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THE EVOLUTION OF SURGERY

BY

J. EWING MEARS, M.D.

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READ BEFORE MEETING OF  
THE AMERICAN SURGICAL ASSOCIATION  
AT ST. LOUIS, JUNE 16  
1904



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BY

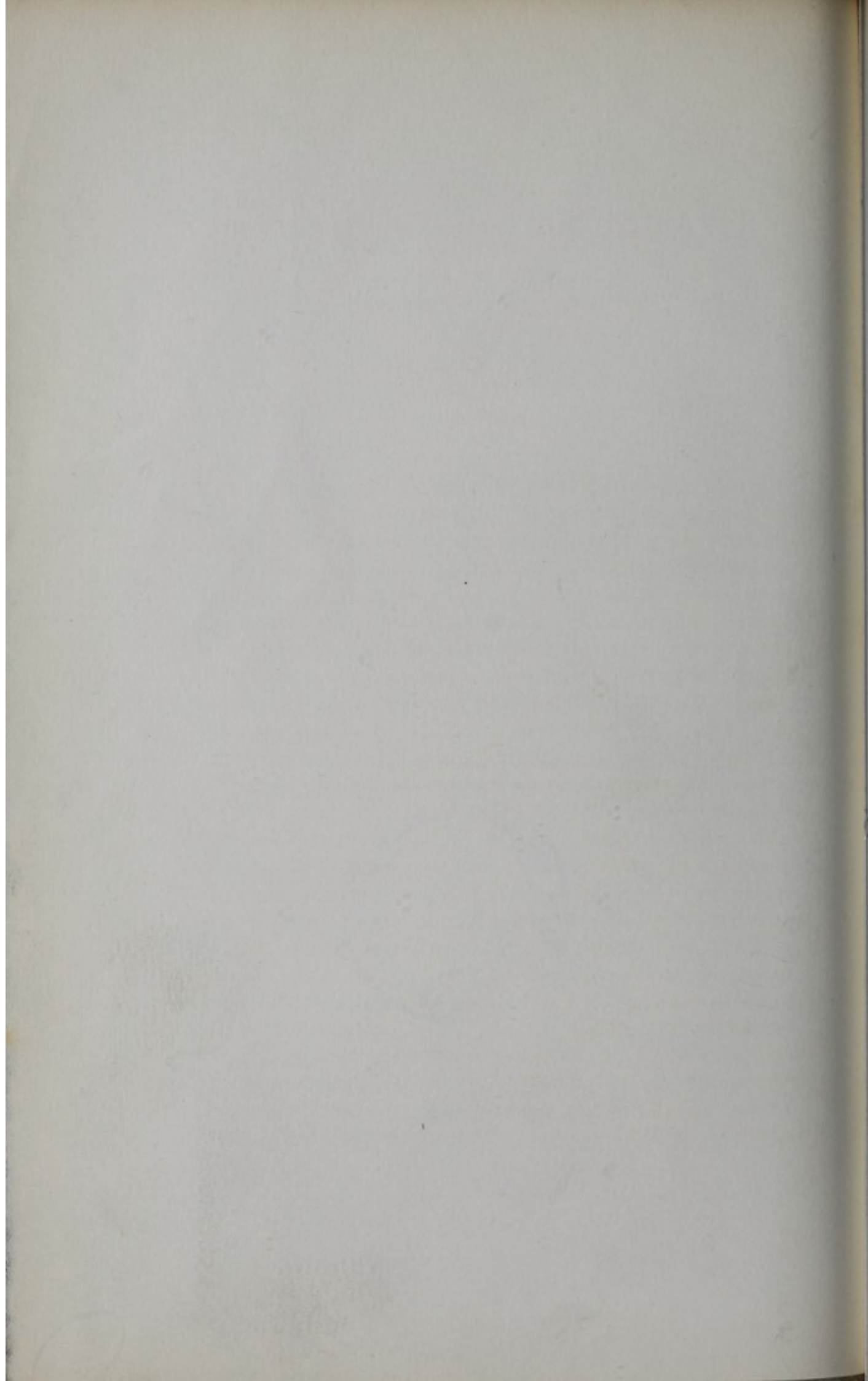
J. EWING MEARS, M.D.

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By J. EWING MEARS, M.D.,  
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THE occasion would seem to be fitting, when our Association holds its annual meeting in the metropolis of a State which illustrates, in its marvellous development and substantial growth, the greatness of that vast territory, the cession of which, to our country by purchase a century ago, is in process of elaborate commemoration in most impressive manner and in colossal proportions, to direct brief attention to the process of unfolding which has attended the science of surgery—its evolution from that which it *was* in the earliest beginnings to that which it *is* in the present day. I have ventured to employ the term “evolution” as representing “an orderly succession of events or a process of becoming,” indicating a progress from the lower to the higher—“the substitution of the complex for the simple type.”

In such etymological sense “that which evolves must contain in some shape what is evolved,” and thus we find that the art of surgery is as “old as human needs,” and found its beginnings in the primitive conditions of life which attended the savage state, when wars and conflicts prevailed and wounds and injuries required treatment. In this manner there was developed skill in the control of hemorrhage, in the extraction of missiles, in the adjustment and support of broken bones, and, in general, in the dressing and care of wounds. Observation and experience gave knowledge with regard to the healing power of tissues, and then, as now, confidence—more or less assured—was reposed in the results to be attained under the methods of treatment employed.

For convenient study I have chosen to divide this unfolding of surgery into three periods of time:

First. That which extended from the beginning to the time of Ambroise Paré (1517-1590), the father of French surgery, as he has been designated, who introduced the use of the ligature in large operations. Second. The use by John Collins Warren, in 1846, of ether as an anæsthetic agent in surgical operations, and, lastly, the discovery and introduction into general use by Joseph Lister (1860-1875) of the antiseptic treatment of wounds.

The occurrence of these events marks three great epochs in the history of surgery and has influenced its development and progress, not only in operative procedures, but in the enunciation of the great principles upon which the science rests.

Reference to the definition of the word "surgery," as that branch of medicine which treats of "manual operations for the healing of diseases or injuries of the body," will explain the character of the work done by those who devoted themselves to this branch of the healing art in the beginning, which constituted the ancient surgery of the *Hindus*, and will account for the development of the art along the lines of mechanic invention and practice, in the designing and manufacture of numerous instruments, more than one hundred in number, most, if not all, of which are in use to-day. Surgical operations of importance and great gravity, it is recorded, were undertaken, including lithotomy, without the use of the staff; varieties of hernia treated by operative methods; abdominal section for intestinal obstruction, with removal of concretions; suture of the intestinal wound and return of the bowel to the abdominal cavity; Cæsarean section; amputations, boiling oil and pitch, with pressure by bandage, employed to control hemorrhage; extraction of cataract; magnets used to remove iron particles from wounds; plastic operations for restoration of the nose; dislocations and fractures classified, and differential diagnosis elaborated; inflammations treated by venesection and anti-phlogistic remedies, cupping, poultices, etc.; constitutional treatment instituted in surgical cases, and medication employed.

Instruction in surgical practice was given by physician priests;

knowledge gathered from books was esteemed of little value without experience and manual skill in operative work; ingenious devices were employed in demonstrations; wax spread on boards was used to illustrate surgical operations; gourds, cucumbers, and other soft fruits to show method of incisions; puncture and tapping demonstrated upon stalks of water lilies, and leather bags filled with water or soft mud; bandaging was taught on flexible models of the human body; live animals used to show the effects of caustics and cauterants, the first example of vivisection. Anatomical knowledge was regarded as necessary, but was not taught in a systematic manner by dissections.

The *Suśruta* contained minute directions as to surgical practice. The ignorant were impressed by superstitious ideas, and teaching was given out as a revelation from Heaven and dependent upon absolute authority. Pathological principles were based upon a "conventional physiology—three humors, wind, phlegm, and bile"—and it has been well stated that the "whole fabric of instruction, good though its utility must have been for many generations, was without the quickening power of reason and freedom, and became inevitably decrepit."

Specialism did not exist in the profession; there were no fixed degrees, and there was no distinction between practitioners of medicine and surgery. In capital operations, as lithotomy, the permission of the Rajah was required; caste regulated to a certain degree the practice of medicine, and "the only distinction recognized between medicine and surgery was in the inferior order of barbers, nail-trimmers, ear-borers, tooth-drawers, and bleeders who were outside of the Brahmanical caste."

In the process of unfolding it will be convenient to note the growth along the lines established in the beginning: perfection in operative procedure and elaboration of technique, the development in teaching and authorship, the gradual ingrafting of the science, and the distinctive impression made by individual attainment.

In chronological and racial order the records show that among the *Chinese* surgery was rudimentary in the largest degree. This condition was due, in certain regard, to the "unwillingness to



draw blood and the respect entertained for the dead body." The insertion of fine needles of gold or silver—acupuncture—was the only distinctive operation practised, which was done for the relief of pain or inflammation, the needles remaining in the tissues for several minutes or days.

The inscriptions and drawings on *Egyptian* monuments and on the walls of temples illustrate the degree of development of surgical practice among these people. These show the application of bandages and the performance of operations upon patients. In the ancient tombs surgical appliances have been found, and in mummies, artificial teeth. The country is described by Herodotus as full of medical practitioners. Among these, ophthalmic surgeons were especially numerous and distinguished, owing, possibly, to the prevalence, in such marked extent, of ophthalmia.

The "Hippocratic Collection" gives, in the highest degree, character and distinction to surgery among the *Greeks*. As described by Homer, surgery was that of the battlefield, and limited. In the "Hippocratic Collection" the treatises on fractures, dislocations, wounds, and injuries, especially those of the head, are most complete models in descriptive precision, giving evidence of original investigation, of accurate observation, of knowledge and skill gathered in fields of wide experience, illustrating methods of practice which exhibit fertility of resource similar to that which gave character to *Hindu* practice. The recognition of tuberculosis as an etiologic factor in spinal curvature was among the most noted achievements of diagnostic skill, and anticipated the labors of Potts in this direction, although it has not disturbed modern nomenclature. Empyema was diagnosed and treated by intercostal incision, with evacuation of the pus, and lithotomy was practised by experts. The art of surgery, as with that of sculpture, did not receive any assistance from dissections, which were not practised, but owed much of its excellence to the opportunities offered for study of the human frame in the "Palæstra" or the place of wrestling.

From the Hippocratic era to the founding of the school of Alexandria (about 300 B. C.) but little progress was made in

surgery. The cultivation of human anatomy, inspired by the instruction of Herophilus and Erasistratus, the first anatomists who dissected and described parts of the human body, gave distinctive character to this epoch in the development of diagnostic precision and boldness in operative procedure. Even the internal organs, the liver and the spleen, were fearlessly attacked by the knife in the hands of Herophilus. Ammonius was the first to introduce the method of crushing with instruments large calculi, and in this way facilitating their removal, by incision, from the bladder. He also treated retention of urine by the use of the catheter. Neatness in bandaging and diversity in dressings were characteristic features of practice by the surgeons of the Alexandrian school.

The *Arabian* contribution to surgery was very small; the work of the ancient world was simply preserved intact. The study of anatomy was proscribed by their religion, and it was characteristic of their race to accept sufferings which came to them and to decline means of relief.

In the time from the reign of Augustus (25 B. C.) to the *Middle Ages* three men lived, who by their work made a lasting impression upon surgery—Celsus, Galen, and Paulus, of Egina. As the authors of voluminous treatises they, as has been truly stated, "brought the whole surgery of the ancient world to a focus." Among the important operations described and discussed are those for hernia, with the recommendation that the actual cautery should be applied to the canal after reduction; resection of the ribs; operations upon the thoracic cavity; subcutaneous urethrotomy; amputation of the extremities, with torsion and use of actual cautery to arrest hemorrhage; resection of bones and of the upper jaws; tenotomy, and, most notably, the brilliant operation of Antyllus, pronounced at that time one of the greatest of the world's surgeons, for aneurysm, ligature of the artery above and below the sac, with the evacuation of its contents.

The event which most distinctly influenced surgical progress in the *Middle Ages* was the founding of medical schools in which systematic instruction in surgery was given. One of the first

among these which became famous was that at Salerno; then the Hotel Dieu at Lyons and Paris; the school of Montpellier; the Universities of Bologna and Naples; the College of Surgeons of Paris, which became the models for schools organized in London and Edinburgh.

Coming to the *fourteenth* and *fifteenth* centuries surgery received a new impulse in two men of originality and genius—Paracelsus (Theophrastus Bombast von Hohenheim) and Ambroise Paré. The teaching of the former has been regarded as having merit “clouded as it was by mystical forms in which it was cast.” His writings had value, the most important among them being those on “Hospital Gangrene,” which is described as “true to nature,” and the healing of wounds.

Ambroise Paré, called the father of French surgery, began life as an apprentice to a barber surgeon in Paris, afterward becoming a pupil in the Hotel Dieu. Entering the army at an early age, he availed himself of the opportunities to study military surgery, and made valuable contributions to this special branch; among the most important of which were those on the character and treatment of gunshot wounds, maintaining that they were simple *contused* and not *poisonous* wounds, and should be treated by simple methods, and second, and most valuable, were the efforts he made, which were crowned with final success, to obtain the use of the ligature in surgical operations as a means of controlling hemorrhage.

The ligature was first used, it is recorded, by Lanfranchi, of Milan, who also recognized the difference between arterial and venous blood. To Paré belongs the credit of its general introduction upon an enduring basis, and through this means of controlling hemorrhage in operative procedures, he made “amputations on a large scale possible for the first time in history.” So little appreciated, at that time, was the great value of this most important contribution to surgical procedure, that Paré was compelled to “justify the use of the ligature before the Faculty by reference to ancient authorities.” A great benefactor to the army, he received its adoration and was the recipient of distinguished honors from Royalty.

Considering the immense advantage gained in operative surgery by the successful control of hemorrhage which the ligature afforded, it would seem proper to give to its general introduction the importance of marking a new era in the "unfolding" or "orderly succession of events" which have characterized surgical development.

As, up to this time of the recognized power exerted by the ligature in the absolute control of hemorrhage, so since then, have no means or agents been discovered to displace it, notwithstanding the repeated efforts, through observation and experiment, which have been made, so that to-day, the perfected ligature—that which has been deprived by skilful preparation of all of the objections urged against the original—gives to the surgeon well-assured confidence in its use in any operation which may be undertaken.

The study of surgical progress in the second period which we have chosen, through the *sixteenth, seventeenth, eighteenth*, and a portion of the *nineteenth* centuries, from the time of Paré and his work, to the introduction of ether as an anæsthetic agent and its use, by Warren, in surgical operation for the first time in history, shows that much time was consumed and labor expended in the correction of the errors of ancient surgery and the establishment of the art upon a scientific basis.

Increased knowledge and experience permitted the application of a refining and elaborating process to the surgical operations practised in the previous times. To the list, already marvellously lengthened, considering the opportunities of that period, new operations were added, notably the operation of trephining, which it is recorded was performed seventeen times upon Philip William, the Prince of Orange, for inveterate migraine. In military surgery the new methods of warfare, with the use of arms of precision, presented to the army surgeons new problems with which they had to deal in the treatment of the wounded soldier.

The study of human anatomy, so auspiciously begun in the school of Alexandria three hundred years before the Christian era, was assiduously cultivated and became the foundation of correct surgical knowledge upon which the practice was built. In

due time and order important factors in the development of the science, comparative anatomy, physiology, pathology, chemistry, and therapeutics were brought to make their contributions to the growing science, broadening the fields of investigation and determining its scope.

The schools of instruction grew in value by expansion of courses of teaching, by elevation of the standard, and by the enrolment in their corps of instructors of men of learning and of distinguished attainments in surgical practice. Edinburgh became the birth-place of clinical teaching, and through the graduates of the University gave this method of surgical instruction to the institutions of this country, beginning with the Medical College at Philadelphia, the first of its kind in America, founded by Dr. John Morgan in 1765, in which Dr. William Shippen became the first professor of anatomy and surgery. The successor of this college now exists as the Department of Medicine of the University of Pennsylvania, with a long roll of eminent teachers of medicine and surgery. Notable as teachers of the latter branch are Gibson, Smith, Agnew, and Ashhurst. In Berlin and Vienna the schools were devoted largely, if not altogether in the beginning, to the teaching of military surgery and to the instruction of army surgeons. As evidence of the position of the surgeon in the Prussian Army, it is recorded that it was the duty of the regimental surgeon to shave the officers of the regiment, from which, it may be inferred, that he did not have the rank of an officer—was, in fact, an enlisted soldier.

In the University of Göttingen surgery was taught by Albert von Haller, the distinguished professor of "therapeutical medicine," and he was qualified to teach this branch as "his mind was imbued with every department of literature and science."

Private schools of instruction came into existence in several places, notably in London and Edinburgh, that most distinguished being the school of William Hunter in Great Windmill Street, London, "inasmuch," as it has been aptly said, "it was the first perch of his more famous brother, John Hunter," not the least of whose monumental services to surgery was, as has been most happily

expressed by one of his eulogists, "that more than any other man he helped to make us gentlemen." In Edinburgh, Alexander Monro, "primus," occupied the position of Professor of Anatomy to the Company of Surgeons in 1719 and afterward in the University. As the first systematic teacher of surgery he is regarded as the "founder of the famous medical school of that city."

Any record of the schools of instruction would be incomplete without reference to those which were indeed pioneers, the schools of Italy, at Salerno, Naples, Padua, and Bologna, institutions in which culture in the highest degree was attainable, the training schools which gave to the world men of great eminence in all departments of learning, among these William Harvey, the discoverer of the circulation of the blood, who studied anatomy at Padua, under the illustrious Fabricius, the home of a distinguished line of teachers of anatomy whose labors so greatly influenced surgical development and growth.

The dominating influence exerted upon the unfolding of surgery in this period by individual effort was most marked, and gave character in the person of the author, the teacher, the original investigator, and in the practitioner. Through the labors of these, gradually, but surely, were the great principles of surgery evolved, which gave it permanence as a science and upon which as a sure foundation rested the expanding and successful cultivation of the art. To those names already mentioned should be added Richard Wiseman, designated the father of English surgery; Abernethy, Astley Cooper, Cheselden, Hey, Petit, Desault, Dupuytren, Larrey, Chopart, Cloquet, Amussat, Civiale, Scarpa, Schmucker, Richter, Siebold, and Callisen.

In the latter part of the eighteenth century there was born in a small country town in Kentucky, Ephraim McDowell. He it was who, in after years, through the operation of ovariectomy, opened the door of the abdominal cavity and established, as justifiable, operations upon the organs contained therein; robbed the peritoneum, the *noli me tangere* of former times, of its terrors, and bequeathed through his successors thousands of years of health and life to suffering woman. The great gift was not bestowed without hard-

ships and trials to his successors, who had to combat the antagonism of ignorance and prejudice, and to suffer, at the hands of members of their own profession, injustice and contumely.

Of what one suffered the writer of this knows, since, as his assistant and co-laborer for several years, he was a witness of the great wrong done him. Denounced as a murderer and one who should receive the attention of the District Attorney by a distinguished professor—teacher in a prominent medical college—in his lectures, deprived of recognition and place in the societies of his profession, he pursued his work with unswerving fidelity and in the firm conviction of right. Without the knowledge of to-day and without the help of modern "technique," he grappled successfully with cases surcharged with complicated conditions and of greater gravity than it seems come to the surgeon's hand to-day. With undaunted courage he met the dangers of hemorrhage, apparently beyond control, and of universal adhesions, and seldom closed the abdomen upon an incompleting operation. After years of professional work of this most arduous character—of unceasing devotion to the effort to place the operation of ovariectomy upon the foundation he believed it should occupy—as a justifiable and life-saving surgical procedure—his last days were made happy in the reception of professional honors and the assurance of high esteem and regard from those who had most strenuously opposed him. Such was the work of Washington L. Atlee, and in grateful memory of his worth and noble endeavors the writer would fain pay this humble tribute of respect.

Entering upon the third period we have set in the consideration of our subject, we find the list grows apace of those who, through their work in various directions, impressed, in marked degree and permanently, the unfolding of surgery. Upon it are inscribed the names of those in Great Britain, on the Continent of Europe, and in this Country who promoted surgical science and gave to it dignity and rank. Among those not already named are Liston, Brodie, Wardrop, John and Charles Bell, Potts, Ferguson, Syme, Colles, Lawrence, Paget, Erichsen, Spencer Wells, in Great Britain; Lisfranc, Roux, Velpeau, Nélaton, Malgaigne, Chas-

saignac, in France; Schuh, Chelius, the two Langenbecks, Diefenbach, Czermak, Stromeyer, von Graefe, in Germany; J. Mason Warren, Bigelow, Mott, Wood, Mütter, S. D. Gross, S. W. Gross, the elder Pancoast, Nathan Smith, Agnew, Mussey, Dudley, Eve, Bobbs, the first to perform cholecystotomy; Pope, McDowell, Hodgen, Beaumont, and Stone.

Great as was the advance made in surgery up to the introduction of anæsthetic agents and their use in surgical procedures, it is impossible to overestimate the importance of this event to the science of surgery. The employment of agents to produce a state of insensibility, more or less complete, was not new, as it had been shown by abundant evidence that it was a practice of great antiquity, preparations of mandrake and hemp having been used for the purpose, as is recorded in the writings of Homer, Herodotus, and Pliny. As early as the third century a preparation of hemp was used among the Chinese as an anæsthetic during the performance of surgical operations. But it remained for Dr. John Collins Warren, surgeon to the Massachusetts General Hospital, Boston, in 1846, to demonstrate in the performance of a surgical operation the value of sulphuric ether as an agent which would produce a state of general anæsthesia in surgical procedures, placing the patient in a state of profound insensibility to pain, with complete removal of muscular resistance—conditions most favorable to the careful and unembarrassed performance of a surgical operation.

More than this, as it has been well said, it was a priceless boon to mankind, in that it removed the great dread of suffering under operations; in that it permitted the performance of operations hitherto impossible, owing to their delicate character and magnitude, and in that it contributed to lessen mortality by the prevention of shock and other untoward conditions.

Under the favoring conditions established by the introduction of anæsthetic agents the field of surgical endeavor was greatly expanded. Not only was operative surgery, through their beneficent influences, greatly promoted, but scientific research received an impetus which carried it into fields of inquiry hitherto unex-



plored, broadening the foundation upon which the great principles rested, and leading, step by step, to the ingrafting, in fuller degree, of collateral branches of science—the outcome of the labors of the original investigator in the laboratory.

As one of the results of these conditions the transcendental contribution of Lister stands pre-eminent and marks the greatest achievement in the history of surgery. Other contributions, valuable as they have been, lose prominence when compared with it and its far-reaching influence. Of little avail was the confidence the ligature afforded in the control of hemorrhage; the tranquil sleep which anæsthetic agents gave; the promise of restoration in the care exercised in the after-treatment, if dangers, unseen and beyond the knowledge of the surgeon, lurked within the recesses of the wound.

To know these and to overcome their evil effects was the great object of Lister's work, which, after years of thoughtful inquiry, painstaking and laborious research and experimentation, was gained, crowned with triumphal success. To him suffering from a wound, whether the result of injury or that made by the surgeon's knife, was given immunity from harmful agencies, with hopeful assurance of restoration to health.

Lister, in common with other surgeons, had observed the important difference which existed in the course of repair between the subcutaneous and open wound, and had endeavored, by the use of various forms of dressing, to prevent the conditions which developed and which were so hostile to the welfare of the patient. The object sought to be accomplished by these dressings was to exclude the air, which in some unknown way was thought to be responsible, from the wounded surfaces. Effective as they were in this respect, they intensified the hurtful conditions by confining the wound secretions, products of unhealthful action, and made easy the ingress into the system of their evil influences, producing pyæmia and septicæmia.

Reaction in opinion followed observation of the results produced by these forms of dressings, and led to their abandonment by some surgeons and to the treatment of wounds without dress-

ings of any kind, or to the application of those, most simple in character, which permitted the free escape of wound fluids. The reparative process was thus promoted, and in many cases was satisfactory, but not as uniformly as was desired, and the search continued for a solution of the problem, the discovery of the causes concerned in the production of the abnormal conditions attending the healing process.

As experience had shown that these conditions prevailed to greater extent when patients were crowded together, better methods of hospital construction were adopted, by which segregation of patients was secured and ample air-space with more perfect systems of ventilation.

The study of the experimental researches of Pasteur into the causes of putrefaction led Lister to the conclusion that "the evil conditions observed in open wounds were due to the admission into them of organisms which exist in the air, in water, on instruments, on sponges, and on the hands of the surgeon, which, finding a suitable nidus for their development and growth in the discharges and surrounding tissues, germinate in them and alter their chemical constitution, forming various poisonous compounds, which, if absorbed into the blood, give rise to pyæmia and septicæmia."

It was, therefore, most desirable and necessary to prevent the entrance of these organisms, in active state, into the wound, to adopt some measures by which they could be destroyed before or after admittance into the wound, to secure the removal of discharges, and to prevent their accumulation in the wound-cavity, in this way maintaining the tissues in a healthy condition, which state is, in itself, destructive to germ life.

To obtain a substance which was destructive to the organisms and harmless to the tissues was an undertaking attended with some difficulties. From the original crude, carbolized putty dressing to the perfected dressing of to-day; from the unfitted and uncleanly operating-room, surcharged with carbolic-acid vapors, to the completely constructed, germ-proof operating arena of to-day, equipped with all the modern appliances needed

in surgical operation, in which, above all, the goddess of cleanliness reigns supreme, was a long stride, and has been accomplished only through study and investigation, supplemented by accurate observation and well-digested experience.

The profound influence exerted by the achievement of Lister the profession of medicine has not alone felt, but every department of life has been brought to a knowledge of its value and importance in the study and practice of sanitary science; in the adoption of methods which contribute to the preservation of health and the prevention of disease, in the nation, in the city, and in the home. The gospel of cleanliness has its ministers and teachers in the household, its earnest missionaries in the slums of the city, in the mills and factories, and as well on the farm.

He who can thus influence the life of his fellowmen is indeed a benefactor, and it is to the great glory of surgery that through the efforts of one of its disciples came this beneficent gift to man.

As the direct result of these most important contributions to surgical knowledge, the introduction and use of anæsthetic agents in operations and of antiseptic methods of wound treatment, operative surgery has made great advances in every direction, most pronounced in operations upon the abdominal, cranial, and thoracic cavities.

As the door of the abdominal cavity had been opened through the courageous efforts of McDowell, into this entered the surgeon, and, under the protecting ægis of anæsthesia and asepsis, attacked organ after organ with successful result. Operations for the relief of morbid conditions, charged with the gravest complications and hidden dangers, have been undertaken and have been executed with a daring which has challenged admiration and disarmed criticism.

Operations of greater or less magnitude have been performed in ancient times upon the thoracic cavity, including puncture and rib resection. These have grown in frequency and importance, while incision of the pericardial sac and suture of the heart walls are among more recent triumphs of surgical skill and daring. Exposure and massage of the heart through incision of the

diaphragm, for the relief of narcosis produced by anæsthetic agents, has been recently performed, and may well be designated as the climax of boldness in surgical procedure.

Magnificent as have been the achievements in operations upon the abdominal cavity, those upon the cranial cavity can claim almost equal rank. Here not only anatomical and physiological considerations have to be dealt with, but also psychical. "The inter-relation of cranial tissues and organs, their capital importance in the physical economy, and the position of some of them, as the substrata of mental activities render any surgical interference a matter of great delicacy and grave anxiety." In this field the labors of the physiologists and clinical observers have yielded the most important results, the practical outcome of which has been the mapping out of the surface of the brain into a series of topographical areas and the establishment of the theory of the localization of function—motor, sensory, and psychic. Supplementing these investigations came anatomical and surgical inquiry, the object of which was to define the relation which existed between the cerebral convolutions and external cranial landmarks. This addition completed the circle of information, and permitted the surgeon to apply to operations upon the cranial cavity the ordinary rules governing surgical operations.

In any record of the progress of surgery mention must be made of the great advances which have taken place in military surgery. The entrance of men of scientific attainments into the medical corps of the army and navy has been signalized by corresponding development and growth of surgical art and science, as witnessed in the improved methods of hospital construction, the expansion of the work of the ambulance service, the equipment and use of the hospital train and of the hospital ship, the improved sanitation of the war-ship and of the camp—the marvellous results obtained by experimental research and practical endeavor in preventive medicine.

The organization of associations having for their object the cultivation of surgical science has exerted a beneficial influence in securing the diffusion of surgical knowledge, the creation and

the defining of surgical opinion, and the promotion of social intercourse. Such was the intent of the eminent founder of this Association, who, as teacher, as the eloquent expounder of the great principles of surgery, as author, and practitioner, was so active and earnest in his efforts to obtain the higher development of surgery and to elevate the standard of the profession.

Thus, in the unfolding of surgery, from the crude to the perfected art, without scientific basis, to the highest development of science, without relation to collateral branches of knowledge, gradually absorbing those elements essential to normal growth, has been evolved the surgery and, with it, the surgeon of to-day. From the bleeder, the nail-trimmer, and ear-borer, through the regimental barber, to the accomplished scholar, the author of elaborate treatises, the trained teacher of principles and of practice in schools of instruction, the astute diagnostician, the learned pathologist, the patient investigator, the dexterous operator, the skilled practitioner, recipient of high honors from the institutions of learning of the world, and crowned, above all, as the refined and cultured gentleman.