expanded. The sections on urologic cancer, trauma, infection, neuropathic bladder, urolithiasis and infertility were completely rewritten, and a new section of 17 expanded or newly created chapters dealing with pediatric urology was added. This updated volume had 88 chapters and more than 2,600 pages.

This preeminent text in urology, now titled *Campbell-Walsh Urology*, is now in its 10th edition and remains the primary source of education and knowledge in the field for both trainees and practitioners. This most comprehensive text now encompasses more than 3,750 pages in 138 chapters and four volumes authored by more than 200 contributors. Volume 4 contains 28 chapters pertaining to pediatric urology. The text is replete with state-of-the-art chapters on laparoscopy and robotics. The editors for this latest edition include Dr. Alan Wein, Professor and Chair of Urology at the University of Pennsylvania; Dr. Louis Kavoussi, Professor and Chair of Urology at Long Island Jewish School of Medicine; Dr. Alan Partin, Professor and Chair of Urology at Johns Hopkins; Dr. Craig Peters, Professor of Urology and Pediatrics at Children’s National Medical Center; and the late Dr. Andrew Novick, Professor of Surgery and Chair at the Cleveland Clinic Urological Institute. Most of the diagrams and figures, and all of the tables, are in color. Numerous points are emphasized in boldface or boxes. There is a website featuring videos for 37 of the chapters, as well as semi-annual updates. The entire text is available online for those who own the book. There is also a companion review guide with questions for preparation for certification and re-certification.

What began more than six decades ago as a proposal to Meredith Campbell from W.B. Saunders Company, the publisher of his *Clinical Pediatric Urology*, for a one-volume textbook of urology resulted in the three-volume text *Urology* in 1954. After 10 editions, *Campbell’s Urology* remains the ‘Bible of Urology.’
References:


- 31 -
Medical Journals: A History
Michael Moran, MD

Though medicine has been called “The Youngest Science” by Lewis Thomas, it has been investigated and reported upon almost as long as astronomy. Like science in general, the dramatic leaps and bounds of our knowledge are fundamentally tied to the reporting of clinical and basic scientific investigations in one way or another. For the last 300 or so years, journals have evolved as the medium of choice. The “big five” medical journals are the Journal of the American Medical Association (JAMA), New England Journal of Medicine (NEJM), Annals of Internal Medicine, the Lancet and the British Medical Journal (BMJ). Of course this selection is somewhat biased because of its focus on the English language, but English has become the lingua franca of modern science.

Scientific journals began in the 17th century with the Journal des Savants and the Philosophical Transactions of the Royal Society. These journals were some of the first recorded investigations of what is now commonly referred to as science and set the stage for rapid medical scientific advances. The Proceedings of the Royal Society followed the founder’s goal of investigating literally everything since its inception in 1660, when a dozen men first gathered in the damp rooms at Gresham College in London. The Royal Society was officially chartered in 1662 by Charles II, and its journal played a major role in shaping scientific publication, especially by making its primary language English instead of the formerly more common Latin. Though much of the advances of science were still presented in books, the Proceedings soon became an important model for the journal as a vehicle of science communication.

From the outset, the Royal Society strived to become a truly international organization based upon the principles set forth by Francis Bacon in New Atlantis. In 1665, Henry Oldenburg, originally from Germany, became the first editor of Philosophical Transactions of the Royal Society, which, according to its subtitle, had the task of Giving some Accompnt of the Present Undertakings, Studies and Labours of the Ingenious in many Considerable Parts of the World. Scholars like Marcello Malpighi, Christiaan Huygens and Antoni Leeuwenhoek became contributors soon after the proliferation of the microscope, publishing more than 200 papers on discoveries made with the new instrument. Many important contributions were printed in the publications of the Royal Society: some have argued that Christopher Merret presented a fermentation experiment that directly led to the creation of champagne; John Aubrey discussed the ancient ruins at Avebury, laying the foundations of archeology; Benjamin Franklin reported his kite observations on electric lightening; Sir William Groves published on his incandescent bulb 30 years before Edison was born. But it is publications on medicine and medical science that draws our attention, and the early medical journals will be the focus of our discussion here.

The dawn of medical periodical print literature arose out of periodical literature itself, specifically in the Victorian and Edwardian periods in England. It has been estimated journal publication increased during this time to upwards of 125,000 items. Magazines targeted at men and women, the wealthy and the poor, the very educated and those just able to read
proliferated after the steam printing press rapidly could produce cheap reading materials. Early medical periodicals were primarily news, social commentaries and reporting about significant publications in foreign languages, which was due to the fall of Latin and the rise of regional publications in vernacular languages. These periodicals, such as the Medical Times for instance, represented an early form of medical journalism.

Some of the important medical journals of today were founded in the early 19th century. One of the oldest, the New England Journal of Medicine, is now over 200 years old. It was founded by John Collins Warren in collaboration with James Jackson. It first appeared as a quarterly publication in January 1812 as an arm of the Massachusetts Medical Society. The Lancet was first published in 1823 by the sole efforts of Thomas Wakley, who was a physician, Member of Parliament and coroner in England. He was a rebel and social reformer who would publish the latest medical lectures of prominent physicians and surgeons without their consent, as well as rail against the corruption of the colleges and established medical systems. Wakley set the medical publishing precedent of appealing to the popular press with scathing editorials to achieve his social reform agenda. The British Medical Journal was originally the Provincial Medical and Surgical Journal (PMSJ) and was first published weekly beginning on October 3, 1840. This journal has been closely linked with the development of the British Medical Association, which was founded in July 1832 in Worcester by a group of 50 physicians led by Charles Hastings.

With the development of institutionalized medical science and the ability to rapidly disseminate the printed materials via effective postal systems, the number of medical journals and published articles steadily rose. For instance, the British Cruelty to Animals Act of 1876 (meant to prevent just that) was drafted because of the huge rise in experimentation—there were 311 reported animal experimental papers published that year. By 1910 this number rose to 95,731. Medical knowledge was exponentially expanding, and it has not stopped since.

The history of medical journals themselves shows that each new (sub-)discipline eventually outgrows the parent organization and starts not only its own specialist societies, but also its own publication. Medical journals and periodicals are expensive, and it is now all but impossible for anyone short of our electronic computers to keep pace with the knowledge output in these journals. The quality of the articles in the journals themselves has always been scrutinized, with scientists themselves now routinely casting scorn upon the writings of scholarly journals. In addition, ethical issues arise, such as conflicts of interest, inadequate data, incomplete interpretation, underpowered studies and peer review. The average medical practitioner spends not much more than one hour per week on professional reading. He or she seeks “synoptic” sources that educate and inform quickly and no longer looks for complex studies that take effort to digest. This has led to what Muir Gray has termed the “information paradox,” where more material is ever present but people spend less time searching or finding relevant, high-quality data. In addition, even truly significant information rarely leads to dramatic changes in practice. This is happening at a time in which science is beginning to abandon printed journals and seeks electronic, open-access publishing venues. The future should be very interesting indeed.
References:

A History of Selected European Urological Periodicals
Friedrich Moll, MD

An analytical history about journals and periodicals in urology has not yet been written.

The history of medical publications, for practical purposes today, can be said to have started with the growth of experimental science during the later Renaissance and early Reformation. The excitement of the new studies in anatomy and physiology can be caught by reading the headlong prefaces and descriptions in Vesalius’ *De fabrica corporis humani* (1543) or Fabricius of Aquapendente’s theorizing on the purpose of the valves of the veins he had discovered (1603). Journals and periodicals began to take over from books in the world of science and medicine in the late 17th and early 18th century with the new learning: observations in the medical field.

The history of journals dedicated solely to urology is much younger. The first scientific articles of the newly established specialty appeared in surgical journals or journals of general medicine like the *Lancet* or the *Journal of the American Medical Association (JAMA)*.

It was in France in the year 1883 that the first journal dedicated to urology, the *Annales des maladies des organs genito-urinaires*, was published under the supervision of Felix Guyon and Joaquin Albarran.

The *British Journal of Urology* was established in 1929. One of the first scientific articles was published by Andrew Fullerton: “DRAINAGE OF THE BLADDER THROUGH THE PERINEUM AFTER SUPRA-PUBIC PROSTATECTOMY (pages 7–16).” Within the same issue, information about the Société International d’Urologie, the Royal Society of Medicine, Section of Urology, the Index Medicus and abstracts from the current literature were included.

In Germany, there were originally two journals: the *Internationales Centralblatt für die Physiologie und Pathologie der Harn- und Sexualorgane* (International Journal for the Physiology and Pathology of the Genitor-urinary Tract), established in 1889/1890 by Wilhelm Zuelzer; the second journal exclusively devoted to urology was the *Monatsberichte für Urologie* (Monthly Messages for Urology), edited by Hugo Lohnstein. These two Journals merged with the foundation of the German Urologic Society one year after the death of Max Nitze in 1906 to form the *Zeitschrift für Urologie* (Journal for Urology). This Journal lasted until 1989, when it was included in *Aktuelle Urologie* (Current Urology). Between 1964 and 1989, it was titled *Zeitschrift für Urologie und Nephrologie* (Journal for Urology and Nephrology), and the Journal was published under the auspices of the Urologic Association of the “German Democratic Republic” (East Germany).

Another well reputed journal in the German-speaking world was the *Zeitschrift für Urologische Chirurgie* (Journal for Urologic Surgery), established in 1913 and published until 1944. This Journal was a continuation of the *Folia Urologica: Internationales Archiv für Krankheiten der Harnorgane* (International Archives for Diseases of the Urinary Tract), which had been published since 1907. *Urologia Internationalis* was started in 1955 as an
independent, international forum for clinically orientated research. It merged with the *Acta Urologica Italica* in 1999, and is currently the official English language scientific publication of the German Society for Urology.

In 1975, after the foundation of the European Association of Urology (EAU) in 1973, the journal *European Urology* was designated the official scientific journal of the EAU. Today, along with *The Journal of Urology®,* it forms the highest rung on the ladder of urological journals.

An overview of the urologic literature of the second half of the 20th century reveals the most popular topics. For this purpose, a PubMed search was performed of all articles published in the 13 most cited urological journals between 1955 and 2009. Articles with more than 100 citations were identified as "classic" and were analyzed further. Of the 97,554 articles published during this time, 1,239 articles were cited more than 100 times. The most common topic among classic articles was “prostate cancer” and “prostate-specific antigen” (33.5%), followed by “bladder cancer” and “benign prostatic hyperplasia.”

References:

The title of this publication, ‘The Journal of Urology, experimental, medical and surgical,’ expresses briefly the aims, hopes and ambitions of the editors. It is…evident that some common meeting place is extremely desirable—some medium in which all types of papers upon the field of common interest may appear—archives of Urology—historical, embryological, anatomical, biochemical, pharmacological, pathological, bacteriological, surgical and medical, experimental and clinical.

The American Urological Association (AUA) became the legal owner of The Journal in 1921.

**The Journal of Urology® Matures**

Numerous changes in submission procedures and format have taken place over the years. While the subject matter had become more diversified, the manuscripts submitted for publication and the process of their consideration became more formalized.

Grouping pediatric urology articles under an identifying subhead was instituted in 1970. By 1975, editorials on pertinent subjects and editorial comments by experts on select articles with rebuttals by authors, review articles and letters to the editor were published. Between 1975 and 1976, the pediatric subsection was joined by subsections for case reports and urodynamics.

In the 1980s, the manuscript review process was expanded, and the selective use of statistical consultants was instituted. In 1982, a major expansion of The Journal reconfirmed its commitment to provide a broad spectrum of information pertinent to urology. The journals *Urological Survey*, edited by Hugh J. Jewett, and *Investigative Urology*, founded by William Wallace Scott and edited by Jay Y. Gillenwater, were incorporated as special sections in *The Journal of Urology®*. The editors of these journals and their associates maintained control of the designated sections in The Journal resulting from these mergers. This “journal within a journal” format was expanded in 1994 when Pediatric Urology became the first subspecialty to have a designated section in The Journal.

Regular use of supplements with *The Journal of Urology®* was initiated in 1986 with the yearly publication of manuscripts from papers presented at the annual meeting of the Section on Urology of the American Academy of Pediatrics. The Urologists at Work designation was also added the same year. In 1994, a quarterly Spanish edition was introduced. In 1995,
single-page preview articles entitled “This Month in Clinical Urology” and “This Month in Investigative Urology” were added.

In addition to changes in content, the physical format of The Journal has evolved throughout the years. The 6 ½ x 9 ½-inch page size used since 1917 was changed to the 8½ x 11 inches in 1976, presumably to accommodate advertisers. Additionally, the cover has undergone a series of changes, and in 1956, the indicia “Founded by Hugh Hampton Young” was added. The description “Official Organ of the American Urological Association” of 1925 was changed to the “Official Journal of the American Urological Association” in 1972. The table of contents was replaced by the AUA logo in 1989 and a revised colored logo in 1998.

Editors of The Journal of Urology®

<table>
<thead>
<tr>
<th>Editor</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hugh Hampton Young</td>
<td>1917 – 1945</td>
</tr>
<tr>
<td>J.A. Campbell Colston</td>
<td>1945 – 1966</td>
</tr>
<tr>
<td>Hugh J. Jewett</td>
<td>1966 – 1977</td>
</tr>
<tr>
<td>Herbert Brendler</td>
<td>1983 – 1985</td>
</tr>
<tr>
<td>Martin Resnick</td>
<td>2004 – 2007</td>
</tr>
<tr>
<td>William Steers</td>
<td>2007 – Present</td>
</tr>
</tbody>
</table>

References:
A History of Urology Histories
Sutchin R. Patel, MD

History of Urology, edited by Edgar G. Ballenger, William A. Frontz, Homer G. Hamer and Bransford Lewis (1933)

The American Urological Association’s (AUA’s) two-volume History of Urology was the first comprehensive text published chronicling the history of urology in the United States. At the time it was published, the field of urology had begun to come into its own. In the preface, the author describes how just a few years ago, urology was considered in many academic institutions a minor department of general surgery and how doctors that specialized in urology were considered to “be nothing but a respectable veneralist.”

Volume I of the work begins with a chapter by Bransford Lewis on the history and founding of the AUA. A chapter that should be read by all those interested in the history of the AUA, it would not be until 2002 that the complete history of the AUA would again be chronicled. It is followed by the early history of urology in Baltimore, Boston, Chicago, the Midwest, New York, and Philadelphia and on the West Coast, chronicling the careers of many prominent urologists during the time. Volume II covers topics in urology, some of which includes: lithiasis, neuroses and functional disease of the genito-urinary tract, outstanding contributions to urology, prostatism and prostatic surgery, transurethral treatment of bladder neck obstructions, endoscopic prostatic resection, prostatic malignancy, roentgenology in urology, urology in childhood and urological instruments. Chapter III in Volume II on “Outstanding Contributions to Urology” by John R. Caulk provides an excellent summary of the major advances in urology up to the early 1900s.

The History of Urology by Leonard Murphy (1972)

Murphy’s The History of Urology was one of the first complete histories of urology. Published in 1972, the text is divided into two parts, with Part I incorporating an edited translation of Ernest Desnos’ L’Histoire De L’Urologie covering “The History of Urology to the Latter Half of the Nineteenth Century.” Ernest Desnos was a French urologist who, together with Alfred Pousson from the Hôpital Necker in Paris, convinced their professor, Felix Guyon, of the need to unite urologists from around the world. He thus became one of the founders of the Société Internationale d’Urologie (SIU) in 1907. His text covers topics from urology in ancient times in the orient, urology in Greece and Rome, Arabian medicine, urology in the Renaissance, lithotomy and lithotomists, uroscopy and advances in urology up to the 19th century.

At a time when medical historians were writing more on the history of medicine and there was less of a contribution by physicians, Murphy would write, “I was encouraged to bring Desnos’ work up to date by Douglas Guthrie’s opinion that the history of recent medicine is best written by a specialist in the subject under review rather than by a medical historian.” He found that “many important urological conditions had not been included in Desnos’ text, and thus [it was necessary to go] back over the field covered by him.”
Part II of Murphy’s text is entitled “The Development of Modern Urology” and is divided into chapters organized by organ system: the kidney, the ureter, ureteric repair and replacement, the bladder, the prostate, the urethra and miscellanea; thusly, each major pathologic condition could be described in terms of recognition, diagnosis and treatment. Murphy bridges the advances in urology from the period when anesthesia and asepsis opened the field of surgery up to the 1970s, including the works of many early master-surgeons (Trendelenburg, Nitze, Gustav Simon, George Goodfellow, H.H Young and Bigelow). Many of his chapters are filled with original illustrations of early operative techniques and instruments, as well as his own simple illustrations to depict anatomy and techniques. Upon completing his text, Murphy realized that “the history of urology is too vast to be reviewed by a single individual.” He ended the preface to his book: “Feci quod potui: faciant meliora potentes.” (“I have done what I could: let those who could do more.”).

_Urology: A View Through the Retrospectroscope_ by John R. Herman (1973)

Dr. Herman was a clinical professor of urology at Albert Einstein College of Medicine, Bronx, New York. He would write, “A study of history need not be painful. Here then is offered a short description of the development of urology, to be read with ease and (hopefully) to be enjoyed.” As an introduction to the history of urology in 16 chapters, some of the chapters included: the beginnings of urology (urology in ancient times up to Columbus’ voyage to the new world), lithotomy, catheters, the development of the cystoscope, the development of x-ray studies, gonorrhea and syphilis, surgical approaches to the prostate, the development of transurethral resection instruments, aphrodisiacs, bladder tumors and urinalysis.

Dr. Herman’s annotated bibliography includes a list of books about the history of medicine in general and urology in particular. Murphy’s text, for instance, he describes as “fine reading and excellent history;” the _History of Urology_ (1933) he describes as “good source from which to research the development of urology [but] on the whole not very exciting.” Herman’s short text (only 181 pages) was meant to be an introduction to the history of urology, not a magnum opus. He states: “If this work comes into the hands of medical students and residents and inculcates a sense of enjoyment of medical history, it will have served its purpose.”

The AUA History Committee’s Annual award for the best history forum presentation and paper, originally named the “Rusty Cystoscope Award,” was renamed the AUA Earl Nation Retrospectroscope Award in 2006 in honor of Earl Nation and in recognition of John Herman’s book.

_Perspectives in Urology, edited by Ralph Landes, Ronnie Bush and Adrian Zorgniotti_ (1976)

Dr. Landes was head of urology at Danville, Virginia, and served as the AUA historian from 1965 to 1979. Dr. Zorgniotti was a urologist from New York known for his innovation in the field of erectile dysfunction. He succeeded Dr. Landes and served as the AUA historian from 1980 to 1988.
The editors pointed out that since the AUA published its first *History of Urology* in 1933, “new pioneers in urology have emerged with as much impact as Guiteras, Bigelow, Young, Albaran, Nitze.” The influence of World War II is evident. “While research was often hampered by wartime conditions, wounded and injured men provided urologists with the opportunity to develop new surgical approaches.” Volume 1 includes 12 chapters covering a number of essays on various topics: endoscopy, nephrectomy, pyelonephritis, endoscopic manipulation of ureteral stones, vesicoureteral reflux, catheters and sounds, suprapubic prostatectomy, venereal diseases, non-calculus obstruction at the ureteropelvic junction, urologic x-ray cinematography, hemodialysis and peritoneal dialysis.

The text includes a section titled “A Visit to the AUA William P. Didusch Museum.” The museum was officially opened on January 12, 1972, and included the unveiling of a portrait of William P. Didusch painted by his niece, Ms Ann Didusch Schuler. This photograph, included in the book, shows Mr. Didusch next to his portrait along with Bertha Trott, known for her many years of service to the AUA and *The Journal of Urology®* (she was secretary to Drs. Young, Colston and Jewett). The section includes numerous illustrations by Mr. Didusch, as well as photographs of instruments and artifacts from the museum at the time. Despite the fact that the proposed second volume was never published, the text remains a valuable source of urological history from its time.


A two-volume work was begun in 1991 in anticipation of the AUA’s centennial in 2002. Ever since Bransford Lewis had edited and written the first chapter on the history of urology in 1933, there had been several unsuccessful attempts to produce a history of the AUA. These two volumes now feature a thorough history of the AUA. Filled with photographs of the “giants in the field” and many of the founding fathers of urology, the authors track the development of each of the Sections of the AUA, the history of *The Journal of Urology®*, as well as the growth of the William P. Didusch Museum. Comprehensive and chronologically oriented, it includes notes in the margin corresponding to other national and international historical events during the time. Some examples include: “The average nonsalaried physician earned $22,100 in 1960” and “In 1961 cystoscopes cost $175-$300, a sterilizer $75, a new microscope $250, a used one $150, and a complete set of urethral catheters cost $150.”

References:


Index Medicus: Making Data Useful and Available
Michael Moran, MD

“The gravitation of John Billings to books was as inevitable and as certain as any law of nature. It was equally certain that, given access to books, he would know their contents, use them, and introduced others to their solace and help. Detailed to the Surgeon General’s Office and finding no library, he made one.”

—H.S. Lydenberg (1929)

We come at last to the problem of making the vast mass of medical information available to those who need it—the medical practitioner and the patients. Seymour Taine of the Army Medical Library, the precursor to the National Library of Medicine, opined:

One also detects the presence of certain fixed ideas recurring, like a leitmotif, throughout the bulk of the literature with such regularity that a pattern tends to emerge: subject heading should be designed to meet the specific requirements of a given bibliographic function; subject headings should be as specific as possible; subject heading lists, indexes, catalogs, etc. should not attempt to be ‘all things to all men.’

The medical profession finally had approached the need to organize the vast and dispersed knowledge that had become a worldwide phenomenon. This again is largely the history of one physician who was at the right place at the right time, John Shaw Billings (1838 – 1913).

John Shaw Billings was a physician, soldier, hospital planner, bibliophile, librarian, archivist, census statistician and indexer of medical knowledge. Billings created a comprehensive index of all journal articles by subject and organized medical literature, including monographs, pamphlets and theses. He began this task, curiously enough, with his own struggle to compile a complete bibliography for his thesis on the surgical treatment of epilepsy. He subsequently published a 316-page, 18,000-item bibliography on cholera in 1875, which was widely hailed as a landmark. He then moved to promote the future work by preparing the Specimen Fasciculus, a precursor to the Index Medicus, for which he received both funding and an assistant paid for by Congress. This bibliography was a gargantuan task undertaken at a time when the only available technologies were informed people, reading, pen and ink, and index cards. It took Billings and his assistant, Robert Fletcher, 15 years to produce the primary bibliographic output—the Index Catalogue. This first series, consisting of the 16 volumes of the Index Catalogue, was completed in 1895, the same year Billings retired and moved on to become Director of the New York Public Library. It was Fletcher’s idea to bring out the monthly Index Medicus, and the Library asked for assistance for the project from the AMA in 1916.
Billings wrote in the introduction to the first volume of the Index Medicus:

> It has often been suggested that it is highly desirable that [the Index Catalogue] should be supplemented by some current publication, which should show all recent works, together with articles and periodicals, **arranged by subjects**, but until quite lately no proper means have been available for such an undertaking. Now, however, Mr. F. Leyboldt, of New York City, proposes to undertake the publication of such a current medical bibliographical serial.

Billings went on his “Prefatory Remarks” to mention the subject headings: “The nomenclature and classification are essentially those adopted by the Royal College of Physicians, based on Dr. Farre’s well-known system.” Frederic John Farre was a literary physician who was also a historian and did work for the Royal College. Billings concludes his introductory remarks with the classic bibliographer’s caveat:

> In conclusion, permit me to call attention to the fact that this is not a complete medical bibliography, and that any one who relies upon it as such will commit a serious error. It is the Catalogue of what is to be found in a single collection – a collection so large and of such a character, that there are few subjects in medicine with regard to which something may not be found in it, but which is by no means complete.

The *Index Medicus* was published by different publishers under contracts from the U.S. government. It was not issued for three years, from 1899 to 1902; during that time the very similar *Bibliographia medica* was published by the Institut de Bibliographie in Paris. In 1926, the last *Index Medicus* was published in the original format; thereafter, it fused with the AMA’s *Quarterly Cumulative Index to Current Literature* and became *Quarterly Cumulative Index Medicus*.

William Welch considered these accomplishments the greatest American contribution to medical science in the 19th century. Dr. Billings became aware of the difficulties of keeping the *Index Catalogue* up to date, so he helped the American Medical Association establish the *Index Medicus* in 1879 as a monthly index of medical literature. It proved to be a powerful tool to the organization and documentation of medical progress. The initial subscription price for the *Index Medicus* was $3 per year. The very first task, however, was to develop a guideline outline of medical topics, which was a complex endeavor in its own right. Fortunately for Billings, an acceptable system had been conceived by a British physician, Frederic John Farre. This would evolve into the MeSH headings of our current electronic databases of PubMed. Billings and Fletcher would read the journals over a glass of port with cigars; whereas today, the National Library of Medicine has a Literature Selection and Technical Review Committee to determine categories, subject headings and journal selection.

The first issue of the *Index Medicus* under this name (not as a subheading to the *Index Catalogue*) was published in 1911 and was 1,357 pages in length. Though alphabetical in

John Billings also mentored others into the history of medicine. Not only did he nominate William Osler and William Welch to their positions at Johns Hopkins Hospital, he also mentored David Low Huntington, Fielding H. Garrison, James Cushing Merrill and others into what would become the National Library of Medicine. There are now more than 18 million articles catalogued in the biomedical literature with 800,000 added in 2008 alone. The accession rate has doubled every 20 years and surpassed 1 million articles in 2012. Without information professionals and a system of classification and organization, drinking from the well of medical information would be like drinking from a fire hose indeed.

**References:**


Electronic Medicine: The Future
Michael Moran, MD

We have already presented the work on organizing the knowledge of medicine by John Shaw Billings with the *Index Medicus*. In 2012 it has been estimated that 1 million articles were archived. Doctors know about 10,000 diseases and syndromes, about 3,000 medications, and approximately 1,100 laboratory tests all with many degrees of overlap to add to medical complexity. Even a specialist, such as a urologist, must struggle just to remain current – it has been estimated that if one read for 21 hours a day, he or she might just barely keep up with this maelstrom of knowledge. One medical specialist, Henry Noyes (an ophthalmologist), lamented, “medical men strive manfully to keep up their knowledge of how the world of medicine moves on, but too often they are the first to accuse themselves of being unable to meet the duties of their daily calling.” He said this in 1865!

The exponential rise in medical knowledge led directly to electronic methods of computerized searching and data storage. The MEDLARS (Medical Literature Analysis and Retrieval System) began in 1964 based upon Frank Bradway Rogers’ computer-based technologies at the National Library of Medicine (NLM). The Library’s first digital archives were produced and available on CD-ROMs utilizing the Medical Subject Headings (MeSH) familiar to medical librarians from the *Index Medicus*. The MeSH list originally combined 4,500 headings and 67 topical subheadings to organize the biomedical database. MEDLINE developed into the electronic database at the NLM, and Grateful Med was launched in 1986 to search the rapidly expanding electronic database. The first MEDLINE search was initiated by Vice-President Al Gore on June 26, 1997. The Entrez system was released in 1995 to allow users and software developers to connect to the National Center for Biotechnology Information’s database system. The rise of Internet utilization for this free, Web-based database rose from 7 million MEDLINE searches in 1996 to 255 million in 1999, and to 400 million annually in 2001. Donald Lindberg, the current Director of the NLM, noted at the 175th anniversary that the electronic database:

… houses the world’s largest biomedical collection (over 17 million items in more than 150 languages), the Library is about more than just books, journals, artworks and other items, dating back to the 11th century. Everyday, via the Internet NLM delivers trillions of bytes of health data crucial to the lives of millions of people around the globe.

The beginnings of the electronic investigations at the NLM started when editor Seymour Taine approached Director Rogers to look at mechanization of indexing and arranging the data in the 1950s. Taine developed a mechanized method of using punch cards just like the tabulators which had been used by Hollerith in the U.S. Census (Herman Hollerith, 1860 – 1929, started IBM). The first grant to pursue these methods followed on April 16, 1958, and the staff was trained at International Business Machines school in Endicott, New York. The “Current List of 1959” was the first electronically published data set. It proved to be a successful publication system but lacked the capacity to retrieve data. The first edition of the new *Index Medicus* was produced in January 1960. Rogers began to research the new
electronic computers at this time to solve the data storage and retrieval issues, but computers were very expensive at the time—ponderous behemoths that utilized vacuum tubes and punch cards and were precarious to work with and maintain.

In November 1960, the NLM drew up specifications for the system that Rogers and Taine named MEDLARS. They believed that by using the new system, production time for each monthly installment of the Index Medicus could be cut from 22 to five days, freeing up staff for other vital duties. By February 1961, the NLM invited 45 firms to bid on the new computer systems. General Electric won the contract; and in August, work began on the MEDLARS system. MeSH headings were utilized instead of natural language to simplify production of the Index Medicus. A Minneapolis Honeywell 800 computer was utilized as the main computer. The preliminary MEDLARS system was completed on January 31, 1962. The computer’s input program recorded data on paper tape and transferred to magnetic tape, edited, and incorporated into stored data files. In 1964 it took MEDLARS 40 minutes to read all the tapes. They added a fast photo compositor (first called GRAC then renamed GRACE) in 1963, which outputted the Index Medicus in August 1964. It operated at 3,600 five-letter words per minute, producing an issue with 13,733 citations and 1.8 million five-letter words. The entire cost to develop MEDLARS was $3 million, but the time savings to the NLM was priceless.

Now attention could be turned to the “demand searches” for data retrieval. This began officially in March 1964, producing more than 600 searches in the first year. The next year, this increased to 1,623 searches (95% from the U.S.). Director Rogers was succeeded by Cummings who maintained the momentum of the digital electronics services. The first true literature search was carried out in June 1966 on “Anterior Pituitary Insufficiency due to Postpartum Necrosis, 1949-1965,” and it produced 77 citations. Over the next decade, MEDLARS was decentralized to 11 regional libraries to further increase the overall efficiency of data mining. Agreements for international cooperation were advocated by Director Cummings, with Great Britain and Sweden becoming the first to sign on in 1965. Mary Corning was named special assistant for international programs; and Germany, France, Australia, Canada, Japan, the WHO, Iran, Mexico, South Africa, Italy and Switzerland had all joined by 1980.

Director Cummings launched a new group in 1967 to evaluate newer methods of communication to aid the NLM at the Lester Hill National Center for Biomedical Communications. They developed an abridged Index Medicus (AIM) by 1970, and linked it to a teletypewriter exchange network, thereby creating the first autonomous search and retrieval system they named MEDLINE, which launched in October 1971. Within a year, there were 150 institutional subscribers submitting 10,605 searches per month. There were 7 million searches by 1996, 225 million in 1999 (700,000 per day), and 400 million by 2001. The dissemination of biomedical knowledge has continued to spiral upwards, approaching what some call a “healthcare singularity.” The ability to transmit globally new medical knowledge is now nearly instantaneous via our electronic data servers. It took about 2,300 years after the first report of angina to be commonly ascribed to the heart. Puerperal fever took almost fifty years to become accepted as a preventable infectious disease. Helicobacter
pylori took about two decades to become widely disseminated, whereas the problems with the drug Vioxx (rofecoxib), first reported by the FDA in May 1999, resulted in the withdrawal of the drug by September 2004, just five years later.

Huge data technologies are poised to accelerate this process even more, such as Microsoft’s HealthVault® and personal electronic records. There could well be personal “consumer data clouds” that might just rapidly identify problems as they are actually occurring. The computers themselves are rapidly advancing, and the computer algorithms are evolving as predicted by the Russian mathematician Andrei Andreyevich Markov (1856-1922). Markov’s models were utilized with astonishing success with an IBM computer program called Watson on the game show Jeopardy! in February 2011. This computer program competed and won against the two leading human players (Brad Rutter and Ken Jennings). The program learned the content of Wikipedia (and other encyclopedias), comprising about 4 trillion bytes of language. From the perspective of data capacity, the system is more than capable of encompassing most relevant medical data. In 1997 a computer algorithm beat all the physicians in diagnosing meningitis in children—the same year that Deep Blue (an IBM computer) beat Garry Kasparov in a game of chess that shook the world. The computerized “doctor” (hologram) from Star Trek might not be that far in the future.

References:

Conclusions: The Appeal of Books in the Age of the Internet
Michael Moran, MD

“The Histoire du livre’ in France, ‘Geschicte des Buchwesens’ in Germany, ‘history of books’ or ‘of the book’ in English-speaking countries — its name varies from place to place, but everywhere it is being recognized as an important new discipline. It might even be called the social and cultural history of communication by print, if that were not such a mouthful, because its purpose is to understand how ideas were transmitted through print and how exposure to the printed word affected the thought and behavior of mankind during the last five hundred years.”


The fact that printed materials have been so powerful is perfectly exemplified by Christopher Columbus’ letter to the King of Spain describing his trip — it was published and distributed throughout Europe within two years of his return; in fact, it was read by Nicolas Copernicus while at college. The great accumulation of mankind’s wisdom, knowledge, leisure and enjoyment has both an overarching sense of grandeur and a mournful sense of so much lost works. In every major area of academic achievement, there are classic authors whose works were lost forever, along with the ancient Library of Alexandria. This year’s historical focus is a tribute to the efforts of our predecessors in medicine, paying homage to the artifacts of written culture (papyri, books and journals) and to the ideas that they have left us.

There is also what has been called the “paradox of print”—glorifying the ancients leads to overthrow of past paradigms. Johannes Regiomontanus learned ancient Greek in order to print a Latin translation of Ptolemy’s Epitome, which in turn stimulated Copernicus to question the heavens and publish his own De revolutionibus orbium coelestium in 1543. Pliny’s Natural History was printed and corrected by Niccolo Leoniceno and in turn stimulated botanists in the Renaissance to question plants and classification, which led to the physician Carl Linnaeus to publish his Systema Naturae in 1735. Discovery and recollection of the past is intimately tied to the progress and future developments in science and medicine. In this way, the past and the future are tied together in a Gordian knot.

“As in any vast collection, the individual objects are buried in the sheer mass of things, even if they glow with a particular wisdom or beauty or oddness or grotesquery or wit or sadness or horror. Despite more than a century and a half of classification and cataloguing and interpretation, they are largely obscure to the public and may even be obscure to the Library’s cataloguers, librarians, curators, historians, and administrators. If we excavate them (and can figure out what to do with them), they once again speak to us, charm us, repulse us, amaze us, inform us, please us.”

—North, Reznick and Sappol: Hidden Treasure
Today, the National Library of Medicine (NLM) in Bethesda, together with the Library of Congress (LOC) in Washington, is the closest thing to a universal depository of mankind’s knowledge. The NLM has an estimated 17 million items in its collection, and the LOC has an unimaginable 119 million items. Those magnificent libraries are, in sheer quantity of information, only surpassed by the Internet. But information is not knowledge. Most of the Internet is not curated by librarians (or other information professionals). And the Internet lacks the appeal of a good book by a warm fire.

“For Books are not absolutely dead things, but do contain a potency of life in them to be as active as that soul was whose progeny they are; nay, they do preserve as in a vial the purest efficacy and extraction of that living intellect that bred them.”

—John Milton’s Areopagitica

Bibliophiles are known since antiquity, but let us turn our attention to one of the most famous of modern medical bibliophiles, Sir William Osler. Osler had been surrounded by books since his infancy: his father collected 1,500 volumes, predominately regarding theology. Osler’s oldest brother reportedly once bought him a Christmas gift of J. Hain Friswell’s Varia: Readings from Rare Books when he was seventeen. Osler’s earliest two mentors, Reverend William A. Johnson and Dr. James Bovell, both had outstanding personal libraries. Osler would write of his library, “A library represents the mind of its collector, his fancies and his foibles, his strength and weakness, his prejudices and preferences.”

He is known today as one of the most prominent physicians of the English-speaking world because of his qualities as a writer, educator and clinician. But he was a book collector who managed to create one of the finest libraries in the world now housed at his alma mater, McGill University.

No more elegant a representation of our legacy to the past has ever been written:

“No other profession can boast of the same unbroken continuity of methods and of ideals. We are justly proud of our apostolic succession. Schools and systems have flourished and gone, schools which have swayed for generations the thought of our guild, and systems that have died before their founders; the medical philosophy of one age has become the wisdom of tomorrow – through long ages which were slowly learning what we are hurrying to forget – amid all the changes and chances of twenty-five centuries the profession has never lacked men who have lived up to the Greek ideals – the ideals of Hippocrates, of Galen, or the men of the Renaissance – and they are ours today.”

—Sir William Osler (1910)