

ANNUAL MEETING, 1926

PRESIDENTIAL ADDRESS

JOSEPH LISTER

BY W. W. CHIPMAN, MONTREAL

TO-NIGHT is the fourteenth Convocation of our College, and Sir Ewen Maclean and myself are to say something to you. My own share of the honour and the obligation is to take the form of a Presidential Address, and you will agree that this is a serious undertaking. May I profess at once that I have been animated and encouraged to this task by the words of my predecessor in office, Rudolph Matas, of New Orleans. The admirable address of last year on "The Missions and Ideals of the American College of Surgeons," has been to me, as to you all, a genuine help and inspiration; his well-timed message represents for the College, not only a prophecy but a fulfillment.

A college of surgeons, if it means anything, is really a post-graduate school, a school in which we are enrolled during our working life. As Fellows of this school, we enjoy many advantages, but we also incur a large responsibility. It is true that there is no definite academic staff, but what is much better, we teach one another; teach both by precept and example, the science and the art of surgery. And our curriculum comprises much more than this. We provide a common tribunal before which new methods of surgical practice may be adjudged; we promote and encourage research; and we are earnestly concerned with the character and reputation of our Fellows. In a word, by attendance at this school, we are stimulated and encouraged to greater usefulness, more completely to find ourselves.

I have said that a college of surgeons should be actually a post-graduate school, and I trust that you will agree in this definition. A post-graduate school, articulated in the first instance with the under-graduate work of the university, as Sir Arthur Currie has pointed out, and embodying within itself the high ideals and the sound measures of our great healing art.

In the life of our American College, we are following rightly enough, the European tradition. Though the nomenclature be somewhat different in France, Italy, Germany or Great Britain, the aim and object of these surgical societies, these fellowships, is one and the same. We have come to realise that a science and an art may have no national boundaries, and so these various post-graduate schools represent a common fraternity throughout the world. A fraternity of colleges or of societies, where each gives of necessity to all the others; where in a sense, we share and share alike the respective gifts of the outstanding men, and the several intellectual and material endowments. And the outstanding man, the *Dux* or leader of the school, in action or in thought is always and for all time the greatest gift, and it is well that we should know him. I shall say something to-night about a great leader of the famous English school.

The bronze doors of our College Home in Chicago are ornamented by six panels, in low-relief, the figures of six great men in the history of medicine. Below the panel to Pasteur there is placed the one of Lister, the "Father," as he is called, "of Modern

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a. b. s. yearbook 1927

Surgery." We recall to-night that April 5th of next year (1927) marks the centenary of the birth of this great man; and it is of this man, this great leader in the English post-graduate school, that I shall now very shortly speak.

Joseph Lister became a Fellow of the Royal College of Surgeons at the early age of twenty-five. He was, you remember, of Quaker origin, a member of the Society of Friends, and of intellectual parentage. Poverty played no part in his industrious life. Barred by his religion from the older universities, he took his degree, both in arts and in medicine, at the non-sectarian University College, London. Of an original turn of mind, natural science attracted him from the first. As a boy we find him macerating the bones and mounting the skeleton of the famous frog; and, rather to the distress of the Quaker family, declaring that he will become a surgeon. And a surgeon, in due time, he came to be. At the age of 17, he matriculated at University College, and, taking first a B.A. degree, he became an M.B. of London, in 1852, the same year that he obtained his fellowship. He has left us a vivid picture of these undergraduate days at University College Hospital. Wharton Jones, William Sharpey, the great physiologist, William Jenner, and Erichsen were the men that influenced him most. In his time, the student walked the hospital, even while he studied anatomy and physiology; and, first as dresser, and then as clinical clerk, various practical duties were assigned him. The student was, in a sense, a hospital apprentice, and I am not sure that our modern methods of education are any better, or are even as good as these. But the methods and results of their surgical practice were truly deplorable. In the operating theatre, a sturdy wooden table, a gas jet to heat the cautery, a small instrument cupboard, and a wash-basin or two, served every purpose, comprised a complete equipment. In these basins, the surgeon's hands were perfunctorily washed in soap and water, with perhaps a dash of Condy's Fluid; here too, the instruments were cleansed; and also the marine sponges, then in common use. The surgeon's coat was like that of Joseph, of many colors; after its years of service, it could almost stand alone. And the coats of the assistants belonged to the same species, for they were worn alike in the wards, in the post-mortem room, or the operating theatre. And this, be it observed, was a modern hospital of that time. Is it any wonder that pyaemia, erysipelas, tetanus, and spreading gangrene were known as "Hospital Diseases"; and that, in the words of Sir James Simpson, "the operating table exposed a man to more chances of death than the Field of Waterloo."

It was fortunate that their surgical field was small, and that few operations of expediency were undertaken. They had abundant reason to believe in the great danger of tempting providence. This hospital of Lister's held some 60 surgical beds, and about 200 operations were performed each year, and of these 40 were major amputations. Healing by "first intention," John Hunter's famous phrase, was a rare occurrence. Suppuration was the rule, with all the attendant risks of the "Hospital Diseases." The yearly death-rate after these amputations—the accepted procedure in a compound fracture—ranged from 25 to 40 per cent; the smaller number being described by Erichsen as indeed "a lucky year." And this high mortality was regarded with resignation as an inevitable occurrence; and we can understand Lister writing to his father that "surgery is a sad calling for a beginner."

Lister was all his life a diligent and a distinguished student, and his undergraduate record was a brilliant one. During these student days, his original turn of mind found vent in the preparation of two papers:—the one dealing with "The Muscular Tissue of the Iris," and the demonstration for the first time of its two muscles; while the other was a microscopical study of "The Involuntary Muscular Fibres of the Skin." Both these papers were admirably illustrated by his own pen-and-ink drawings. The year after graduation he carried out his first piece of

experimental work, on "The Nature and Flow of the Lacteal Fluid (the chyle) in the Mesentery of the Mouse."

It was in this year, in 1853, that Lister, taking the advice of his famous teacher, William Sharpey, went to Scotland, to pay a short visit to James Syme, Professor of Clinical Surgery in Edinburgh. The visit to this distinguished surgeon (Syme's "Amputation" we all know) was to be one of a month. Instead, he remained with Syme seven years, and even as Jacob, married his eldest daughter, not Leah but Agnes; was for nine years Regius Professor of Surgery in Glasgow; and, later, succeeded Syme in the Edinburgh Chair. He was in all twenty-four years in Scotland, and it was in this land of his adoption that the great discovery of his life was made.

Scotland was congenial to him, from the first. In the Edinburgh Royal Infirmary there were 200 surgical beds, and Syme, who was then fifty-four, was in the full swing of his surgical practice. He was known as one of the boldest, coolest, and most successful operators of the day, as well as one of the most original and thoughtful surgeons, perhaps in Europe. He was, moreover, a great teacher, and it was said of him that "he never wasted a word, a drop of ink, or a drop of blood." He took to this young London graduate from the first; their acquaintance ripened into a life-long friendship, for he was to become the strongest influence in Lister's professional life.

He began as Syme's private assistant, but by a fortunate chance soon became his resident house-surgeon. The death of the promising Mackenzie, in the Crimean War, permitted a rapid advance to assistant-surgeon at the Royal Infirmary, and a lectureship—one of five—in the Extra-Mural School. It is interesting to read Lister's account of his first operative clinic before the students, where he amputated a great toe, and performed the radical cure of an inguinal hernia. He writes of this, "I was very nervous before beginning . . . but felt very thankful at the way I was able to acquit myself." We confess at once that Lister was never at any time a rapid or a brilliant operator. Ether-anaesthesia had been in use but ten years, and speed and dexterity were still regarded as the prime requisites of any surgeon. This apparent inferiority accounts, I believe, for the initial depreciation of his views by some of his colleagues.

As a teacher, Lister rapidly developed. He was accurate, original, and conscientious; and his lectures, regarded at first as too theoretical, were thoroughly imbued with a scientific spirit. His mind was actively occupied with problems in physiology and pathology, for he maintained, "We always stand in need of the beacon-light of correct pathology." In his teaching, as in his practice, he subscribed to the immortal saying of Buffon, the great French naturalist, "Let us gather together some facts in order to have some ideas." Perhaps for this very reason these classes were never large, but they encouraged and stimulated him in gathering his all-important facts.

So we find him continuing his studies on "Involuntary Muscle Fibre;" contributing papers on, "The Parts of the Nervous System which Regulate the Contractions of the Arteries;" and on "The Cutaneous Pigmentary System of the Frog." He began now his important work on, "The Early Stages of Inflammation," employing the frog's web, and the wing of the bat. His use of the term "Spontaneous Inflammation" shows us that as yet he had no conception of the part played by micro-organisms in the production of these phenomena. In 1856 he speaks for the first time of "Some Experiments upon the Coagulation of the Blood," the results of which were embodied in a Croonian lecture, delivered before the Royal Society in London, in 1863. Despite all our increased knowledge of the chemistry of the blood, we have been able to add very little to his understanding of the formation of the clot. One thing is added to another, and Lister's work upon the blood was an essential sequence to his studies on Inflammation; and this double research led

naturally to his investigation of the Causes and Prevention of Wound Suppuration, in due time his famous achievement.

Little need be said at this time of his private practice. Mrs. Lister once lovingly referred to it as, "poor Joseph and his one patient."

So passed the seven Edinburgh years, in hospital practice, in teaching, and in research. In these several activities he had already won an enviable reputation; and the Chair of Surgery in Glasgow falling vacant, he was in 1860 appointed to fill it, the third occupant of the post. It is a great honour to have with us this evening Professor Archibald Young, the sixth occupant of this Chair. He was to remain in Glasgow nine years, and these were to prove themselves the all-important years of his life.

For the first time, it was his to control a large and active hospital service; and to make the most of it. But, despite his open windows, a more scrupulous attention to surgical cleanliness, and presently the pride of a newly-built hospital, his surgical results were far from satisfactory. In his own discouraged words, "There was still no security against the simplest and most successful operation being followed by dangerous and even fatal results." He more than agreed with von Volkmann when the latter said that, "a surgeon was like a husbandman, who, having sown his field, waits with resignation for what the harvest may bring." How little they guessed, these two, the true nature of the sowing, even as they reaped! The larger the hospital, the worse always were the results; surgical wards had often to be closed, and the erection of separate pavilions was often seriously discussed.

In respect to these surgical infections, these "Hospital Diseases," everything was in uncertainty and doubt; they were regarded as mysterious visitations, even as the cholera, or the plague. It was generally believed it was the air that caused the mischief, either the fixed gases, the oxygen or the nitrogen; or this same air, tainted by certain "miasms," or effluvia; or yet again, with Sir James Simpson, this air polluted by morbid materials from the bodies of fellow patients. These were the uncertain beliefs; and you will observe that the infection was always a matter of exposure to the air, and not due at all to septic contact.

The operation wounds were dressed in one of the following ways:—

1. Either by the "occlusion" method, designed to exclude the air, and imitate Nature's healing under a scab; and carried out by the use of certain astringent powders or caustics, goldbeaters' skin, or Collodion.
2. Or by the "open," known as the "German" method, where the wound was left to granulate.

Syme and Lister followed this latter plan, only they had variously modified and improved it. They both approximated the raw surfaces of the wound, by sutures, set widely apart, at first of silk or whipcord, prepared as a shoemaker's thread, by drawing them to and fro across a piece of common bees' wax; and later, following Marion Sims, using metal sutures, of silver, gold, or iron. Heavy pads were placed on either side the wound, and some distance from it, and a firm bandage over these added approximation to the deeper areas of the incision. And so they prepared the patient and themselves to await the harvest. At the first sign of suppuration these sutures were cut, and the dry dressing exchanged for either a linseed poultice, or a water compress. And the harvest was still to reap. It was by measures such as these that Syme had made his wonderful record of 20 amputations through the thigh, without a death.

Every effort was directed toward the treatment of this dread infection, when it did occur,—and by the use of all kinds of antiseptic remedies. The word "antiseptic" had long been in common use, to denote a substance that may be

employed when the wounds, in the phraseology of the time, "suppurated, stank, or were corrupt." And the number of these agents was legion. Of such were Friar's Balsam, Alcohol (we remember the oil and wine), Glycerine, Chlorine, Chlorinated Soda, of special interest as the agent employed by the ill-fated Semmelweiss, Chloride of Zinc, and our present favourite, Iodine. These agents were employed to combat the suppuration, with better or with worse results. And so the struggle proceeded until the ultimate healing of the wound, or the death of the patient.

During the early Glasgow years, Lister continued his studies on the problem of suppuration. Under the microscope, he examined carefully the pus cells, devised many experiments in their production, and concluded at first that the fluids of the wound, when exposed to the air, became acrid, and, by this chemical change, induced the suppuration. Later, he thought it was decomposition occurring either in the blood, serum, or contused tissues, and that these special putrefactive changes led to the suppuration. And this was his teaching until there came as a light out of darkness, the micro-organisms of Pasteur.

In the meantime, all his energies were still bent toward the prevention of the decomposition-changes in the wound. He was still working with various antiseptics. The latest of these was carbolic acid, discovered by Runge, in 1834, and already introduced to the French profession by Jules Lemaire, a pharmaceutical chemist. Lemaire had used it as a disinfectant, and found it a valuable dressing for wounds and sores. He conducted many experiments in its surgical use, and even speculated as to micro-organisms being the cause of suppuration, but his work left no lasting impress. This lasting impress was destined to be made by Joseph Lister.

A sample of this acid, then known as "German Creasote," was presented to Lister by his colleague Thomas Anderson, Professor of Chemistry at Glasgow. Lister at once began a series of experiments in its use. The story goes that on his hospital rounds, he frequently carried a small vial of it in his waistcoat pocket. And then, on August 12th, 1865, James Greenlees, a boy of eleven, with a compound fracture of the left leg, was admitted to the Glasgow Infirmary. As usual, the broken limb was cleansed by soap and water, and the blood-clot expressed from the wound; and then, with the courage of his new conviction, he thoroughly anointed the wound with the strong carbolic, and protected it merely by a dry dressing. And, as all the world knows, the result was startling in its beneficence, for both the life and the limb were saved. The ten succeeding cases of compound fracture were treated in a similar way, and with but one death, a hitherto unknown result. In these first cases Lister really did better than he knew, for whereas he used the carbolic acid to prevent the putrefactive changes, brought about in some unexplained way by the air, he was actually doing much more than this, inasmuch as he was destroying the organisms that give rise to these changes.

And the knowledge of these organisms, these wound-bacteria, he obtained from the great Pasteur—Louis Pasteur, Dean of Lille, at the early age of thirty-two, the Founder of Bacteriology, and perhaps the greatest chemist that the world has seen. His famous work had already shown that putrefaction is but a species of fermentation, and is caused only by the growth of micro-organisms. He had also proved that these organisms are carried on the dust in the air, and subsist everywhere on and in solid and liquid substances; that they grow and multiply in a wound, and so cause the wound to mortify. And so at last, the problem of wound-infection, the age-long mystery of suppuration, was finally solved.

In the words of this great French Chemist, "chance only favours the mind which is prepared." And, as we have seen, the mind of Lister was well prepared to make the most of this great discovery. He realised at once the true action of the carbolic

acid in destroying the micro-organisms, already in or about a wound; and before long it occurred to him that, by the timely application of such an agent, he might prevent a wound-infection altogether. This was really the beginning of both the antiseptic and the aseptic methods in surgical practice, which will always bear his name. There is no doubt whatever that Listerism was the most important application of Pasteur's work. The epoch-making paper was published in 1867, and, as was said by John Stewart of Halifax, in Canada's first Listerian oration, "The Renaissance of Surgery had begun."

Lister, for the remainder of his life, devoted his entire energy to promoting this Renaissance. To this end, he devoted his industry, his broad and sound training, and his individual genius. His first paper spoke only of "The Conditions of Suppuration," whereas, in a few months, a second paper was read in Dublin, "On the Antiseptic Principles in the Practice of Surgery." In this short interval, his mind had travelled both fast and far. He had seized the truth of wound-infection, already he implicitly believed it, and he at once began to formulate the principles of this new practice. A wound dressed antiseptically, in Lister's phrase, "did not mean dressed with an antiseptic, but dressed so as to ensure absence of putrefaction." As we have seen, he began with carbolic acid, though he afterward employed various other agents. How often later he was compelled to say, "The virtue is in the method, and not in the drug." This carbolic acid he used, first in a watery solution of two strengths—a one in twenty, or a one in forty; soon found, however, that it was more effective when mixed in oil; and eventually devised as a dressing to protect the edges of the wound, a carbolic paste, or putty.

In these ways he began to treat all varieties of wounds, and also to prepare the field of operation. The results justified alike his faith and his ingenuity. Already, at this time, he writes to his father that, "I now perform an operation with a totally different feeling from what I used to have; in fact, surgery is becoming a different thing altogether."

His old Teacher, Syme, the *Magister*, as he was called, followed this work of his son-in-law with enthusiasm and encouragement. But in 1869 Syme suffered a paralytic stroke, and Lister was recalled to Edinburgh to fill his Chair. He remained here eight years, and then made his final academic move to King's College, London.

These Edinburgh years were perhaps the busiest and the happiest of his life. The Scot is usually more receptive and adaptable than his English brother, and this student body declared that his "method of Antiseptic Treatment marked an epoch in the history of British Surgery." In the last analysis, a student body is seldom mistaken. But with some of his colleagues, Scotch as well as English, it was a different story; and from these, Lister endured for many years a definite hostility, in fact, determined obstruction. His was the universal fate of the prophet, or of the reformer. The mind of the average man, and most of us are average, is prone to reject, or even to resent a new idea—the idea that threatens to disturb, or disrupt the former peace, the old tradition. We all enjoy our accustomed comforts, even our mental ones; and the most of us genuinely hate to be disturbed. Lister was not pugnacious, but this long controversy revealed beneath his gentle exterior a Quaker-like insistency of purpose, and an abiding faith in his own views.

At this time he was in his prime, the later years of his fourth decade; and, as I have said, they were indeed busy years.

Every moment that could be spared from teaching and from practice was devoted to perfecting his methods, and devising new measures in this treatment. The question now was always, how best to sterilize a wound, and in what way to keep it sterile. He still used carbolic acid, but as a protection for the wound he gradually substituted for the non-absorbent putty or lac plaster, dressings of gauze, impreg-

nated with various antiseptics. Of these the sero-sublimate, or the double cyanide of mercury and zinc proved the best.

For some years he had experimented with the absorbable ligature, first introduced, you remember, by Philip Syngue Physick of Philadelphia, some sixty years before. This ligature was no longer of kid or buckskin, but was made of the so-called catgut (we owe this to the violin). The difficulty was always to secure this gut of sufficient and uniform strength, and then to sterilize it. After many experiments, Lister overcame both these difficulties; and his carbolized catgut ligatures, as finally prepared by himself, were for long a satisfactory witness to his patience and ingenuity.

For the drainage of recent wounds, he introduced the India-rubber tube of Chassaignac, an innovation of great importance. The strip of gauze, which had formerly been employed, had often acted as it does to-day, as an actual plug to defeat its own purpose. The story goes that he and Sir William Jenner improvised such a tube for the drainage of a deep axillary abscess in Queen Victoria. The physician Jenner so clumsily manipulated the spray that some of the carbolic entered the patient's eye. He excused himself by saying that "he was only the man that worked the bellows." The Queen later described the operation as "a most disagreeable duty most pleasantly performed."

And now a word of Lister's carbolic spray. This "donkey-engine," as the scoffers nicknamed it, was worked first by the hand, and then by the foot, until the steam spray was introduced. It was an attempt to create an antiseptic atmosphere far and wide about the wound; to render innocuous the many organisms in the air, that Pasteur and Tyndall, the great physicist, had contended were as numerous as motes in a sunbeam. The surgical results of Thomas Keith and Spencer Wells, and the investigations of Metchnikoff, presently showed that the great number of these air-borne organisms were non-pathogenic, and that the real danger of infection lay in the patient's skin, the surgeon's hands, the sponges and the instruments. Lister worked with the spray for some twenty years before he finally abandoned it. Though for some time he had confessed that it was useless in the object for which it was designed, he still contended that it had a definite value as a diffuse and perpetual irrigator—an unconscious care-taker about the wound. This spray was used throughout the surgical world for many years, until finally it received its *coup-de-grace* from Bruns of Tubingen, who pronounced its death-sentence, with the words, "Fort mit dem Spray!"

Though it condemned the spray, the scientific vindication of Lister's work came from Germany, following the research of Robert Koch; and it was Germany again, in the person of von Bergmann, who introduced, in 1886, steam sterilization for all instruments and dressings.

Lister was fifty when he finally returned to London. For the remainder of his life he was, in military phrase, merely "consolidating" his position. He had still, of course, to compel mankind to hear him—mankind in the shape of a reactionary profession. But his great work was accomplished; for not only had he applied the truth of wound-infection, but he had firmly established the principles of its treatment—the principles of antiseptic and of aseptic surgery.

As the years passed on, it was given to him, even as to Pasteur, to see the fruition of his work, *he* the Father of Modern Surgery. And it was a world-wide recognition. He was created a baronet in 1883, raised to the peerage in 1897, and was one of the original recipients of the British Order of Merit. The several countries of Europe endorsed and supplemented these distinctions. It is with pleasure that we remember his visit to Canada in 1897. Toronto gave him an LL.D., while from the profession in Montreal he received an Address, and, on laying the corner-stone of

the Jubilee Nurses' Home at the Montreal General Hospital, he was presented with a silver trowel, the shape of a maple leaf, Canada's national emblem.

In the midst of all these honours, he was active still, and so continued until the failing years before his death. He passed from the sight of men at the age of eighty-five, and we may truthfully add, full of honours as full of years.

Many men in our world's history have been greater than Lister, but mankind has never had a better servant. At the time of his death it was truly said that he had already saved more lives than had been destroyed by the armies of Napoleon. In his life and work he faithfully exemplified Carcoyle's famous definition of a genius—as one having “an infinite capacity for taking pains.” His career will always remain as a great example; for Lord Joseph Lister was a famous Dux, or leader, in his own post-graduate school.