The old and the beginning of the new in surgery / by J. Ewing Mears.

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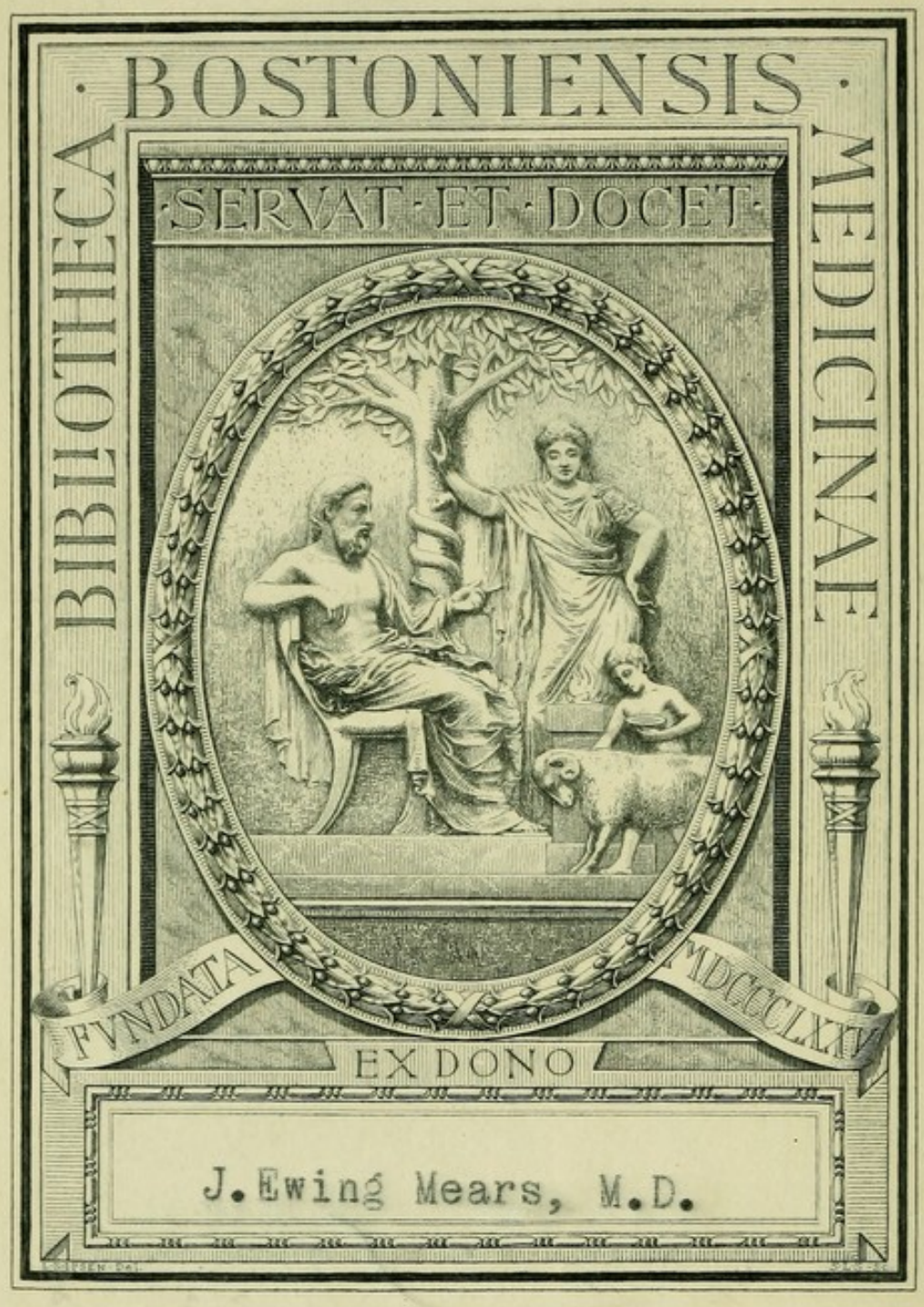
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AND

THE BEGINNING OF THE NEW

IN

SURGERY

BY

J. EWING MEARS, M.D., LL.D.

PHILADELPHIA
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THE OLD AND THE BEGINNING OF THE NEW IN SURGERY.[1]

It has happened to the writer to have lived in one of the world's periods of greatest activity and progress. It may be questioned whether the last half of the nineteenth century cannot claim the maximum of development in those conditions which have contributed to the improvement of man's stay on earth. In considering these conditions and the influences exerted by them, it must not be forgotten that the foundation upon which they are builded and upon which they rest took origin at the very beginning of man's existence—at the dawn of creation—and the structure of knowledge has grown progressively through the contributions which have been made in successive periods of time, influenced by the conditions of life which have constituted their environment. This, it may be said, has been eminently true in the development and growth of surgery. At one time the legitimate part of the barber's art, emancipated only from this ignoble association when the genius of those who were its disciples gave to it its proper place as a part of the science of medicine, through the ingrafting of the principles of that science, which were essential to its development and growth. In the successive ages of the world's history the value of life has been measured by the increase in knowledge of the means of its preservation, and all efforts have been directed to those ends, until in this day the prevention of disease, through the prevention of the causes which produce it, has become the ideal object of the labors of the disciples of the art of healing.

[1] Reprinted from the Transactions of the American Surgical Association, 1909.

In view of the limit the writer has fixed for the discussion of the subject expressed in the rather comprehensive title of his paper, he is moved to state that it will concern chiefly his own experience, which covers nearly the last half of the last century. In that period of time two of the most important and controlling contributions to surgery have been made—the general introduction of the use of ether as an anesthetic agent in major surgical operations and the method of antisepsis in the treatment of wounds.

With regard to the first, it has occurred to the writer to witness operations upon patients who had been placed in a state of insensibility, more or less complete, by large draughts of alcoholic stimulants or by the administration of opiates in unusual quantities. Firmly bound to the table, the patient was unable to offer successful resistance, and the operative procedure was conducted to the end, despite the agonizing cries of pain and suffering. These conditions of necessity limited surgical interference to cases of absolute emergency and those which involved the extremities, as a rule, and which were the result of accidental injuries. Great as was this boon, general anesthesia, to suffering humanity, the agent employed possessed certain objections, the chief one being that of the nausea following its use in many cases, and the effort has been continuous to obtain a substitute freed from this condition. Up to this time many agents have been added to the list of anesthetics, local and general, but attached to each there has been found to exist some element, either of danger or unsatisfactory efficiency, and the search, through observation, practical experience, and laboratory experimentation continues in order to find the ideal substance, one capable of producing complete insensibility to pain without the loss of consciousness. The nearest approach to the accomplishment of this desirable condition would seem to have been found in the use of stovine by lumbar puncture, but this method is not free

from elements of danger, which, in reported cases, have led to fatal results.

Taking a fundamental part in the development and growth of surgery in the time set apart was the method of instruction in vogue in the beginning. The sessions of the medical colleges were short, at most, not more than three and a half to four months in each year, and the student, while he was expected to enter at the beginning of the course, was permitted to begin his collegiate studies after a large part of the session had passed. Some obtained the degree in medicine in one year of nine months, by taking a winter course of instruction in one college and spring course in another college. A requirement for entrance and for the privilege of appearing for the examination for the degree of doctor in medicine at the termination of the two years' course of instruction was a presumed year's study and apprenticeship in the office of a practitioner, whose qualifications as an instructor were quite an unknown quantity. No conditions were imposed as to preliminary education. Graduation from a school of high grade was rare, and still rarer was the possession of the degree of Bachelor of Arts by the candidate for admission. The methods of instruction were didactic, and the student sitting on the benches for two courses in succession heard the lectures of the first course repeated, without, in most instances, addition or emendation. When the learned professor read his lecture from manuscript pages, it has happened, to the knowledge of the writer, that the paper was yellow with age and the text was as ancient as the paper. The dissecting room was the only laboratory, and the work done therein was largely of a perfunctory and defective character, concluded without any test by examination, in the presence of the dissected specimens, of the knowledge gained by the student. The fee for instruction paid by the student was outside of the

college ticket, and was the emolument of the demonstrator, and did not reduce the sometime large receipts of the professors, who received all of the income of the college, paid the expenses of maintenance, and divided the remaining balance, sometimes giving to each from five to eight thousand dollars in the year.

The large sum obtained by the professors each year was increased by the sale of the text-books written by them, copies of which each student was expected to buy—if his financial resources permitted such expenditure. As the lectures of the professors were embodied in these books, it was to the advantage of the student to possess them, and the study of them assisted in the work of preparation for the final examination. In a way it may be said that the text-books on different medical subjects, written by the professors who taught the branches, were more useful to the student than those written today by a number of authors and edited by one or two. As a student, in the text-book of the teacher he receives instruction which is individual, and not the opinions of many who may treat the subjects in very different ways. As a graduate and a practitioner, the text-book of many authors may possess for him positive advantages and assist him in his work.

Anatomical material was expensive, and in the absence of legal provisions by the State sometimes difficult to obtain by methods short of "Burking," with the suspicion even that this method was resorted to. The surgical laboratory did not exist, and the student, as a rule, received his degree which declared him qualified to practise surgery without having received any practical instruction in the application of surgical dressings or in the performance of surgical operations of either minor or major character upon the cadaver. The student who felt the necessity of possessing practical knowledge on this subject was compelled to obtain a cadaver at his own expense and pay a private instructor for the instruction

given. In the days spoken of, at a later period, the eminent teacher of Surgery in Jefferson Medical College, Professor Samuel D. Gross, organized, as a part of the instruction of his chair, a surgical laboratory, and the writer was appointed to take charge of the Department of Surgical Dressings, sharing the duties with a colleague, who gave instruction in operative surgery. Later, the entire teaching in the laboratory came under the writer's care, and the student received instruction in the laboratory, which was made compulsory, without extra fee. This condition the writer earnestly advocated, feeling that every student receiving the collegiate degree should be required to receive instruction of this character and without extra cost. It is believed that the surgical laboratory, thus organized by Professor Gross, was the first established in the medical colleges of this country. The branches of medicine which were included in the curriculum were the traditional seven—anatomy, physiology, materia medica and chemistry, principles and practice of medicine, principles and practice of surgery, and obstetrics. With the exception of anatomy, the fundamental branches were taught only by lecture, and laboratories for experimental and practical work in these branches were absent. Students who were ambitious to gain practical knowledge in Materia Medica had the opportunity in certain apothecary shops, where they were instructed in the art of making pills, powders, and certain simple mixtures. In medicine, clinical instruction was given by the professors in turn, those occupying the chairs of anatomy and surgery giving clinical instruction in surgery in the divided halves of the term. Clinical material in medicine in the college clinics was limited entirely to walking cases, illustrating chronic affections, as a rule, of the stomach, not extending in nomenclature beyond dyspepsia, or what was vaguely designated as chronic gastritis. The diagnosis, in each case, was

most frequently, if not always, made without physical examination, and based upon the very vague and non-intelligent information given by the patient. The treatment was eminently empirical, a condition of inflammation being assumed as the diagnosis, counter-irritation to the extent of blistering was advised, and enforced over the epigastric region, or, as more intelligently conveyed to the patient, over the pit of the stomach. When torpor of the liver was the suspected diagnosis, remedies which would administer a fillip to the lining membrane of the intestine were regarded as indicated in order to invite and stimulate hepatic activity. There were no obstetrical clinics as such. Gynecology was taught by lectures; the use of the speculum was demonstrated upon models or the cadaver; physical examinations were not permitted to be made before the class by the teacher, and the members of the class were not permitted to make, even under the guidance of the instructor, in the clinical room, such examinations. The solid stick of silver nitrate, or, more commonly designated, lunar caustic, was the agent universally applied for morbid affections of the cervix uteri, and displacements were most frequently unsuccessfully relieved by the use of very varied and uncomfortable mechanical appliances. Believing that students in medicine should have practical instruction in the methods of making digital examinations, the writer at one time, conducting the gynecological clinic, arranged to give instruction in this branch in the retiring room of the clinic to the class in sections. The instruction was prohibited by the controlling powers of the institution as not conforming to the rules, which protected the female non-paying patient from usage not agreeable to her sense of modesty. Instruction in practical obstetrics was obtained by students who felt its necessity, on the payment of a fee, in lying-in-homes. When sufficiently instructed in the institution they were permitted, under the guidance of a

practising physician, to take charge of cases in the homes of non-paying patients. At an earlier date, somewhat, than that of which we write, the writer has been told that in the then frontier West the act of parturition was accomplished while the wife was held on the lap of the husband, a limb each confided to the care of a sympathizing woman neighbor, while the physician sat on a stool between the two. It can be readily understood that this position was not one of comfort to any who were required to take part in the procedure, which in the case of primiparæ was likely to be of a prolonged character.

Clinical surgery was taught in the college amphitheatre and, as well as clinical medicine, in certain hospitals which had lecture rooms in the buildings. In the college amphitheatre the instruction was given by the professor of surgery, or, if a practising surgeon, by the professor of anatomy. In some instances one or two rooms in the college building, not very remote from the odors and pathological conditions of the dissecting room, were assigned for the reception of patients who had been submitted to major operations in the clinic. Bloodletting for inflammatory affections was practised, and the writer while on duty in the surgical clinic was directed by the Professor on one occasion to bleed a patient suffering from acute iritis. Inquiring as to the number of ounces which should be let, the answer was as follows: "Ounces! Bleed him, young man, until he falls over;" and the orders were strictly obeyed, with the happy result of prompt relief of the phlogistic conditions. In the hospitals the students were not permitted to "walk the wards." The closest contact they had with the patients was from the benches of the amphitheatre, large enough, in some cases, to seat six hundred students.

Associated with the subject of the conduct of the medical college, in the day of which we write, it is interesting to consider

their method of organization. In some States the Legislatures granted charters to medical colleges which were parts of a sweeping franchise to construct a railroad and, possibly, one or two other enterprises of commercial character. These charters came into the possession usually of members of the medical profession with political proclivities, who sold them to other members of the profession ambitious to acquire the title of professors. Some of these colleges, thus organized, were undeniably fraudulent in character and conduct. Endowed under the charter with colossal powers and privileges, they conferred degrees of all kinds, from A.B. and M.D. to LL.D. and D.C.L., in the majority of cases "in absentia," and for sums of money varying in amount according to the financial ability of the intending purchaser. The conferring of these degrees was not limited to this country, but extended quite over the world. In Great Britain and the continent of Europe the business became a subject of international interference, and happily, for the good repute of the medical profession of this country, it was stopped.

In marked contrast, the medical colleges of today, with possibly a few exceptions, can claim a greatly improved condition of excellence in the requirement for entrance—two, the Harvard Medical School and Johns Hopkins University, exacting the degree of Bachelor of Arts—in the extension of the sessions, expansion of the courses of instruction, organization and conduct of the laboratory systems, and all methods which contribute to the complete education of candidates seeking admission into the medical profession.

General hospitals, even in the larger cities of the country, were few in number, limited to one or two at most. Among those most closely associated with clinical teaching and venerable in years of existence were the Massachusetts General Hospital, in the city of Boston, and the Pennsylvania Hospital, in the city of Philadelphia, founded by William Penn. The clinical amphitheatre

in this hospital was unique in character, having been constructed in what may be called the cupola of the main building, in a space so restricted that the students sat on benches almost overhanging in position, and looked quite directly down upon the teacher and patient.

In the days of which we write the operations performed in the clinics were usually in the form of amputations and the removal of external growths. Operations upon the cavities of the body were limited to the cranial, and did not pass beyond the use of the trephine in cases of depressed fracture. Paracentesis of the chest and abdominal cavities was performed for dropsical effusions. Thoracentesis, with rib resection, was not practised, and although McDowell had opened the gateway into the abdominal cavity through his operation for the removal of ovarian tumors, this operation was rarely performed, and then not in the public clinics. The writer recalls an interesting experience which came to him on the occasion of a visit to one of the hospitals connected with the teaching in the University of Edinburgh, when a distinguished ovariotomist was required by the authorities of the university to perform the operation of ovariotomy in the public clinic. He protested that the conditions surrounding operations in a public clinic were hostile to any operation which involved the opening of the abdominal cavity. Yielding, however, to the official mandate, he did the operation, which fortunately happened to be of a very simple character, and when it was completed, remarked to the class of students: "Well, you didn't see anything, did you?" Cesarean section had been performed in a few instances, and Dr. John S. Bobbs, of Indianapolis, Indiana, had performed the first operation of cholecystotomy.

In private practice surgical operations were performed in the homes of the patients, in bedrooms and in living rooms, without

any special preparations as to cleanliness. On one occasion, when the writer assisted in an operation of abdominal section—ovariotomy—the operating room was in the top story of a tenement house under the roof, in a narrow alley way. During the operative procedure a sudden and heavy thunderstorm occurred, with a deluge of rain, and the water poured through openings in the ancient and perforated roof, one stream being so directed that, before the assistants could interfere, it entered the abdominal cavity through the large incision which had been made to effect removal of the adherent tumor. Efforts were made quickly to place the operating table—the usual kitchen table—in a place better protected from such irrigation methods. It was felt, however, by those present that the storm water was as clean, if not cleaner than, that which was used from the somewhat battered and discolored tin hand basin. The operating table in the homes was usually the kitchen or double-leafed dinner table, which was firmer than the bedstead or lounge, which was sometimes brought into service. In one case the writer excised the greater part of the upper jaw in a patient who, being addicted to the excessive use of alcoholic stimulants, became frenzied during the ether administration, and, flinging aside the assistants, men and women of the household, threw himself upon the floor. Extra help was summoned, which, sitting upon the patient in his prostrate position, controlled him while the operation was completed, patient, surgeon, and assistants being well bespattered with blood. In another case in which the writer was called in consultation, the patient, a burly chief of police of the town and an alcoholic subject, during the process of ether inhalation sprang from the lounge in the stage of stimulation, went to a closet, and seizing a loaded revolver stalked about the room in a very menacing manner. The family physician, a brave and resourceful man, taking advantage of a con-

venient opportunity, leaped upon his back, pinioned his arms, and in this position directed his movements skilfully to the open door, the assistants meanwhile emerging from safe places of refuge, which had been sought at the time of the impending danger. In this case the operation was completed without the further administration of the anesthetic agent.

Associated with these conditions of improvised operating arenas was the indifference manifested by the surgeon and his assistants with regard to the state of cleanliness of the operating instruments, of the sponges and other materials used in the wound cleansing during the operation, and in the subsequent dressings which were applied. The instruments were not many in number, made with bone handles, white or black in color, often with dull cutting edge, and kept either in an operating case or placed loosely in a bag of convenient size. The sponges, which were universally employed in the wound cleansing, were those gathered from the sea and found in the apothecary shops. Those known as surgical sponges were usually of finer texture than the ordinary bathing sponges. Frequently they were charged with calcareous particles and almost microscopic prickles, which proved to be irritating to the wound surfaces and, as well, to the fingers of the assistants using them. The sponges, if of good quality, were very enduring and did duty for a long period of time. One distinguished ovariotomist was accustomed to replenish his stock of *three* sponges at the beginning of each year. He never used more than that number, and they were always accounted for after an abdominal section, in order to prevent the untoward accident of permitting one to remain enclosed in the cavity when the operation had been completed, an accident which has happened in several recorded and some *unrecorded* cases. It is known to the writer that after operations the sponges have been used to remove blood from the table and

even from the carpet or floor. They were cleansed after operations either in the basins, which had been used to contain the hot and cold water, which alone was applied to the wounded surfaces, or under the hydrant in the back yard, if the patient lived in the home of the poorer class. They were placed uncovered in the bag containing the instruments, in which was also frequently concealed the morbid specimen which had been removed by operation. The basins containing the water used during the operation came either from the kitchen or bedroom, and the dressings and bandages were frequently obtained by tearing them from unlaundered sheets or muslin or linen underwear.

The garb of the surgeon was sometimes a rubber apron of large dimensions or a coat known as a generally used linen duster, on the sleeves or body of which the blood-clotted knife was generally wiped. The assistants performed the duties assigned to them in their shirt sleeves, divested of coat and vest. In the absence of proper conveniences the hands were not washed. In cases of malignant character or those accompanied by foul discharges they were anointed with olive oil or lard. The effort made was constantly to protect the surgeon and his assistants from dangers coming from the patient, not the patient from dangers coming from those taking part in the operation.

The writer has been told of an instance in which a very prominent ovariotomist of the Middle West, who suffered from vesical calculus, accompanied by a severe cystitis, stopped twice during the performance of an operation, took the soft catheter from the inside pocket of his coat, lubricated it with spittle, evacuated his bladder, and continued the operation probably without washing his hands. Of another surgeon who, during an operation for amputation of the thigh, overheard the casual remark of one who was present that the patient looked as if he had "phthisis." He

had made the anterior flap, but put the amputating knife upon the table and proceeded to make a physical examination of the patient's chest, one of his assistants holding his thumbs over the femoral artery with some anxiety during a somewhat prolonged procedure of auscultation and percussion.

The after-care of patients in the hospitals was a duty undertaken, as a rule, by convalescent patients, or, in some cases, by men and women who served as nurses for a slight compensation. As can be conceived, by these methods patients suffered from ignorant and, at times, cruel treatment. The writer recalls an instance which happened during his term of service as Interne in the hospital of a large eleemosynary institution, in which the nurses were taken from among the number of pauper inmates, some of whom belonged to the criminal class. On one occasion, when a wound was being dressed, the nurse placed his foot, encased in a dirty boot, upon the bed, and spat tobacco juice from his foul mouth directly into the water contained in the dirty basin which was used in the effort at the supposed cleansing of the wound. This act was regarded as the limit of endurance, even in those non-aseptic days, and the offender was promptly relieved of his duties as nurse and sent to the kennels of the out-ward department. In the homes the care of patients after operation was assigned to the female members of the family or friends who volunteered their services. Under these conditions the patients received kind treatment and fairly good care, sometimes endangered by the emotions which sprung from the warm heart of the attendant, whose conception of sick-room discipline was thereby influenced.

In no way was the absence of regard for cleanliness more forcibly illustrated than in the use of the catheter in hospital and private practice. In the former the unwashed instrument was frequently used after lubrication with olive oil or simple ointment contained

in vessels which had been in use for long periods of time, affording in this way easy access into the bladder of septic germs. In private practice the metal instrument carried in the pocket case and lubricated in the home with lard or butter was used. When the soft or rubber instrument was introduced, the walking patient was instructed how to use it, and frequently carried it, conveniently coiled up, beneath the sweat-band of his high hat, and when used in convenient places, lubricated it with spittle.

Of the dressings most frequently used after operations to combat inflammatory conditions, the emollient poultice was most popular. These were made of stale bread crumbs with water or milk, but most generally of flax-seed meal. The directions given by the learned professor with regard to the preparation of this last poultice were very specific in character, and unless these were strictly followed, failure was predicted. The test given of the proper consistency was to be found in the adhesion of the mass to the side wall or ceiling of the room when projected against these parts of the room structure. At the final examination of the candidate for the degree given by the college, his ability to practise surgery was determined, to a certain extent, by his knowledge, in minute detail, of the poultice preparation. In the lectures and text-books poultices were classified according to the effect to be accomplished, as emollient, astringent, stimulating, fermenting, rubefacient, narcotic, etc. Suppuration in the wound followed the use of the emollient poultice, and the discharge of pus was, as a rule, very copious. The wound condition was determined by the character of the pus—if laudable, favorable; if sanguinolent or ichorous, unfavorable. Among other forms of dressings the writer recalls a case of amputation at the hip-joint in which the stump was kept bathed with laudanum (tinctura opii), and without any manifestation of the toxic effect of the agent used.

During the Civil War the discipline which was enforced in the camp and on the march was carried, in some measure, into the management of the general hospitals of the service, with favorable results as to conditions of cleanliness in operation and in wound treatment. In this respect, however, the results were influenced to a large extent by the qualifications of the surgeon in charge, or of the inspector who made his tours of inspection. Notwithstanding the precautions taken, and those which were born of the knowledge of the time, the mortality was very great. Gangrene, designated hospital gangrene, was of a most virulent type, and resisted all known methods of prevention or treatment. The ignorance with regard to the influence of germ infection led to the tolerance of conditions most productive of disease dissemination, and thousands of lives paid the penalty for what was then regarded as a state of inevitable ignorance. The lessons, however, were not lost, and the faithful, earnest surgeons of the day, groping their way through the darkness, sought the light which was to be reached in not many years to come. The general hospitals were located in cities and where possible, in the suburban parts in the search for better air and surroundings. In some instances these were large wooden structures constructed upon the pavilion system, which gave both light and air. They contained usually a large number of both medical and surgical cases, and the physicians and surgeons in attendance were largely chosen from those practising in the cities, with some officers of the regular service. In the emergency, large buildings in the cities, which had been constructed for factory or mill purposes, were taken and converted to hospital use. That these should fail to give the best results, by reason of former use and character of construction, was to be expected, but the needs of the service demanded such provision for the sick and wounded, who in the large variety of diseases and wounds from which they

suffered, furnished a great school of instruction to the intelligent and observant physician. Chloroform, unmixed with other agents, was the anesthetic largely, if not altogether, used in operation, and many lives, it was reported, were sarcrificed through its careless administration. The need of medical men in large numbers to supply the demands of the service led to the appointment of many not fully qualified, but, as a rule, the surgeon, especially in the emergency of service in the field hospital following great general engagements, was found to be equal to the duty imposed. The writer recalls two instances in which wounded soldiers were brought to a military hospital, in which he was the temporary acting executive officer, with extremities suffering from compound fractures the result of shell wounds; in one the limbs were encased in an excellent supporting dressing made from the bark of a tree, and in the other, rails taken from the ordinary rail fence of the country did good service in affording support and permitting comfortable transportation.

The large number of pathologic specimens obtained and preserved, with full histories of each, laid the foundation for the valuable collection in the Army Medical Museum, the development of which, with the Surgeon-General's Library, was so successfully promoted through the work of our distinguished Honorary Fellow, John S. Billings, at one time the efficient Surgeon-in-Charge. In the ending days of the war the writer met in London Sir James Ferguson, the celebrated English surgeon and teacher, who remarked, in commenting upon the work done by the medical profession of our country in that heroic struggle, that the members had done splendid work and deserved great credit for what they had accomplished. No war, certainly none of modern times, has offered such opportunities for the study of diseases and surgical conditions incidental to the life of the soldier in field and camp and in the deadly conflict

of arms. The arm of precision today projects a missile the purpose of which is to disable, to put the soldier out of service; in the time of which we write its duty was to destroy life, discharging, as it did, the large death-dealing Minie ball. Following the experience gained in the Civil War, surgical endeavor was greatly stimulated and methods were improved. In this period also and later there appeared operations which may be designated, as in a way, fashionable. The organs of generation in the female and near-by parts presented a large field for exploitation, and operations were performed for the relief of supposed functional disturbances, correlated with supposed grave constitutional conditions. Freed from the difficulties and dangers of organic changes, the hand of the tryo and empiric found free play. Condemned by professional opinion and judgment, these operations have been stricken from the list of those necessary to be performed or justifiable in purpose. Unfortunately for the good repute of surgical science, this glamour of professional notoriety, promoted by the eager desire of commercial success, has been in a measure transmitted, even to this day, and confiding patients have been, shall we say, the victims of the untoward results of surgical procedure not necessary for the relief of supposed morbid conditions. But this is passing; the stern verdict which true science renders when sitting in judgment on the work of those who assume to be its disciples consigns to merited punishment those who violate its principles and degrade the standard of its code of ethics.

The operations claiming in these days to be the most important and as well involving danger by reason of their character and magnitude were amputations at the hip-joint, the ligature of large arterial trunks, and the removal of ovarian tumors by abdominal section. In the former the percentages of success were fairly good. The text-books of the day gave prominent

position to a surgeon of local repute who had three successful cases in succession. A mortality not exceeding 32 per cent. was regarded as most favorable in operations of ovariotomy, and this percentage prevailed when the cases were those of non-adherent monocysts. In multilocular cysts, with parietal and visceral adhesions, the percentage of mortality was greatly increased, exceeding often 50 per cent. The writer, as the assistant of the distinguished ovariotomist, Dr. Washington L. Atlee, contributed a chapter on the "Pathology of Ovarian Tumors" to his book, and in this he announced what he regarded as a discovery of some interest, to the effect that the pathological conditions which followed operative interference had an important relation to the length of the incision made in the linea alba in the abdominal section. The small incision was only possible in simple monocysts, in which, when the fluid contents were being drawn off, the flexible walls of the cyst could be drawn into the opening and effectually sealed the abdominal cavity, thus preventing the ingress of the air, and with it the then unknown and unrecognized myriads of organisms with which it was charged. The knowledge of the day did not permit of an understanding of the relation of cause and effect involved in these conditions. Experience had demonstrated that the air in coming in contact with the surfaces of a wound or the lining membrane of a closed or serous cavity was harmful, but in what manner it acted was not known. It remained for Lord Lister to solve the problem and to devise a system through which these organisms were destroyed and the process of putrefaction in wounds prevented.

In the decade included between the years 1865 and 1875 the dawn of a new era appeared in surgery; the beginning of the new—the new built upon the work of the old, surcharged as it was, of very necessity, with ignorance born of the abscence of knowledge

beyond the discern of man. The wound conditions with which the observant surgeon had to deal led in time to the recognition of the fact that they were not normal, that there were no conditions in the tissues themselves which should generate them, and that their causes must be sought for outside. The experimental researches of Pasteur determined the causes of putrefaction, and it remained for the reflective mind of Lister to associate these causes with the abnormal conditions observed in wounds. The result of his painstaking and laborious effort was the creation of a system which prevented the introduction of putrefactive influences into wounds, the destruction of the organisms of putrefaction, everywhere existent, before or after their admittance into a wound cavity. This was the beginning of antiseptic surgery, a monumental contribution to the science of which Lister was an illustrious disciple, and one which has influenced its development as no other which has ever been made. In the gradual process of refinement from the crude but efficient antagonistic measures and combative dressings to the perfected system of today *antiseptic* surgery has been deposed and *aseptic* surgery rules in its stead. The foul kitchen basin has given place to the porcelain-lined tray; the sea-born sponge, with its myriad cells charged with deadly organisms, has been replaced by the cleanly, once used gauze sponge; the bone and wooden handled knife by the one-piece metal instrument; the kitchen table and sitting room lounge by the metal and glass structure with its convenient mechanism; the bedroom and sitting room in the home and the amphitheatre in the college, with its revolving table, used alike for the dissected cadaver and the patient undergoing surgical operation, by the microbe-proof operating arena with sterilizing apparatus, glass cases for the deposit and care of instruments, perfect ventilation and lighting. The operating surgeon in his linen duster, with his assistants in

shirt sleeves, have been banished, and in their places are the surgeon, assistants, and nurses enrobed in white, with masks, hands thoroughly scrubbed, disinfected, and rubber gloved, with trimmed finger nails freed from microbe accumulations. The unbathed patient, in possibly street walking garments, gives place to the scrupulously bathed and appropriately robed patient, with operating field cleansed with microbe destroying agents. Thus equipped, the surgeon enters any cavity of the body with impunity and attacks with expected assurance of success morbid conditions involving organs and parts heretofore beyond his power to assault—safe through his ignorance.

In our country antiseptic surgery was, to a certain extent, a plant of slow growth. Learned teachers of surgery in our colleges, some too old to accept readily new things, some too young to appreciate its far-reaching importance and grasp its power, and still others doubtful as to its true value, referred to it as something new and to be proved. It happened at the introduction of the system of Sir Joseph Lister that the writer was one of the corps of lecturers in the Summer School of Jefferson Medical College. The subject he taught was practical operative surgery, and he endeavored, to the best of his ability, in his course of instruction, to teach the principles of this great system. In his hospital practice in St. Mary's Hospital, Philadelphia, in association with his colleague, Dr. W. W. Keen, he practised antiseptic methods of treatment, employing the crude carbolic oil putty as a dressing, with the carbolic acid steam-spraying apparatus to destroy organisms floating in the air. It is believed that this practice of the antiseptic methods of treatment by Dr. Keen and the writer was the first carried out in the city of Philadelphia. Despite the warning sent to the writer by the learned professor, that he must cease teaching the so-called new-fangled and harmful system, he continued to teach the subject,

and was greatly gratified to know, within a year's time, that the messenger who had conveyed the injunction issued was as enthusiastic and earnest an advocate of the system, both in his lectures and practice, as the writer.

Such is a simple description of the old and the beginning of the new in surgery as experienced by the writer in the period of time set apart. He has endeavored to place on record events which have come under his own observation, and which show not only the conditions which then were in existence and with which the surgeons of the day wrestled heroically, but those which exalt to the pinnacle of successful endeavor the achievements of today. In the ranks of the practitioners of surgery in those days there were stalwarts, men of resource, men of courageous convictions. With the facilities then possessed it was, in truth, a battle to win success against an enemy ever present, but unknown and concealed.

Today the patient requiring surgical treatment enters the hospital, private or public, constructed upon methods the most modern, and with full equipment for perfected work; from the door of entrance he passes from department to department, submitted in each to critical examination, and finally reclines upon the operating table, a transparent body into and through which the eye of science has penetrated, revealing the hidden morbid conditions, the significance of which the trained intellect of the expert has fathomed. At the operating table stands the surgeon with complete record in brain, and knife in hand, to prove its accuracy and reveal it to the naked eye. With deft touch he excises morbid masses, shapes and fashions parts, reconstructs organs, and restores halted function. Thus reconstructed, the patient emerges from the modern hospital a faultless specimen, illustrating the high art of the master hand.

And what is the future of surgery in the coming half century?

Has the climax of surgical technique been reached? Is the earnest worker in surgical science satisfied with the present state of diagnostic precision? Is there not a large and inviting field for pathologic research? The work in this direction has already begun, and in the list of our Fellows there are able and zealous workers laboring to unravel the entangled problem of the abnormal, the abortive cell—to devise the means of retarding the action and checking the growth of the overstimulated cell, to so control cell development and cell growth that homologous and heterologous formations will have no lodgement in the tissues and organs of the body—to formulate, may we not say, the proposition of preventive disorders, which find their relief, too often unsuccessful, in the knife of the surgeon. Will organ substitution, the replacement of a diseased organ by one in every respect in a state of health, find a legitimate and established position in surgical art? Will the operative surgeon enlarge his sphere of action and become, as well, the constructive surgeon, doing the combined work of architect and builder? Are these the fantastic images of a prophetic vision? The history of the development and growth of surgery in the past gives reality to our expectations and hopes of what the future may unfold, and is this in truth not the great work of the surgery of the future?