**First Listerian oration / [John Stewart].**

**Contributors**

Stewart, John, 1848-1933

**Publication/Creation**

Montreal : Canadian Medical Assn., 1924.

**Persistent URL**

https://wellcomecollection.org/works/v427chjh

# FIRST
# LISTERIAN ORATION
## 1924

SPECIAL NUMBER
CANADIAN MEDICAL ASSOCIATION JOURNAL

Dr. D. Fraser Harris
with esteem and affect
from John Stewart.

# FIRST
# LISTERIAN ORATION

BY

JOHN STEWART, M.B., LL.D. (Edin.)

UNDER THE AUSPICES
OF THE
LISTER MEMORIAL CLUB
OF THE CANADIAN MEDICAL ASSOCIATION

SPECIAL NUMBER, OCTOBER, 1924

Canadian Medical Association Journal
836 University Street
MONTREAL

*PRICE FIFTY CENTS*

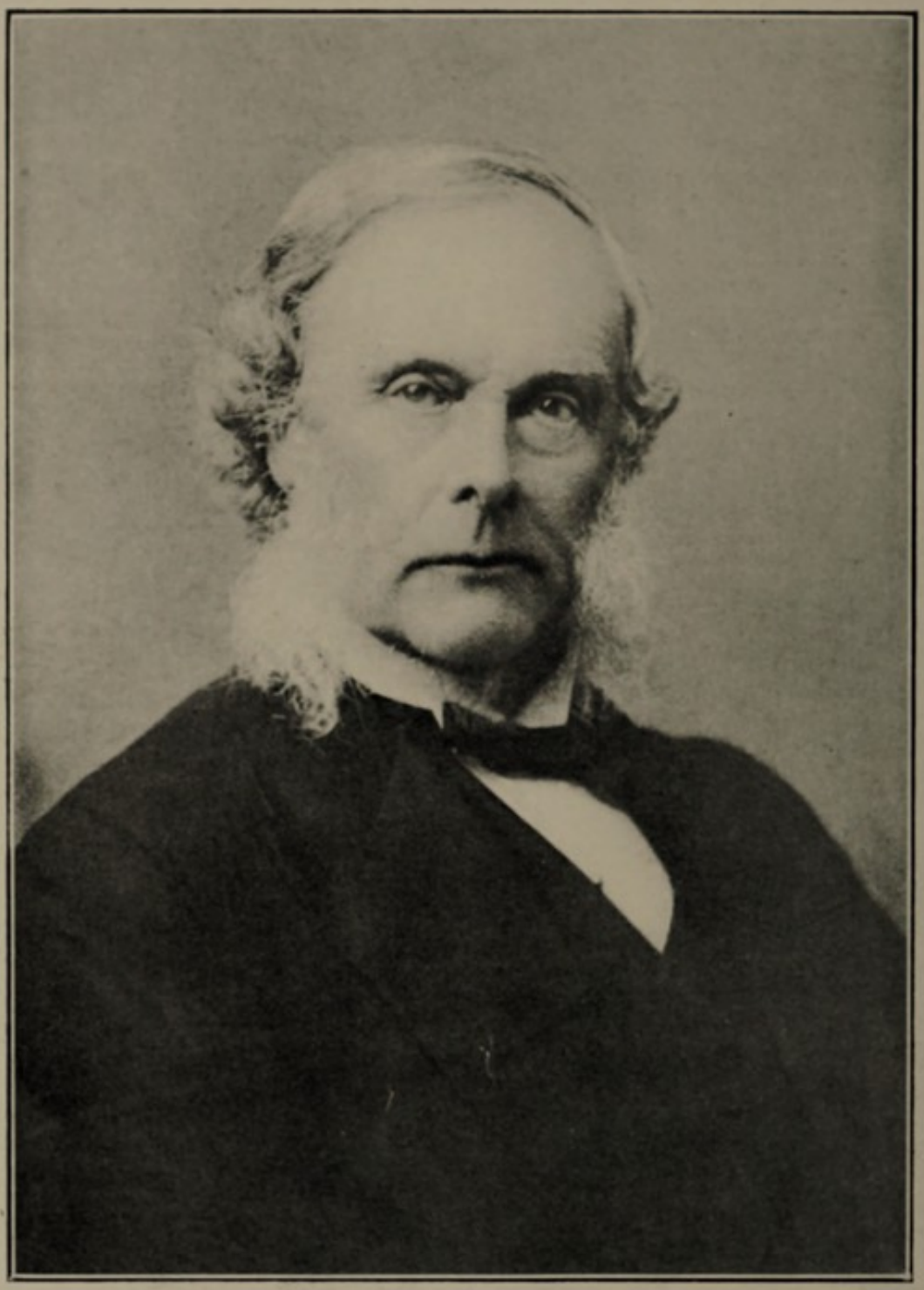
# LISTER MEMORIAL CLUB

At the Winnipeg meeting of the Canadian Medical Association in 1922, it was suggested by Dr. John Stewart that it would be well for the Canadian Medical Association to consider having an address in honour of Lister at every third annual meeting of the Association. The Council appointed Dr. Stewart as chairman to organize a committee. This committee consisted of:

| | |
|---|---|
| *Maritime Provinces* | — Dr. John Stewart, Halifax. |
| *Quebec* | Drs. E. Archibald, G. E. Armstrong, W. W. Chipman, J. A. Hutchison, Montreal. |
| *Ontario* | Drs. A. Primrose, Irving Cameron, F. LeM. Grasett, E. S. G. Baldwin, F. N. G. Starr, Toronto. |
| *Manitoba* | Drs. R. J. Blanchard, S. W. Prowse, |
| *Alberta* | Dr. W. H. Macdonald, Medicine Hat. John Gunn, Winnipeg. |
| *British Columbia* | Drs. R. E. McKenzie, G. S. Gordon, Vancouver, Dr. C. Wace, Victoria. |

At the meeting in 1923 the Council reappointed the Committee for another year and chose Dr. Stewart, who had been a student clerk, and afterwards a personal friend of Lord Lister's, to give the first oration. Dr. F. N. G. Starr was asked to undertake the duty of collecting an endowment fund. At a subsequent meeting in Toronto of the local members it was decided that the best way to do this would be to organize a club to be termed the Lister Memorial Club, a subscription to which of at least ten dollars would entitle the subscriber to membership. The objective hoped for was five thousand dollars, the interest on which would amount in three years to about eight hundred dollars, and would be available for the expenses of the preparation, delivery, and publication of each triennial oration. A list of members will shortly be published in the *Journal*.

The first Listerian Oration, published herewith, is very properly concerned with the life and work of Lord Lister himself; subsequent orations may draw not only upon the various themes associated with Lister's life, but may include also the story of all great and important advances in scientific surgery and medicine.



Joseph Lister

# FOREWORD

THE Executive Committee acting for the members of the Lister Club has much pleasure in presenting to every member of the Canadian Medical Association a copy of this special number containing the address on Lord Lister given by Dr. John Stewart of Halifax. The selection of Dr. Stewart by the Council of the Association to deliver this first Listerian oration was a happy one. An earnest student of Lister's, one of his dresser-clerks for several sessions, and one who accompanied him from Edinburgh to London when he accepted the appointment in King's College Hospital, to act first as an externe, afterwards as an interne assistant, Dr. Stewart was recognized by all as eminently fitted by his early education and by his personal qualifications thus to honour the master.

After reading this account of Lister and his achievements, told with the sympathy born of sincere friendship, everyone we are sure will admit that Dr. Stewart has presented us with a delightful and stimulating picture of this great surgeon; one who by his clear and logical mind and persevering investigations has conferred upon mankind an inestimable boon, and has enabled our profession to make marvellous advances in the cure and prevention of disease, and to attempt operations so near the miraculous that the surgeons of his time denied their possibility.

With his name, however, we must ever associate the name of Pasteur. Canada is indeed happy in its ancestry, and in its ability to claim kinship with these two great benefactors of the human race, Pasteur and Lister. In his foreword to the *Life of Pasteur*, by René Vallery-Radot, translated into English by Mrs. Devonshire, Sir William Osler calls attention to the fact that until the researches of Pasteur startled the scientific world, our knowledge of disease had been based almost entirely on observation and experience, and the profession knew little more of the causation of disease than did Hippocrates. It is true that Girolomo Fracastorio, a Veronese physician of the sixteenth century, spoke of the seeds of contagion passing from the sick to the whole, and was the first to draw a parallel between the processes of fermentation in wine and of contagion in disease. An English philosopher in the next century, Robert Boyle, also affirmed that "he who could discover the nature of ferments and fermentation would be more capable than any one else of

explaining the nature of disease." These writers, however, were only as voices crying in the wilderness until Pasteur in 1857, two centuries later, read his first notable paper on Lactic Acid Fermentation before the Lille Scientific Society, and a few months later presented a paper on Alcoholic Fermentation in which he laid the beginnings of biological chemistry by correlating some of the phenomena of life with the conversion of sugar into alcohol and carbonic oxide. The possible analogy between disease and fermentation appears to have been a dominating thought in Pasteur's mind for years. Having proved that spontaneous generation did not exist, and that the changes in lactic, alcoholic, and butyric fermentations were due to living organisms, the question seems to have weighed in his mind: Why should not the same microscopic creatures set up the changes which occur in the body in putrid and suppurative diseases?

These researches of Pasteur met with an eager reception by Syme's young house surgeon, Joseph Lister, who had recently come to Edinburgh from a similar position in University College Hospital in London, and who for several years had been labouring over the problem of why wounds should occasionally heal by first intention, but all too frequently should become suppurating and putrid. While in London he had devoted much time and microscopical study to some cases of hospital gangrene under his care, and had been convinced of their parasitic and local nature. He was therefore quite prepared to recognize the great importance of Pasteur's work.

At the present day we can scarcely appreciate the condition of surgical wards in those days. Only a few years previously had anæsthesia relieved patients from the horror of the knife. The pain of operation now no longer demanded haste on the part of the surgeon, and he was thus permitted to undertake longer and more intricate work. Unfortunately, this increased opportunity appeared only to render the oncoming of suppuration and putrefaction more certain. Sir Clifford Allbutt states that at that date "patients, no matter how critical their need, dreaded the very name of hospital, and the most skilful surgeons distrusted their own craft." James Simpson in the sixties pathetically denounced the awful mortality following operations and uttered a protest against the hospital system itself. It was in this state of affairs, ten years after Pasteur had published his researches on Fermentation, that Lister was able to write to the *Lancet* calling attention to the flood of light that had been thrown by Pasteur's researches on the problem of

decomposition in exposed organic substances. Pasteur, he said, had convincingly demonstrated that the contaminating properties of air were not due to any of its gaseous constituents, as had for many years been the belief, but were due to the minute germs of various low forms of life contained in it and long since revealed to us by the microscope. These previously had been regarded as merely the accidental contaminations of putrescence, but had now been shown by Pasteur to be their essential cause. Lister claimed that experience in his wards had demonstrated that with their absolute exclusion suppuration and putrescence in wounds could be prevented, and asserted that it was not the hospital ward and its air that was the chief source of evil, but the surgeons' hands, instruments, and dressings. Lister's recognition of the importance of Pasteur's theories of microbic activities, and his application of antiseptic principles in operations and in the treatment of wounds was thus the beginning of modern surgery. As Sir Clifford Allbutt remarks, "Lister saw the vast importance of the discoveries of Pasteur. He saw it because he was watching on the heights, and he was watching there alone." Sir William Osler adds "The prevention in this way of wound infection forms one of the most brilliant chapters in the history of preventive medicine."

Lister was very generous in recognizing the work of *confrères.* Semmelweiss who discovered the importance of antisepsis in midwifery, and had insisted on the use of chlorinated water for the hands of students before approaching the patient, was slow and reluctant as an author, and was ignored, and his statements opposed bitterly, by his associates in the Hungarian Capital, as well as by the French Academy and by the highest pathological authorities in Germany. This neglect and opposition broke his heart, and he unfortunately died within the gates of an asylum. Not until his story came to the knowledge of Lister through a Hungarian physician practising in London was the value of his methods acknowledged and brought seriously before the profession. Lister promptly accorded Semmelweiss the position of being in a measure his forerunner.

Dr. Stewart in his address has told us the story of a great man who not only did great deeds but had a great heart. He was devoted to his friends, just and generous to his rivals, and patient and persevering under much opposition. Carlyle writes that the grandest of heroic deeds are not always those performed on the battlefield, but are often those performed within four walls and in domestic privacy. Beaconsfield in one

of his volumes writes that one of the greatest legacies of any nation is the memory of a great name and the inheritance of a great example. An anonymous writer in the *Spectator* described Pasteur as the most perfect man who ever entered the Kingdom of Science. Dr. Stewart is right when he places Joseph Lister on the same pedestal.

The future belongs to Science, and more and more will she turn the destinies of nations. We rejoice that two young Canadian graduates have recently accomplished great deeds by their persevering researches, and have written their names as benefactors of the world on the walls of the Temple of Fame. It is our hope that this address on Lord Lister may stimulate many others to pursue the same path and in the same spirit.

A. D. Blackader

# LISTERIAN ORATION*
# 1924

*By*

JOHN STEWART, M.B., LL.D. (EDIN.)
*Halifax*

THERE is a river not to be found on any map of this terrestial globe, yet a river well known to all the sons of men, and never very far from any of us. It flows in the Realm of Time. It is Lethe, the river of Oblivion. What memories of noble persons and heroic deeds, what words of wisdom and what glorious thoughts have been engulfed in that dark, remorseless tide!

To retrieve, if it may be, from its "watery labyrinth" and to preserve something of the character, the appearance, the thought, and speech, the "little unremembered acts" of our heroes and benefactors, as well as to keep bright the story of their life work, is the object of such orations as this which has assembled us here this evening.

It may seem an extraordinary thing that a memorial to Lister should be thought necessary. Is not his name known and beloved throughout the world? It is probable that none in this assembly, nor indeed in any similar gathering in the world have not in their own persons, or those of their friends or acquaintances benefitted by the work of Lister. There can be no doubt that in the providence of God it was granted to Joseph Lister to do more to save life, to relieve pain, to obviate deformity, and to prevent mutilation than any other man in the history of our race. How then is a memorial needed for him? Because memories are not inherited and the waters of Lethe are bitter with benefits forgot. There are many intelligent people today who know and honour the name of Lister, and who yet have very hazy ideas of what he accomplished. The majority know of him as a great surgeon. So he was, the greatest surgeon since the world began, but they do not know how or why they think him so. Some know he invented a new surgical dressing. So he did, and that dressing has long been among the flotsam of Lethe. Some think he discovered carbolic acid. He adopted it as the most powerful and useful weapon in his battle with disease. His successors have discarded it. They call it poison. It is not upon a new dressing or a lotion, or even upon new methods of operation that Lister's fame rests. He was a great pioneer, he intro-

---

* Canadian Medical Association, Annual Meeting, Ottawa, June 18th, 1924.

duced new principles, he revolutionized the pathology of inflammation, he made rough and perilous ways smooth and "sweet with certainties," he opened a new and beautiful door into the House of Health, and gave us, his followers, the passport and the key. How many, even among the members of our profession, know of the years of patient toil and profound study, of a veritable agony of sympathy with sufferings which he was powerless to prevent, and of a divine discontent with conditions which made surgery a name of terror instead of a messenger of hope? How many know that he was the discoverer of many of the facts and principles which are commonplace teachings in our textbooks, and, for the most part, without any mention of his name? In what calendars do the dates of his birth and death appear? And what of the great International Memorial proposed and undertaken with such enthusiasm a few weeks after his death? Alas, before the details of the plan could be fairly laid down the Abomination of Desolation came upon us and trampled upon the projects of Peace and we were at war with the people who of all the nations had been the most admiring and enthusiastic followers of Lister. That International Memorial must now wait until the present war, camouflaged as peace, has come to an end.

As regards our own profession there are two notable examples of memorial orations in England, the Harveian Oration, in memory of William Harvey, the discoverer of the circulation of the blood, who may be said to have laid the foundation of scientific medicine, and the Hunterian Oration, in honour of John Hunter, the father of scientific surgery. It was doubtless a knowledge of the success and value of these memorials which determined the Canadian Medical Association to adopt a similar method in memory of Lister. As such, every member of our profession, from the distinguished Faculties of our great universities to the most recent recruit in our ranks, from Cape Breton to the Yukon, may take a personal, proud, and hopeful interest in it.

Circumstances over which I have had no control have placed me in the position of honour in which I stand tonight. It was my hope and expectation that the Listerian Orations would have been inaugurated by some one of those eminent leaders in our profession who may be considered the scientific successors of Lister, some one preferably, from one of the great centres, Glasgow, Edinburgh, or London, the scenes of his glorious toil, some one whose name and reputation would have lent distinction to the task. My colleagues have decided otherwise. It would indeed be ungenerous and unmannerly of me to shirk this duty, or to fail to thank you with all my heart for the signal and undreamed of honour you have done me. I am not competent to expound the scientific work of Lister. It is my fervent hope that in future orations the various phases of his work may be discussed by eminent authorities in the several departments in which he was an explorer and discoverer. In histology, in pathology, in bacteriology, as well as

in surgery, Lister was an original investigator and his labours have affected and influenced every department of medicine. What I conceive to be my task is first, to make a rapid survey of his career, and then, to tell you, if I can, what manner of man this was, his appearance, his manner of life, his ideals, his influence as a teacher, his methods of work, his attitude to students and to patients, his interest in Nature, and the workings of his mind.

For this purpose I depend on many ineffaceable memories, on entries in my diaries, old letters of my own and of fellow students, and, not least, on a correspondence of over thirty years with my revered master himself. But for a full account of Lister's life, character and work I recommend two books. First there is the Life, by his distinguished nephew, and the more I have exercised myself in the preparation of this address from among the multitude of my recollections, the more I have admired the judgment, the restraint, and the perfect art of Sir Rickman Godlee. This enthralling book is not only the one authoritative life of Lord Lister, and the main source of information as to his numerous activities, but also the authentic account of the development of antiseptic surgery. The second is his collected works in two large volumes. These were compiled by pious hands as a memorial of his eightieth birthday. They represent an amount of original work which is almost incredible as the work of one man. Many of the papers are of surpassing interest, and one may say that in them are embodied the *principia* of modern surgery.

## I

Joseph Lister was born at Upton House, Essex, on April 5th, 1827, the fourth child and second son of Joseph Jackson Lister. The Lister family were of Yorkshire stock and their ancestors lived in the neighbourhood of Bingley in Airedale. For several generations they had been members of the Society of Friends. Their religious beliefs, their manner of life, and at that time even their dress and conversation separated to a certain extent "the people called Quakers" from their fellow citizens; many of the ordinary amusements and recreations were considered unprofitable and frivolous. But they were not a gloomy society. The characteristic mood of the Friend was one of cheerful gravity, and the child grew up in an atmosphere of love, joy, peace, and cheerful industry. "His family was a lively and a human one..... They had their rides, games of cricket and bowls, skating in winter, and merry evening parties.....and whether at work or at play there never was any question that life was a gift to be employed for the honour of God and the benefit of one's neighbours."

Lister's father, Joseph Jackson Lister, who was a prosperous wine merchant in the City, was a very remarkable man. He was well educated, a good Latin scholar, and with "a sound knowledge of French and German." But his scientific reputation, world wide, was due to

his studies in optics, to which he devoted his spare time. It is to his researches that we owe the modern achromatic microscope. He was not only an authority on the making of microscopes, but he was an expert microscopist.

I like to think of the little boy accompanying his father on his walks, collecting objects for microscopic investigation, and peeping through the magic tube at the marvels of that world of the infinitely little which was one day to be of such surpassing interest to him.

He was educated at private schools. He was a bright, intelligent boy, very apt, especially in classics, but his interests were those of the ordinary healthy school boy, as his letters of that period show. When he was twelve years old, Godlee tells us, his master reported, "He finds no difficulty in his learning.....I have to report favourably of his conduct. He is full of spirits, which sometimes cause him to overstep the rules of order and bring him a little into disgrace." In this school the boys were well grounded in classics, mathematics, natural science, and modern languages; also in the writing of essays.

His favourite subjects would appear to have been natural history and chemistry. In his holidays he collected and studied flowers, dissected small animals, prepared and articulated their skeletons, and thus acquired the remarkable manipulative dexterity which was to serve him so well in his studies of a later date. He had an unusually retentive and accurate memory.

I have dwelt on these memories of his childhood because the child is father of the man and coming events were casting shadows before. His father seems to have had some pre-vision of his son's career, for he preserved all his letters. Godlee has given us one charming example, written at the age of fourteen, which I shall quote as it shows the tendency of the boy's mind, his joy in the work of his hands, something of his sense of humour, and a glimpse of the unusually intimate confidence between father and son.

"As this is the last day I shall be here for some time, I thought I must just write a short note to thee to tell thee how I spent my time when Mamma was out, and also after she came home. When Mamma was out I was by myself and had nothing to do but draw skeletons, so I finished the cranium and named the bones of it, and also drew and painted the bones of the front and back of the hand and named them. Mamma came home on seventh day, at about 2 o'clock, and in the evening, with John's help, I managed to put up a whole skeleton, that of a frog, and it looks just as if it was going to take a leap, and I stole one of Mary's pieces of wood out of one of the drawers of the cabinet in the museum, to stick it down upon, and put it on the top of the cabinet with a small bell glass over it, and it looks rather nice. Do not tell Mary about the piece of wood."

At the age of seventeen he was sent to University College, London, and graduated B.A. (*Lond.*) in 1847. His father considered this was

an essential preparation for a medical career and Lister himself always recommended it to students if time and money could be spared.

During his arts course he had studied with too much ardour, and he had also had an attack of small-pox and a nervous break down, and was unable to begin his medical studies until 1848. While still a child he had expressed a wish to be a surgeon.

His teachers at University College were men of eminence. The lectures of Professor Graham, famous for his pioneer work on crystalloids and colloids, had great interest for Lister. The two who had the greatest influence upon him were Sharpey the physiologist and Wharton Jones, who was Professor of Ophthalmic Medicine and Surgery, but also a man of great originality as an investigator, and whose studies on the circulation as seen under the microscope, and on the phenomena of inflammation probably inspired Lister to take up this line of research. He was house physician to Walshe, one of the great authorities of the time on diseases of heart and lungs, and was house surgeon to Erichsen, whose well-known text-book on surgery was the most popular on the subject in England and America for many years. After a student career of the highest distinction he graduated as M.B. London, and also took his F.R.C.S. in 1852, at the age of twenty-five.

While still a student he had done a good deal of original investigation. In 1852 he made a study of the muscular tissue of the iris, in which he confirmed the conclusions of Kölliker, the eminent German histologist, which had not been generally accepted, and he made several original observations.

This research, and others carried on in 1853, on the structure of involuntary muscle, were published in the *Journal of Microscopical Science*, and attracted a good deal of attention at home and abroad.

He was now about to make the usual post-graduate tour of the continental hospitals and settle as a consulting surgeon in London, when by the advice of Professor Sharpey he decided to spend a few weeks in Edinburgh to see the practice of Professor Syme. This remarkable man, of whom it was said he never wasted a word, a drop of ink, or a drop of blood, was a teacher of great originality and one of the most brilliant operators in the history of surgery. He was then about fifty-four years of age and in the prime of his power. Between him and the young Englishman a mutual regard and affection seem to have arisen at once. He had the shrewdness to recognize the genius of the earnest young man of half his age, and Lister was greatly impressed by the novelty and originality of Syme's teaching, the boldness and simplicity of his operations. He had come to Edinburgh to spend a month; he remained for nearly seven years. The brilliant young graduate and ex-house surgeon of Erichsen was glad of an opportunity to revert to the position of house surgeon to Mr. Syme. It was a fortunate decision. Syme soon gave him a free hand in a great deal of the work and had him as his private assistant. He became a leader among his

fellow residents and the students; within two years he became a Lecturer in Surgery at the Royal College of Surgeons, and three years after his arrival in Edinburgh he was elected an Assistant Surgeon to the Royal Infirmary. During these years he had continued his microscopical studies in physiology and pathology, and two of these were among the most important in the history of medicine, namely that "On the Early Stages of Inflammation", and another "On the Coagulation of the Blood." These embodied original discoveries and observations. That "On the Early Stages of Inflammation" was read at the Royal Society in London on June 18th, 1857, sixty-seven years ago to-day. I think that should be a festal date in the surgical calendar, for this research laid the cornerstone of modern surgical pathology. The researches "On the Coagulation of the Blood" were not completed for some years and they formed the subject of his Croonian Lecture at the Royal Society in London, June 11th, 1863.

These were happy and fortunate days for the young surgeon. His researches were attracting the respectful attention of the leading pathologists throughout the world, and, if the secret of happiness is joy in the work of one's hands, Lister was happy, for in this kind of work his heart delighted. But for him the happiest and most fortunate event of this period was his marriage to Agnes, eldest daughter of Mr. Syme. In one respect the step probably caused Lister some anxiety. For, as his biographer tells us "in those days when a Quaker married one of another denomination it led almost invariably either to resignation of membership in the Society, or to disownment. In such a seriously minded family as Lister's, this was naturally a cause of considerable regret." But the ancient rule holds. A man leaves father and mother at the call of a true love. It was an exceedingly happy marriage and it brought no change in the affectionate relations between Lister and his own family. "Later he became a member of the Episcopalian Church. In this communion he found peace and satisfaction, holding as he did that true religion stands neither in forms nor in the formal absence of forms."

In 1860 he was appointed Regius Professor of Surgery in the University of Glasgow, and in the same year, at the early age of thirty-three he became a F.R.S. His reputation as a scientific man and a practical surgeon was becoming world wide. But the greatest distinction was yet to come. There is another date I suggest for the surgeon's calendar. It is August 12th, 1865, when James Greenlees aged eleven years was admitted into the Glasgow Royal Infirmary with compound fracture of the left leg, and was treated "antiseptically." This is Case 1 in Lister's first paper "On a New Method of Treating Compound Fractures, Abscesses, etc.," published in the *Lancet*, Vol. I, 1867.

The Renaissance of Surgery had begun.

Ever since his student days Lister had been gravely affected and depressed by the great mortality of surgical operations and the inex-

plicable uncertainties attending the so-called hospital diseases. So had many surgeons for many generations. The majority seem to have resigned themselves to the belief that such unhappy results were inevitable. Lister could not accept this. He grieved and he pondered. About the year 1861 he taught that suppuration in wounds is determined by the influence of decomposition or putrefaction in the discharges. But what was the cause of this decomposition? It had long been thought to be some mysterious action of the atmosphere. Then came Pasteur with his epoch-making researches on Fermentation. Lister studied these. His sound knowledge of chemistry and his long series of microscopic researches had prepared his mind to accept Pasteur's teaching. As he himself said, "When it had been shown by the researches of Pasteur that the septic property of the atmosphere depended, not on the oxygen or any gaseous constituent, but on the minute organisms suspended in it, which owed their energy to their vitality, it occurred to me that decomposition in the injured part might be avoided without excluding the air by applying as a dressing some material capable of destroying the life of the floating particles."

Lister's Antiseptic System was founded on the Germ Theory as enunciated by Pasteur.

As we now look back on the long years of Lister's struggle to develop and perfect his system we are struck by two things. In the first place we admire the skill and ingenuity with which the scientific knowledge of the time was applied to wound treatment. There was never anything unscientific or unreasonable in Lister's work. The knowledge of the time, the experiments of Pasteur, of Tyndall, of Lister himself, and they are among the most beautiful and interesting in the history of science, all went to show that the pathogenic germs existed in the air and that these air-borne germs were the danger, and the spray, which occupied so prominent a place in his system was devised in the hope of purifying the air.

In the second place we are amazed by the objections to Lister's "reformation." One reason undoubtedly was that the average practitioner of the time was not sufficiently educated in the fundamental sciences of chemistry and physiology to appreciate the work of Pasteur and Lister. But our wonder grows as we consider the evidence available before the eyes of the objectors, in the results of the new system. Lister's opponents asked for statistics. Lister was too busy studying and experimenting to trouble with statistics. Time was to tell. But the statistics of even the most successful surgeon of the day were not in the same category as Lister's. When an eminent professor published a series of two dozen successive amputations without a death, Lister could claim that by his method a large number of these cases might have had their limbs saved.

In 1869 Lister succeeded Mr. Syme in the chair of clinical surgery in Edinburgh. I have always felt that this second Edinburgh period

was the happiest in his life. He was convinced that he held the key to success in wound treatment, the experience of every day confirmed this faith and unfolded new visions of undreamed possibilities of saving lives and limbs. He knew there were many objectors and opponents. With one exception his surgical colleagues in Edinburgh were hostile to his teaching, or only half convinced. His one out-and-out disciple was his assistant-surgeon Mr. John Chiene, afterwards Professor of Systematic Surgery. But he saw that many earnest surgeons throughout the world were interested, and that the young men, with whom the future rests, were enthusiasts with him. He must have felt his heart strengthened and his courage fired as he saw cases in his wards recovering from severe injuries and serious operations in a way hitherto unknown. Surgeons from all countries were coming to see his work and returning to inaugurate his methods in their own hospitals. And by this time some of his own students had left Glasgow and Edinburgh and either at home or in the colonies were lighting beacons of health and healing, "shining like good deeds in a naughty world."

Three somewhat notable events, which had marked influence on the spread of his system, occurred during this period. In the summer of 1875 he made a prolonged tour in Germany, partly to see for himself how his doctrines were applied. German surgeons had shown more interest in his work than those of any other country, with perhaps the exception of Saxtorph of Copenhagen, Kocher of Bern, and Lucas-Championnière of Paris. His reception was enthusiastic. In the words of the *Lancet*, "the progress of Professor Lister has assumed the character of a triumphal march." Small wonder that such a city as Munich should receive him as a benefactor. The condition of their great hospital had become so bad, that, a few months before Lister's visit, it was on the point of being closed or even destroyed. Eighty per cent of all wounds, accidental or operative, became infected with hospital gangrene. Then, as Professor Nussbaum himself said, "When, in 1875, at one decided stroke I organized the clinic on Lister's principles, this disease disappeared as by magic, and has not since showed itself in a single case."

Then there was the meeting of the British Medical Association in Edinburgh in the same year when Lister gave demonstrations of his method of operation, and of dressing wounds and showed many cases. These demonstrations created a profound impression. He was at pains to point out that the good results shown were not due to his own personal care, but to the fact that the cases were treated on a new principle. "Mr. Rice, my house surgeon, does these things exactly as I do them myself."

And in 1876, at the invitation of some of his friends in Philadelphia, he visited the United States and took part in the proceedings of the International Medical Congress held at the time of the Centennial Exhibition. His reception was most cordial and he was made President of

the Surgical Section. This visit did much to stimulate American surgeons to adopt his system. He addressed medical students both in Boston and New York, and in a clinical lecture shortly after his return he told us of the earnestness of the American students and their "readiness to receive doctrine." He hoped that his visit "had been made at an opportune time."

These tours must have been a grateful relaxation from the incessant work of this period. It was indeed a time of intense intellectual energy. In addition to his clinical teaching, and his prolonged ward visits, during which he himself dressed many cases in order to show the students and the many visiting surgeons the novel and interesting features of his work, he was devising and introducing new operations, he was occupied with chemical and physical researches bearing on his surgical dressings and in the preparation of the catgut ligature, and he was also one of the pioneers, working literally night and day, in the new science of bacteriology.

And now this glorious period was coming to a close. In 1877 Lister was called to London. This is not the occasion to discuss his decision. Perhaps he was influenced by the fact that London was now the chief centre of opposition to his teaching. For us, his students, it was a day of woe when the final decision came.

On June 18th, 1877, forty-seven years ago to-day, he was elected to the chair of Clinical Surgery in King's College Hospital, vacant through the death of Sir William Fergusson. The earlier months of the London period were undeniably depressing. The change from an attendance of two or three hundred at a clinical lecture to a straggling dozen, and the small number of patients was not a pleasant one. The consciousness that on the part of some of the Governors and staff of the Hospital there had been strong opposition to his election was certainly unpleasant.

Gradually the results of his operations aroused interest. It was very noticeable that it was among the younger men, the house surgeons and registrars at the hospitals that the chief interest was shown, and among these were some of the future leaders in London surgery. The majority of the leading surgeons were still unconvinced, but the leader of them all, the "fine flower" of English surgery, Sir James Paget, was friendly and approved his system, and I know of at least one important case in which on his advice Lister was called in to operate. Two years later I had a letter from Lister in which he said: "The utter apathy in my small and irregular audience was sometimes almost more than I could endure. Now, however, things are greatly altered for the better.. Seventy-three have enrolled themselves in my class this summer.....At my last lecture my house surgeon counted between eighty and ninety in attendance and these remained to the end of the lecture, instead of any straggling off as of old during its delivery. It is a great comfort to me to have Cheyne as Assistant Surgeon and he cannot fail to be very

useful to the school. Already his work on the relations of organisms to antiseptic dressings has given him a good scientific position."

The year 1879 marks a notable epoch in Lister's career, and in the progress of antiseptic surgery. It was in this year that Mr. Savory, one of the most brilliant surgeons of London, in the Address in Surgery at the meeting of the British Medical Association in Cork, criticised Lister's theories and practice, threw discredit upon all he did, and declared that results just as good as Lister's could be obtained by ordinary methods.

In the same year, at the International Medical Congress in Amsterdam, at which Lister gave an address replying to various objections made to the antiseptic system, "he was received," as the *British Medical Journal* reported, "by the whole Congress with an enthusiasm which knew no bounds. When he stepped forward to the desk to open his address (which was delivered with but few notes in improvised French) the whole assembly rose to their feet.....with deafening and repeated rounds of cheering and waving of handkerchiefs. This was continued for some minutes until Professor Donders.....taking Lister by the hand said, 'Professor Lister, it is not only our admiration which we offer you, it is our gratitude and that of the nations to which we belong.' "

From this time on Lister was the acknowledged head of the surgical world. Honours now began to come to him. In 1880 he received the honorary doctorates of Oxford and Cambridge. In 1883 he was made a Baronet. In 1892 he retired from the professorship of surgery, having reached the age of sixty-five, the retiring age for professors at King's College. At the request of the Hospital authorities he continued in charge of wards for another year. In this latter year also, 1893, the greatest sorrow of his life came to him in the death of Lady Lister. Perhaps the best idea of what Lady Lister was, may be guessed from words used by their old friend, Dr. John Brown, of "Rab and his Friends," when they were starting in life thirty-seven years before. Looking back upon a childish illness of hers with several days of unconsciousness, he said, "Lister is one who I believe will go to the very top of his profession, and as for Agnes, she was once in Heaven for three or four days when she was a very little child, and she has borne the mark of it ever since."

Lister never was the same again. But he still tried to keep up his interest in science and surgery. He became Foreign Secretary of the Royal Society, and in 1895 succeeded Lord Kelvin in the Presidency.

About this time I had a letter from him in which he says, "To me as far as my work is concerned, dear surgery is for the most part a thing of the past. For some time I have found myself handing over serious operations to Godlee or Cheyne, and I have long felt it to be a thing of doubtful propriety for a surgeon to see cases in consultation when he has ceased to operate. It is so very different a thing to advise another man to undertake a piece of operative work from what it is to be prepared to undertake it yourself. So I have applied this view of the matter to my own case, and since the beginning of the present year (1896)

I have declined to see patients except a few old friends. But, as you are aware, I have other duties of no inconsiderable kind as President of the Royal Society. I daresay you can believe that I had no desire for this office. In fact I did almost all I could to get off. Yet I find the work in connexion with the meetings very interesting, and the association with men in high position in various branches of science is as pleasant as almost anything can be to me in my altered life..... One speaks of the blessedness of memories of the past. I hardly know how I should have got on without them. They are a daily solace to me."

In 1897 he was raised to the peerage, and in the same year he visited Canada, and many now here present must have vivid recollections of the impression made upon them by his unaffected simplicity, his gracious dignity, his clear, musical voice, and his evident pleasure in all he saw.

In 1898, at seventy-one, he received the freedom of the city of Edinburgh, in company with Lord Wolseley. In his speech he naturally referred to his old associations with Edinburgh. He said, "Here I spent some of my best and happiest years. The enthusiastic students it was always a joy to me to teach, and with my colleagues.....my relations were of the most cordial description. I also received from Edinburgh a gift which I cannot name, but which was to me a source of unspeakable blessing." He also said, "I feel that the honour I have received is much enhanced by the fact that it has been conferred, on the same day, on the illustrious head of the British Army. The work of a General of the very highest rank like Lord Wolseley has certain analogies to that of the ideal surgeon. For the cure of ills in the body politic he performs operations, bloody, painful, dangerous. But he executes his task with the least possible expenditure of human life and human suffering, and he addresses himself to his work in the spirit of self-denying, self-sacrificing devotion." One realizes that in Lord Lister as in Lord Wolseley the "Character of the Happy Warrior" is displayed.

The Third Huxley Lecture delivered in 1900 when he was seventy-three, was the last of his great public addresses. But a year later, at the second Tuberculosis Congress in London, when Koch made his amazing and disquieting assertion that human and bovine tuberculosis were separate and distinct diseases, and that there was practically no danger of the infection of human beings from milk, butter or meat derived from tuberculous cattle, Lord Lister, who was in the chair, showed how thoroughly he had kept in touch with the advance of bacteriology, and his speech, in its lucidity, authority, and tactful courtesy to the illustrious visitor, was a masterpiece.

In 1902 he received the Order of Merit, being one of the twelve original recipients.

In 1903 he had a serious illness which kept him more or less an invalid for the rest of his life. He was much crippled and unable to continue active exercise.

There was a wonderful celebration of his eightieth birthday, April 5th, 1907, when congratulatory letters and telegrams came pouring in from all parts of the world.

His last public appearance was on June 28th of the same year, when he was present at a crowded gathering in the Guildhall, to receive the freedom of the City of London. He was now a feeble old man. After the Lord Mayor's address "Lister spoke in a low voice a very few words of thanks, and so passed away finally from public view."

In 1908 he retired to the quiet seaside town of Walmer. Even then there is evidence of his desire to continue work. During the summer he wrote to me at some length discussing Bier's treatment, and in 1909 he sent to the medical journals a communication on the subject of the cat-gut ligature. He was still hopeful. Godlee tells us he was always hopeful, "Even when he became weaker and weaker, and months lengthened into years his horses stood in the stables in London ready to take him home..... In the summer of 1909 sight and hearing became much impaired. He could no longer read nor write, but he dictated many letters, mostly filled with kind enquiries.....and listened with interest to the reading aloud of books and papers, not omitting the medical journals. As the autumn came on he was almost confined to his bed. Occasionally on fine mornings he sat in a chair to watch the sun rising over the sea."

He was ever a lover of the morning. And on the morning of February 10th, 1912, he passed from earth.

No man would have been more welcome to the honour of a grave in Westminster Abbey, but he had willed to lie beside the wife of his youth. There was, however, a solemn and impressive public funeral in the Abbey, and the coffin was then taken to the West Hampstead Cemetery with the sorrow not only of an empire, but the mourning of a world. The *Times* obituary notice said, "No panegyrics are needed, the greatest modern Englishman is dead."

## II

It is now fifty years since I became a student of Professor Lister. He was then in the prime of his strength and activity. In face and figure he was one of the handsomest men I have known. His brown hair was beginning to turn grey. His bright expressive eye was a clear hazel colour and he had a pink and white complexion which any debutante might envy. He was tall, about five feet eleven, exceedingly well proportioned, active in his movements and gave the impression of vigorous health and strength. With all this manly grace and vigour, and an energy that carried him swiftly through the corridors of the hospital, and up the stairs, two steps at a time, there was then, and on into serene old age, an indescribable air of gentleness and even shyness. I always felt there was a quaint fragrance, so to speak, of the innocent happy child in Lister. Two or three portraits have been painted of

Lister but none that have satisfied me. There are several photographs, some of them very good, but it would take a Raeburn to paint Lister's face. The best portrait that I know is a portrait in words. It was done by William Ernest Henley, and this is it:

"The Chief"

His brow spreads large and placid, and his eye
Is deep and bright, with steady looks that still.
Soft lines of tranquil thought his face fulfil—
His face at once benign and proud and shy.
If envy scout, if ignorance deny,
His faultless patience, his unyielding will,
Beautiful gentleness and splendid skill.
Innumerable gratitudes reply.
His wise, rare smile is sweet with certainties,
And seems in all his patients to compel
Such love and faith as failure cannot quell.
We hold him for another Herakles,
Battling with custom, prejudice, disease,
As once the son of Zeus with Death and Hell.

He was always plainly dressed, the conventional frock coat and silk hat of the professional man in Victorian days, a narrow black tie in a bow knot, mother-of-pearl shirt studs, and, usually, light grey trousers. Sometimes he wore a light fawn coloured overcoat. He was fond of horses and we used to think his favourite pair, a black and a dark grey, the finest pair that drove to the hospital gate.

His early interest in birds and flowers, which his wife also shared, continued throughout life. They spent their holidays together, generally in country places. Lister was an accomplished botanist and loved to collect and classify the plants of any district, at home or abroad, where they spent their holiday. Although not an expert angler, he was very fond of fishing. The holidays were active, physically and mentally. Notes were kept of plants and birds and scenery: he was interested in languages and dialects. There are many glimpses in Godlee's charming book of his joy in life. We see the exultant morning plunge into the sea of the strong swimmer, we see him lending a hand at the oars with the boatman, returning from a happy day's excursion, with successful fishing, on a Norwegian fjord. There are walks in Skye, or along the Cornish coast, with his vasculum slung on his shoulder, and field glass in hand for the study of birds. He and his wife seem to have enjoyed their holidays like a pair of happy children. They both had a keen sense of humour which enabled them to find infinite amusement in even the occasional discomforts of travel.

Lister's sense of humour led him sometimes to indulge in puns, and he admired the gift in this peculiar art of Thomas Hood. One of his favourite puns, used sometimes to give point in a clinical lecture was based on a Scottish pronunciation. In describing the discolouration

of a gangrenous limb he would say, "it has gaen green." Alluding to his preference for chloroform over ether as an anæsthetic he would quote,

"How happy could I be with 'ether'
Were t'other dear charmer away."

One day when the instrument clerk had omitted to put a probe in the tray Lister looked at us gravely, but with a twinkle in his eye and said, "Watson has been very *improbus* as regards that probe."

No memory of Lister is complete without the picture of him entertaining friends in his own house. He was the perfect host. Cares and anxieties were laid aside, his sole object was to make his friends happy. This hospitable spirit showed itself early in his career. The "high spirits" of the boy of twelve, perhaps somewhat repressed by the arduous studies of the next twelve or fourteen years, appear to have flourished afresh when he was transplanted to Edinburgh and came among the high spirited, if also studious youths who are indigenous there. He soon became a great favourite and formed some of the dearest friendships of his life. He was fortunate in being exempt from anxiety on the score of pecuniary embarrassment, and had no desire for display or a foolish use of his means. But he loved to entertain friends.

I was told by Mrs. Porter of a famous supper he gave his clerks and dressers on the occasion of the furnishing of a new ward for Mr. Syme. Mrs. Porter, whose memory all old Edinburgh "medicals" revere, she of the silvery hair, black eyes and rosy cheeks, who has also been portrayed by Henley in one of his inimitable word pictures, had been Syme's head nurse for years before Lister came. She worshipped Syme and she loved Lister as if he were her own son, and the tears rolled over the "sweet old roses of her sunken face" when Lister left Edinburgh. It was she who told me of the narrow escape Lister had in attempting to climb, with another high-spirited youth, a cleft known as the Cat Nick, in the Salisbury Crags, and gave an idea of the consternation that fell upon them all as the victim was carried into the Infirmary where he had to stay in bed for a fortnight. And we know that when his companions gave a dinner in honour of his marriage they were a merry company and that he joined them in singing appropriate ditties. All who have any recollection of that circle of friends know that their merriment was both hearty and wholesome. "At times his fun and merriment were like that of a boy." He was fond of music and especially of Scottish songs.

Thanks to his retentive memory and his unusual power of application he had a wide acquaintance with the best literature. From my own observation I concluded that his favourite books were the Bible, Shakespeare, and Horace. He was also fond of Milton, Dante, and Goethe and could repeat from memory, for the entertainment of friends, long passages from these writers. Soon after his arrival in Edinburgh

he purchased a copy of Burns' poems and knew these well. His favourite author on pathological and surgical subjects was John Hunter, whose works he described as "That remarkable treasury of original observation and profound reflection." He had marked linguistic ability. He had such a command of French and German that on his Continental tours he was able to address medical societies in these languages. He acquired some knowledge of the language of all the countries he travelled in.

His bearing towards his hospital patients was always one of unaffected kindliness and personal interest. But it was with children that his kind, warm heart showed itself. Childless himself, the sight of a child, especially a suffering child, seemed to awaken deep feelings of interest and affection. In my ward there was a small "street arab" whose wrist Lister had excised. I was dressing the case one day while Lister was making his tour of the ward with his house surgeon and the students. The lad was paying no attention to my proceedings. His eyes were following the Chief. When he had gone the boy said to me, "I think its the little yins and the auld wimmin he likes best."

Sir Hector Cameron tells a delightful story showing Lister's love of children. On one occasion when visiting his wards he found a little girl in tears because the nurse had taken away her doll. On enquiry it turned out that a tear had been inflicted on the doll's body and sawdust was escaping on the sheets of the child's cot. Lister at once asked the nurse to bring him the doll, also a needle and thread. Sitting down by the child's cot he sewed up the wound, thus staunching at the same time the "hæmorrhage" of sawdust and the tears of the little girl to whom the doll was restored.

Among the happiest recollection of those Edinburgh days are those of the Sunday afternoon visits. This was one of Lister's ways of keeping the Sabbath day. The coachman and the horses had a rest. Lister came to the Infirmary on foot. The picture is plain before me now. It is the old Reserve Ward, a large ward for men, and about two o'clock on a summer afternoon. Clerks and dressers, and some students from other clinics, are standing about, chatting together, or talking to the patients. The instrument clerk, in charge of the famous spray is seated on the broad window sill at one end of the ward, now examining the flame of the spirit lamp, or touching the safety lever to let steam escape, for the spray must be kept ready for instant use, and now looking across the smoky roofs of the old town, where his eyes rest on the blue gleam of the Forth, "North Berwick Law with cone of green, and Bass amid the waters." Then some one suddenly says, "Here comes the Chief!", and we see our hero come through the little side-gate, down the slope, with his easy rapid stride, a light cane in his hand, and on his handsome face a look of happy meditation. The house surgeon meets him at the main door, and in a few minutes they enter the ward. Students come to attention, patients' faces beam. I wonder if there were anywhere else

in the world a surgeon whose pupils held him in more reverent admiration, whose patients so trusted him, loved and positively adored him. He cannot be unconscious of this feeling, the "soft lines of tranquil thought" grow softer, that "face at once benign and proud and shy" is suffused with the unaffected pleasure of this modest and simple minded great man as he begins his tour of the ward. It was his wish on Sunday to see every patient in his wards, and as we often had sixty or seventy, this meant a visit of three or four hours. He goes from bed to bed, occasionally conversing with a patient, or discussing a case with the house surgeon, and perhaps himself changes a dressing, drawing the attention of dressers and students to clinical facts, but never using a word to alarm or distress a patient, and performing his manipulations with the gentlest, steadiest, firmest hand which any sufferer could dream possible.

And so through all the men's wards, then downstairs to the women and children. How their eyes followed him! And perhaps the visit ended in that famous little ward at the back, a room really meant for one bed and one patient, but in which there were two big beds: in one lay or sat, looking at picture books or playing games, three small boys, Tommy Miller, Roden Shields, and Willie Shotts, all "chronics," spines and joints, doomed to early death or at least deformity and lameness but for him, and all happy and recovering. And in the other bed the tall, gaunt, russet-bearded figure of Henley the poet, who lay there with a saved limb, musing and framing his "Sketches in a Northern Hospital."

## III

When Lister left Edinburgh for London he was just fifty years of age. He had been practising antiseptic surgery for twelve years, and this is a suitable point at which to survey the results of his work during that period.

1. The mortality of surgical operations had been greatly reduced. For example, the average mortality in amputations at this time was thirty-three per cent, one death in every three cases. In Lister's hands the mortality was one in ten. Further, the number of amputations was reduced, for antiseptic surgery had made it possible to save many limbs formerly condemned to amputation.

2. A vast new field for surgical treatment had been opened up. Operations for deformities of the bones, for un-united and badly united fractures, for diseases of joints and for radical cure of hernia were done safely.

3. The maleficent trinity of hospital diseases, Erysipelas, Pyæmia, and Hospital Gangrene, were practically abolished in the wards of Lister and his followers. Sporadic cases of erysipelas might occur, but this disease did not attack operation wounds treated antiseptically. A rare case of pyæmia might occur after operation but only in cases where thorough antisepsis could not be carried out, as in operations on the jaws.

The reader of a paper before the Royal Medical Society in Edinburgh in 1877, quoted from the Hospital Reports that Lister had had two cases of pyæmia in eight years, while in another service in the same hospital there had been forty-three cases in the last five years.

And yet even at that date he had to meet with great opposition. From an apathetic indifference to violent and even vituperative contradiction the bulk of the profession had ranged itself against him. It was not only that too many medical men were unable to appreciate the germ theory, but there was something bordering on insolence in the indifference of many. It is a fact that there were colleagues of Lister who ridiculed and opposed him, and yet never entered his wards to see for themselves the results of his practice. Lister's attitude toward these opponents was characteristic. When a very distinguished authority had occupied several columns of the *Lancet* with an article showing that in Lister's method, what was of value was not new, and what was new was of no value, Lister replied in a letter of eight lines, merely saying that if his critic would do him the honour of coming to his wards and seeing his cases, he might perhaps modify some of his views. If those "captious contradictors" had adopted the maxim "by their fruits ye shall know them," and had taken the trouble to visit Lister's wards, they could not have failed to see the unspeakable superiority of his methods, whatever they might think of his theories. They would have seen, in some of the best hospitals and under the care of the foremost surgeons in Britain many cases of septic fever. They would find patients exhausted by long continued discharge from their wounds. They might see a recent amputation case dressed, say one week after operation. On removal of the pus-soaked dressing the stump is seen, swollen, red, and tender, pus oozes from the wound, between the sutures, and trickles down strands of dirty ligatures hanging from the angles of the wound. In spite of the gentlest handling, the dressing is a painful process and may have to be repeated two or three times during the day. A sense of anxiety and gloom seems to affect the patients, and over all hangs the heavy unpleasant odour of suppuration. And this in spite of all ordinary rules of cleanliness as regards bedding and linen, floors and walls, which made English hospitals the best in Europe. In spite, too, of the use of many antiseptic and deodorant agents and a rigid enforcement of the regulation floor space. What a different scene in Lister's wards! Temperatures are as a rule normal. There are no cases of continuous suppuration. When the week-old amputation case is being dressed the only sign of the wound may be the row of sutures. No swelling, no redness, no pus, no pain. And the painless dressing may not be required again for three or four days. In these wards no melancholy, but an air of cheerfulness and hope, and no odour other than the aromatic fragrance of pure carbolic acid.

In those other wards there might happen, from time to time, a case of perfect healing, or even a series of "successful amputations." But no

one could count on these results. The issue was always precarious. In Lister's wards we might almost say we had a splendid monotony of success. This was not because Lister's wards were more favourably situated or kept cleaner or better ventilated. Quite the reverse. In Glasgow the sanitary condition of his wards had been the worst in the hospital, but after the introduction of his system the results were the best. In Glasgow he was "engaged in a perpetual contest with the hospital board who were disposed to increase the number of beds in each ward." In Edinburgh, on the other hand, he permitted his wards to be crowded, indeed often overcrowded. Two, and sometimes three children were to be seen in one bed and at night mattresses were laid on the floor for those who were able to sit up and move about during the day. In his address before the British Medical Association, in 1875, he said, in discussing the salubrity of his wards, "while I have fifty-five beds, I have lately had seventy-one patients." In the following winter I recollect I wished to get one of my dispensary cases into the hospital, for an operation for ununited fracture of the femur. I went to my friend, Dr. Baldwin, (Lister's house surgeon at the time.) He said, "Well, I have fifty-five beds and seventy-six patients." Yet he found room for my poor man.

Experience had taught that in the absence of suppuration the air, even of a hospital ward, was so pure that occasional overcrowding, even to so great a degree, had no serious results.

In the face of such results as Lister had obtained, who could doubt? For us, his students, his dressers, there was no shadow of doubt. We knew that we were in touch with genius, with a strong, beneficent genius, of clear vision, indomitable patience, and unshakable courage. In the words of Ogston, of Aberdeen, one of his most brilliant and successful followers, he "had changed surgery, especially operative surgery, from being a hazardous lottery into a safe and soundly based science."

## IV

Apart altogether from this great achievement, Lister was a very distinguished surgeon. In fact, the vast and universal importance of his *magnum opus* has perhaps obscured the brilliance of his work in other directions. While still a young man he was selected to write the articles on "Amputation and Anæsthetics" for Holmes's *System of Surgery*, the most important surgical work of the time, and these are still classics. He devised new operations and improved others. In 1867 he performed the first recorded radical operation for cancer of the breast, with division of the pectoral muscles and clearing out the axilla. He was the first to suture blood-vessels, and the first to do an osteotomy for knock-knee. He practised bloodless surgery several years before the Esmarch bandage came into use, and his method is simpler and better. His re-introduction and perfection of the cat-gut ligature was itself an epoch in surgery. If rapidity in operating were required he was not wanting in that accomplishment of the surgeon. But his aim was thoroughness,

in contrast to brilliant rapidity, and in this he set the fashion which characterizes the best surgery of to-day.

He was a pioneer in many fields. In histology he was the first to give an accurate description of involuntary muscular fibre, and he was the first to employ section-cutting in the study of tissues. Reference has already been made to his work in physiology and pathology. He was one of the founders of the science of bacteriology, and was the first to obtain a pure culture of a micro-organism when he isolated, described, measured, figured, and named the *Bacterium lactis*, and he did this by the difficult and tedious process of fractional dilution, the only possible way before the genius of Koch had devised solid culture media.

In Renan's famous speech, welcoming Pasteur on his admission to the Académie Francaise, he compared his genius to a species of divination. There was much of this in Lister, there was an almost mysterious insight into vital processes, and in his lectures and writings, there were sometimes almost prophetic hints and suggestions. One instance of this gift is his forecast of the existence of a nervous plexus in the musculature of the intestine, which was discovered shortly after by Meissner. He had evidently some conception of that function of the cells announced years after by Metchnikoff as phagocytosis. Many old students will remember his interest in the action of granulation tissue on dead bone, producing absorption. He described the granulation as "nibbling" the bone.

In reflecting upon the enormous amount of work which Lister accomplished, I have been impressed by two considerations. One is his choice of the morning hours for study. When, as a young man, he was beginning his first course of lectures in surgery, he wrote to his brother, "The way I manage work is by getting up early. I go to bed about ten, and get up by alarum at 5.30, light my fire (laid the evening before) and my coffee boils while I dress. I take it and a bit of bread, work for three or four hours and off to my ten o'clock lecture when my mind is brimful of it. Then I have the afternoon for the hospital."

But there were occasions when work had to be carried on night and day. In studying the growth of a micro-organism, not infrequently observations had to be carried on during the night and the small hours of the morning. He was also fond of studying in the open air. He loved to meditate in a garden. When in 1869 he returned to Edinburgh as Professor of Surgery, and settled at No. 9 Charlotte Square, he looked forward to meditating in the West Princes Street gardens. "It will indeed be a grand place for the purpose when I have it all to myself before breakfast." Thirty years later we find him pacing to and fro in these gardens in the morning of the day when he was to receive the honour of the freedom of the City and thinking over the speech he was to give.

The other consideration is the great assistance he received from his wife. She entered with affectionate energy into his researches and had a clear understanding of their importance. She was his amanuensis and wrote many of his letters. The many hundreds of closely written

foolscap pages which form his "Common-place books" are in her beautiful clear hand writing. When night vigils with the microscope were required she sat by him, note-book in hand, until the early morning hours, ready to note from his dictation the changes which were going on before his eyes, or the thoughts that occurred to him.

## V

Lister was a great and inspiring teacher. The outstanding characteristic of his teaching was its moral earnestness, its insistence on our personal responsibility and duty to our patients, the right use of the "swift and solemn trust of life," the injunction to observe keenly, and the duty of forming our own conclusions and acting on these.

At the very beginning of his teaching career, when at twenty-eight years of age he became Lecturer at the Royal College of Surgeons, Edinburgh, he was impressed with his responsibilities. In a letter to his brother he says, "..... I was so lately a student myself, I feel I have undertaken a most responsible duty. How much may depend on the principles of practice which I impart to these young men. May I be enabled to discharge the duty faithfully."

A few years later in writing to his father, who feared his son was giving too much time to teaching, in neglect of practice, (Mrs. Lister had referred to "poor Joseph and his one patient"), he said, "I trust, however, that the chief object in my mind is that of doing them good as regards fitting them for treating the diseases of their fellow creatures in after life."

In a speech made at a complimentary dinner given him on the occasion of his leaving Edinburgh for Glasgow he quoted from his favourite Horace the words, *Quid verum atque decens curo et rogo*, etc., and said, "for us the *verum* will ever be the *decens*, scientific truth as bearing directly upon the well-being of our fellow-creatures, will always be a becoming object of our pursuit, and while there is probably no calling in which there is greater opportunity for deception than in ours, yet when we consider the sacred interests which are committed blindfold by the public to our trust, we must allow that there is no calling in which falsehood is more unbecoming or more despicable."

And shortly after, in his introductory address in Glasgow, he told his students that the two great requisites for the medical profession were "first, a warm, loving heart, and secondly, Truth in an earnest spirit."

The concluding words of his Graduation Address in Edinburgh in 1876 were, "If we had nothing but pecuniary rewards and worldly honours to look to, our profession would not be one to be desired. But in its practice you will find it to be attended with peculiar privileges, second to none in intense interest and pure pleasures. It is our proud office to tend the fleshly tabernacle of the immortal spirit, and our path, if rightly followed, will be guided by unfettered truth and love unfeigned. In the pursuit of this noble and holy calling I wish you God-speed."

I will quote from letters written about fifty years ago, before Lister's doctrines were generally accepted, which may give some idea of the feelings evoked among his students by the matter, and the manner of his teaching.

"We get splendid lectures from Lister. He is so original. We hear things which were never heard before." "He is a good lecturer, he speaks distinctly and makes things very plain. Some think he is not practical, but I think he does better in giving us principles as a solid foundation for our practice."

"At the last clinic of the summer session he advised us 'not to work too hard, to keep up our acquaintance with science, and to remember ours is a high and holy calling.' I thought it a good homily on the Physical, Intellectual and Moral."

"I heard him say one day that eight years ago he thought his system would die with him, but that now he felt the day was to be won, though he would not live to see it. But he may. I think it is possible he may live to see antiseptic surgery universal."

"Long after this, if we are spared to be old men, many a one of us will look back to the old dingy wards of the Royal Infirmary, and think with swelling hearts and dimmed eyes, of him who taught us there. Whatever monument he may get from the world, he has raised his own monument in our hearts."

A few days ago I had a letter from Sir Hector Cameron, one of Lister's first house surgeons, his first assistant, and his oldest and most intimate friend, outside of his own family circle, and in this letter he recalls "the keen interest and pleasure which were aroused in those of us who listened to his lectures sixty years ago. We felt conscious that we were listening to new and valuable lessons not yet in print. But we little realized how great their value was or what was to be their unspeakable fruitfulness in the fulness of time. Alas! those of us who were privileged to drink of those pre-libations of future glorious progress are now a very small band indeed. I can count them on the fingers of one hand."

I shall now quote at random a few *ipsissima verba* from my notes of his clinical lectures:

"I beseech you to form your own opinions. The minds which you bring to bear on this subject to-day are very much the same as they will be throughout your lives. You are as competent as you ever will be to draw logical inferences from established data."

"Mere book-knowledge is of little value, if you have this alone you are at the mercy of the next man who writes a book."

"The whole object of your existence is to understand and cure disease in this world, from this time forward."

"If you believe this treatment is safe, and that you will get better results in this way, then it is your duty to carry it out. It is no longer 'May I do this?' it is 'I must do it.'"

"If a death should result from our carelessness or want of thought it is not far removed from manslaughter."

"Act upon thoughts as they come. Strike the iron while it is hot. If I have ever done anything it is by acting on thoughts as they occurred to me."

"To intrude an unskilled hand to such a piece of divine mechanism as the human body is indeed a fearful responsibility."

One day while he was explaining certain anatomical points in connection with an operation, some thoughtless students tittered. Turning round from the blackboard on which he was drawing, he electrified us by an appeal to be attentive to these details, telling us the more we studied them the more we should bow and admire the stupendous Wisdom that planned them all.

As a great deal of the novelty and interest in Lister's teaching was due to his pathology I add a few pathological aphorisms.

"The subject of the blood is the foundation of all pathology."

"Blood has no inherent tendency to coagulate."

"A wound may be æsthetically dirty yet surgically pure."

"Granulations have no inherent tendency to form pus."

"The injured tissues do not need to be stimulated or treated with any mysterious 'specific'. All that they need is to be let alone. Nature will then take care of them: those which have been weakened will recover, and those which have been deprived of vitality by injury will serve as pabulum for their living neighbours." (1876).

"Healthy tissues are hostile to the development of parasitic organisms. There is reason to believe that the white corpuscles themselves exert a similar influence." (1878).

"To exclude living organisms entirely from wounds is an impossibility."

"Inflammation may be caused by the action of the nervous system."

Surprise has often been expressed that Lister never wrote a book. He aimed at perfection, but perfection is at the foot of the rainbow. His occasional publications were really interim reports of a continuous and prolonged study. Many years ago I was thinking of preparing a paper on antiseptic surgery for one of our medical societies, and I wrote to him enquiring as to the latest developments in his practice. His reply is so characteristic of my revered master that I venture to quote it. It caused me a good deal of compunction to find that my request had trespassed upon his holiday. The letter is dated from Bregenz on Lake Constance where he and Lady Lister were spending a part of their holiday in September, 1886.

"It has often caused me a pang to think that your letter remained unanswered. But at home I am so much pressed with professional engagements of an immediately urgent character that I find it extremely difficult to get half an hour in which to write. Consequently yours has been only one in a pile of letters which I have got myself into disgrace as well as compunction by leaving to a more convenient season..... The fact is that I have been for a considerable time in what I hope will

ultimately prove to have been a transitional stage to something better as regards our antiseptic methods. As regards the spray I confess I have not myself used it since last October. But on the other hand I am sure that if it is not employed, more care must be taken in other respects in order to attain the same results, and I have not felt in a position to publish on the matter as yet and therefore I could not well furnish you with material to publish in my name. As to the dressings also, although I have been labouring for years at endeavours to improve them I have always hitherto seen something further to be done before I could feel satisfied that I had got what I should wish to publish. I really do hope, however, that many weeks will not elapse without my being able to announce some progress. There are such a multitude of conditions to be complied with in order to have a dressing in all respects to be commended that the attempt to fulfil them has sometimes seemed almost like following a Will-o-the-wisp. So you see I really could not comply with your request nor write shortly to explain my inability."

One of Lister's outstanding characteristics was his modesty. As an instance of this I may say that I never heard him refer either in lecture or private conversation to the fact that he had had Queen Victoria as a patient. He had succeeded Mr. Syme as Surgeon-in-ordinary to the Queen in Scotland. This was no empty title. In 1871 he had the honour, and the anxiety of operating upon Her Majesty. It was a case of deep seated acute abscess in the axilla, and it had a special surgical interest as it was the first case in which he used a drainage tube. In the *Collected Papers* there is an account of the conditions which led him to use the tube, but with no reference to the identity of his august patient.

Another marked element in Lister's character was his firmness. If after careful thought he had come to the conclusion that a certain operation, or a definite line of treatment was the best thing for his patient, no considerations of danger or of difficulty prevented him from carrying it out. And so with all his beliefs and principles, he kept "the law in calmness made," regardless of the consequences to himself. In 1875 a movement was on foot to promote legislation making it illegal to experiment on animals. Queen Victoria personally asked Lister to support this movement. It is evident from her letter that in her view, with her information, all experiments on animals were "horrible practices." One side only of the question had been before her. Lister replied to her private secretary: "I should deeply regret that I cannot see my way to complying with this request, were I not persuaded that my doing so would not promote the real good of the community, which I know to be Her Majesty's only object in the matter." And he goes on to express his reasons for his opinion in a letter which is perhaps the best thing that ever was written in defence of scientific experiments upon animals.

As to his own kindness and thoughtfulness for his patients I shall narrate a case, which displays at the same time the simplicity and the efficiency of his methods. On the first of August, 1876, a young woman

was admitted to Lister's wards. She came from Devonshire, had been travelling all night, and looked tired, but was otherwise healthy-looking and with rosy cheeks. But it turned out that this was a case of psoas abscess, with angular projection in the lower dorsal spine, indicating softening of the bodies of the vertebrae. As she had been complaining of pain the lady who employed her had called in her own doctor who diagnosed the case and advised that she be sent without delay to Mr. Lister. She was entered in the case book as "Lizzie Thomas, aged 29, parlour maid, Torquay. Psoas abscess, left side."

One of the maxims of surgery is to open abscesses, but the grim experience of centuries had taught that in this particular sort of abscess, a chronic abscess connected with diseased bone, such a proceeding was disastrous. I shall quote from text books which guided the practice of surgeons fifty years ago. "In these cases we are to content ourselves with rest and general management, and look gloomily to the result." Another eminent teacher says, "There can be no doubt whatever that it is the duty of the surgeon to leave these abscesses alone." And Syme, perhaps the most influential teacher of the era, said the abscess "ought not to be opened since doing so could only accelerate the patient's fate, and bring the surgical art into discredit." And so, in spite of her rosy cheeks, the wisdom of the time saw that "Death had set his broad arrow" upon her. But Lister had changed all this. He did not fear to open the abscess. When he came to the hospital he saw the patient in her bed in the ward, confirmed the diagnosis, and then and there the operation was performed. There was no wheeled stretcher nor white-robed orderly to bear the patient to the shining splendour of a modern operating room, with white enamel and nickelled steel. Students were orderlies, and learned how to lift and carry patients. The patient remained in her bed, and the bed was moved out into the middle of the ward, a screen was set up round it, a student with a pound bottle of chloroform and a folded towel proceeded to anæsthetise the patient. On a small table by the bed there was a tin basin with a 1 to 20 watery solution of carbolic acid, containing a bistoury, a sinus forceps, a drainage tube and a gauze mop. In another basin was a 1 to 40 carbolic solution, with a piece of folded gauze for the "deep dressing." The large dressing and the necessary bandages and the carbolic spray were there. Lister turned back the cuffs of his coat, washed his hands for a few seconds in the 1 to 20 solution, and the area of skin covering the abscess was washed with the same. In a few minutes the patient was quietly asleep, and the abscess was opened. Pus ran freely out, aided by gentle pressure, to the amount of twenty ounces, and the drainage tube was passed into the abscess cavity. The deep dressing, squeezed out of the 1 to 40 lotion, was laid over this, then the usual ample dressing of gauze, then the gauze bandage, and over all, a few turns of elastic bandage. The screen was removed and the patient and her bed replaced. All was over in fifteen or twenty minutes.

It had been a very simple operation. It was also revolutionary: the subsequent course of the case was in rebellion to all the surgical canons of the time. Suppuration ceased, there was no fever, appetite was good and sleep undisturbed. At first the dressings were changed under the carbolic spray every day, the discharge ceasing as the abscess cavity contracted. After some weeks the dressing was done once a week, for comfort and cleanliness. The rest in bed was necessary on account of the diseased condition of the bone.

A year passed and Lizzie Thomas entered on her second year of "rest cure," with rosy cheeks, patient smile, and busy fingers, a great favourite.

This was Lister's last year in Edinburgh. Early in October he took up his new duties in London, and it was my good fortune to be one of the staff he took with him.

On October 24th, I had letters from my friend Mr. Caird and from Miss Logan, the staff nurse in the wards that once were Lister's, telling that under the new regime, all patients with these chronic abscesses of spine or hip were to be discharged, and that Lizzie Thomas, who had been recumbent for fifteen months, had been ordered to sit up, but that Mr. Roxburgh, Lister's last house surgeon in Edinburgh and still in charge of these wards, had protested. They wished to know if Mr. Lister would take Lizzie Thomas into King's. I shall never forget the flush that came into his face nor the expression of mingled incredulity, sorrow and indignation as I read this letter. He used the strongest language I ever heard him speak, "It is an infamous shame." Yes, of course he would take Lizzie Thomas into his wards. I telegraphed to Caird and the next day Miss Logan, the staff nurse, with Lizzie Thomas in the basket (a long wicker basket in which patients were carried to and from the operating theatre) left for London by the night express and was taken into King's College Hospital. And that is another story. A few days later a letter from Roxburgh told me of the removal of the rest of these cases, six men and boys, by Mr. Lister's directions and at his expense to private lodgings in Melville Place, where he had had a "nursing home" for private cases.

In January, 1878, Lizzie Thomas developed another abscess, a psoas on the right side, and this was opened. It contained four ounces of pus. This abscess was dressed every day for some time, the other once a week as usual, and on August 1st., 1878, Lizzie Thomas entered on her third year as a hospital patient, and when I left London in October she was still rosy, smiling, patient and busy knitting or reading.

The next note I have of this case is in a letter from Lister written in June, 1880, beginning "I was reminded of you yesterday by seeing Lizzie Thomas, whose sinus healed at last, a few days ago, walking well in the street and looking well. About three months after you left we had her removed to 15 Fitzroy Square, (a private nursing home). After she had been there some months a fresh abscess appeared in the back

beside the dorsal vertebrae. This was almost enough to make one regard her case as hopeless. But, under antiseptic treatment, it healed in time, as also did the sinus in the right groin. But that in the left groin continued to discharge a few minims per week, till, thinking that the spine must, after the long rest, have become sound, and hoping that exercise would do good to her general health, we allowed her to get up with the gauze dressing and a well applied elastic bandage. The result was that the discharge diminished instead of increasing, and a few days ago the last sinus was found completely cicatrized. Now that it is all over, the long continued care of Cheyne and yourself seems well repaid by the appearance of this amiable, handsome girl restored to health and usefulness."

Fourteen years later he spoke of this case and told me he had lately seen her in Torquay. She was now a healthy woman of forty-seven.

And what of the six men and boys for whom Lister had provided in Edinburgh? One, a poor fellow of about thirty years of age with tuberculous disease of both lungs died a few weeks after removal from hospital. Every one of the others recovered. One of them I believe, became a doctor, and another a journalist.

## VI

In an old letter of my own I have found an account of a memorable evening I spent with Lister in 1894. I found him very much changed from what he had been at my last visit three years before. He seemed to have grown ten years older. I had a sad presentiment, fortunately not realized, that I should not see him again. The blithe, almost boyish heartiness of the greeting of 1891 had gone, but the grave smile of welcome was not less sincere. The duties of the hostess were carried out in the most kind and hospitable way by Miss Syme (his sister-in-law) but the spell of a dear and vanished presence was felt by all. It happened that I was the only guest. Mr. Cheyne was to have come, but had been called out of town. After dinner he drew his chair towards my corner of the table and we talked for two hours or so, chiefly of past times and old hospital days. He recalled several cases and discussed them, speaking of some of them by name. He spoke with much feeling about some of his old house surgeons and students, expressing his pleasure in the success of many of them. He was much pleased when I told him of Mr. Caird's marriage, a few weeks previously, and said pleasantly that he hoped he would soon hear the same of me. He was very much interested in diphtheria antitoxin, which had just been introduced and rejoiced in the prospect of success in its use. He had, of course, been greatly disappointed in the expectations formed of tuberculin, a few years before, but said he believed we had in diphtheria antitoxin a real addition to our means of saving life. He described to me at some length the successive steps in the final elaboration of the antitoxin, from the time of its discovery by Behring. We discussed "aseptic" surgery. He

was not very happy over the recent changes introduced chiefly by one of his great admirers, von Bergmann. He regretted the abandonment of the simplicity of his own methods. He thought the surgeon would now have to depend on too many assistants. Responsibility would be divided throughout a long chain of assistants, nurses, and orderlies, and at any moment a link might break. He thought that the simply sterile dressing, that is, one containing no antiseptic, a mistake. He foresaw the enormous expense entailed in the newer ideas of hospital construction and equipment. He knew from experience that his simpler methods gave as good results in the dingy wards of an old hospital or in a workman's cottage.

I told him of Hoernlé's favourite idea that he should write a book telling of the beginnings of his antiseptic work, a history, as Hoernlé put it "of the mental genesis" of antiseptic surgery. Hoernlé, (the late Canon Hoernlé of Leith), one of my fellow students, had, as a medical missionary for several years in Persia, introduced Lister's methods into that country. At this suggestion Lister smiled and seemed pleased, but said he did not feel equal now to very much work. He said, "I would like to say with the Apostle, 'I desire to depart', and I feel this deeply when I think of my dear wife." Then, after a pause, "but we are not to choose these things." He told me he had lately been reading the life of Dean Stanley, and enjoyed it very much. He also knew Stanley's life of Arnold. He was much interested in Stanley. He looked at me with a smile and something of the old twinkle in his eye and said, "Stanley did not marry until he was forty-eight." From discussing Stanley we got talking about some phases of religious belief and of that philosophy which holds that in the light of modern science all the old faiths in the "Resurrection of the body" and the "Life Everlasting" were untenable. Not so for Lister. He confessed that, for him, if this were the truth there would be no more pleasure or satisfaction in his work. In speaking of men whose lives were exemplars of the Christian virtues but whose intellectual convictions denied the Christian revelation, he said, "These men are better than their creed," and, mentioning one distinguished leader of thought, generally, although I think unjustly, regarded as an "adversary of the Faith" he said, "this man could never have been what he is were it not for Christianity."

Lister owed much to his parents and their careful training. As one looks at the portrait of his father, one seems to see in the lines of the face and the firm-set lips, the tireless tenacity of purpose inherited by the son. And in the mother's face one sees gentleness, patience, and sympathy, not unmixed with firmness. I think it is likely that Lister inherited his musical voice and his appreciation of literature from his mother who in her youth had been noted for her exceptional ability as a reader. From both parents he inherited a calm earnestness of purpose, and he followed their advice to "cherish a pious and cheerful

spirit." Gentle, modest, patient, hopeful, brave, undismayed by failure and unspoiled by success he persevered calmly for years in his long battle with "custom, prejudice, disease."

As a man thinketh in his heart so is he. Thoughts are actions. The mind is the man. I cannot give a better picture of Lister than by quoting his own words. Godlee quotes a letter written to his sister in his early Edinburgh days, telling of his solicitude in regard to his first operations, as assistant surgeon. "Just before the operation began, I recollected that there was only one Spectator whom it was important to consider. One present alike in the operating theatre and in the private room, and this consideration gave me increased firmness. I trust I may be enabled in the treatment of patients always to act with a single eye to their good and therefore to the glory of our Heavenly Father. If a man is able to act in this spirit, and is favoured to feel something of the sustaining love of God in his work, truly the practice of surgery is a glorious occupation."

Writing to me, in 1893, after his great bereavement, he says, "Though I know the time is not far distant when all my surgical activity must come to an end, yet I still feel solace in the old noble work which you and I have loved both for its own sake and because we believe it to be in the service of our common Master."

In June, 1895, he wrote, "When your letter arrived I was prostrated by an acute attack of traumatic synovitis in the knee. It furnished a striking illustration of aseptic inflammation and aseptic fever, and kept me confined to my room for nearly three months..... I was at Lyme Regis at the time of my illness and had the kind ministrations of my brother and sister and nieces. This long absence from London naturally tended to make practice drop off very much; an arrangement which I think quite salutary, as I feel my active work as a surgeon very much a thing of the past. But I have the satisfaction of seeing ever increasing evidences of the deep and wide roots that the antiseptic principle has struck in the surgical world. I have also had an abundance of interesting objects to occupy me. We are doing much really good work at the British Institute of Preventive Medicine, and no one can say what lies before us in the way of important discovery." This Institute is now known as The Lister Institute of Preventive Medicine.

On New Year's Day, 1904, he wrote to me from Buxton. He told me of a sharp attack of rheumatism which had prevented his usual outdoor exercise and "produced a great effect on my mental capacity, making me incapable of any prolonged effort and greatly impairing my memory. But I have much to be thankful for. My faithful butler Jones sleeps in my bedroom and is most attentive. Miss Syme has been a most kind and loving companion."

In January, 1905, he wrote: "I think I may say that I have picked up somewhat in strength. But at my time of life, nearly seventy-eight years, recuperative power is naturally not very strong. I have thus a

stronger call than you to look beyond our present state of existence. Without the priceless boon of the Gospel we should have but slender grounds for hope for the future. But with "Life and immortality brought to light by that inestimable gift we may hope for something far better and higher than anything we have known here."

And a few months later, "Though you kindly tell me not to reply to your letter (a birthday greeting) I cannot but say, however briefly, that it was extremely welcome to me, and thank you for it. I am glad you had that pleasant meeting with our Toronto friends, Drs. Baldwin and Grasett. I should well like to be able to see them myself. Let me say that although I am very unworthy that such should be the case yet I rejoice if I have been at all helpful to you as regards matters of the highest moment."

It is noteworthy that both Lister and Pasteur, two of the greatest explorers of the mystery of life, could and did "without usurpation" as Sir Thomas Browne puts it, "assume the honourable stile of a Christian." They both had the child-heart. That "inner light" which illumined the mind and soul of the happy-hearted, thoughtful, busy little boy, which showed him at the beginning of his career, as he said in a letter to his father, that his success depended on his own efforts "under the blessing, if I may humbly say so, of Almighty God in Christ Jesus," this light was an ever-burning lamp in his soul. No one could be much in contact with Lister and not feel that he was in touch with other powers and another world than this. In one of his early pathological studies involving a consideration of the properties of living tissues he says, "here then it appears to me we have a sure though imperfect glimpse of the operation of mysterious but potent forces, peculiar to the tissues of living beings.....forces which I suspect will never be fully comprehended by man in the present state of his existence, and the study of which should always be approached with humility and reverence." And Pasteur with his intellectual humility, "bowed before a Power greater than human power." We are told that he "soared without an effort into the domain of spiritual things. Absolute faith in God and Eternity and a conviction that the power for good given to us in this world will be continued beyond it, were feelings which pervaded his whole life: the virtues of the Gospel had ever been present to him. Full of respect for the form of religion which had been that of his forefathers, he came to it simply and naturally for spiritual help in the last weeks of his life." Those who have read his biography cannot forget that last scene of all. To him was granted the prayer of the Roman poet, *Te teneam moriens deficiente manu*, as he lay, while one hand was clasped in one of Madame Pasteur, and the other held the sacred symbol of his faith.

Lister had been parted for nearly twenty years from the constant and loving companion of his youth and prime but he had absolute trust in reunion and the life to come. His concluding words in a letter which

is one of my chief treasures, the letter in which he wrote me an account of Lady Lister's death, were "May you and I so live during the rest of our time on earth that we may rejoin her." And in another letter he writes, "But it is indeed a grand thing to have hope in a future which will surpass in its capacities, its glories and its beauties all the good that we have ever known here. It often pleases me to think that however different we and our surroundings may be hereafter from what they are now, they will be cared for and provided by the same glorious Creator Whose works we contemplate in this life."

For us, who knew and loved him, who drew so much of the inspiration and ideals of our lives from him, there cannot be any of the sadness that echoes in the old pagan formula of farewell, *Ave frater atque vale.* Rather would we say, *Nunc vale, care magister et amice, atque in aeternum ave!*