An Address

ON

THE APPROACH TO SURGERY.

DELIVERED AT THE OPENING OF THE SESSION AT KING'S
COLLEGE HOSPITAL MEDICAL SCHOOL

BY

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THIS is Lister's year. One hundred years ago Lister was born. Fifty years ago this hospital had the courage to invite him to join its staff, and on the day of his inauguration Lister delivered this annual address at the opening of the winter session. At the centenary celebrations held in London in April and in Edinburgh in July much was said of Lister's work, of the revolution in surgery of which he was the sole and direct cause, and of the unequalled services to mankind which he was privileged to render. Yet there remains, I think, something more to say, and what occasion could be more fitting than this: what platform more appropriate?

The story has often been told, and there is no need to repeat it here, of the horrors and tortures of surgery before the middle of the last century. The craft of the older men was possibly in some respects superior to our own; in swiftness of movement especially they are said to have been almost incredibly expert. If only the cinema had then been able to record an amputation of the thigh performed by Liston, or an excision of the jaw by Ferguson, I think we should all be as much startled at their rapidity as horrified at the general uncleanness, at the demonstrable absence of any conception of the truths regarding infection upon which all operative methods to-day are founded. Little wonder is there that surgery was likened to butchery. Lord Thurlow, when the bill to indemnify the Surgeons Company, and to give it greater power over the profession, was under discussion said, "There's no more science in surgery than in butchery." To which Mr. Gunning answered, "Then, my lord, I heartily pray that your lordship may break your leg, and have only a butcher to set it." This was the same John Gunning who is said to have given that flat contradiction to John Hunter which acted like a sentence of death. Lister himself speaks of "the bloody and butcherly department of our art."

Surgery is in these days both Science and Art. As Science it accomplishes the purposes for which every science exists: to acquire direct knowledge, to accumulate facts, from a multitude of individual examples to raise a broad truth, to weave generalizations, in its highest accomplishment to link cause and effect. We bring to our aid inductive and deductive logic, recalling with pride that both these weapons of the intellect were first brought into use and established by members of our own profession. For as Hippocrates was parent of the inductive, so was Galen of the deductive method. As Science surgery has not only separate existence, but in its wider sense it is related to, and dependent upon, many other sciences: upon biology, chemistry, physics, physiology, and the like. Discoveries in these sciences not seldom react upon surgery, whose progress has in the past often taken impulse from them; whose progress cannot now continue without them. But surgery is not only, as many suppose, an applied science. If we could conceive it bereft of the aid of all other sciences, surgery would still remain a science of exact observation, of inductive reasoning, of pursuit and discovery of broad truths—a method of seeking the causes no less than the remedies of many of the diseases which afflict mankind.

As Art surgery is incomparable in the beauty of its medium, in the supreme mastery required for its perfect accomplishment, and in the issues of life, suffering, and death which it so powerfully controls.

The methods by which surgery, both as Science and Art, could be created, directed, and expanded were fashioned in early days by Hippocrates and Galen, but for more than a thousand years they were discarded. The works of the great masters were erected in the intellectual market-

places of the world as idols which all men must worship, or pay the price even with their lives. It is lamentable to realize that infinite harm may in the end be wrought by great teachers when their disciples slavishly imitate and perpetuate not the methods by which they won knowledge but their so fallible doctrines.

Men have not been reluctant to pay tribute to Lister for his incomparable services to the world, through the discovery of the principles underlying the modern practice of surgery, but they have been slow to realize that the eternal truths which he expounded are no less applicable in the domain of medicine. Infection plays a part also in the causation of those diseases which remain the province of the physician. First to discover and to propound this truth was William Hunter, who, in studying pernicious anaemia in the year 1900, became convinced of its dependence upon oral infection. The connexion between these two conditions—between probable cause and tardy effect—seemed so slender, so incredible, that many workers did not even pay the tribute of inquiry. In medicine a new idea rarely obtains a friendly greeting at the moment of birth. We do well to be sceptical, to demand proof upon proof, and to seek evidence in our own experience before accepting a new doctrine. But when scepticism leans to hostility and is nurtured in derision we become worthy of blame. Quick to accuse Lister's contemporaries for their disdain and incredulity of our great master, we in our day are not free from numbing and sterile apathy. Since the year 1900 Hunter has fought with belated success for the recognition of focal sepsis as a cause of far distant and seemingly disconnected disease. To read his several papers to-day is to be convinced not only of the accuracy but of the far-sighted vision of his teaching. "A voice crying in the wilderness," and, like that other, we now realize that his, too, was teaching a true gospel.

It is not yet realized, I think, that Lister's work has not only revolutionized the scope and practice of surgery, and revealed the clue to the so-long-hidden mysteries of many systemic diseases, but that it has also given to the surgeon and to the laboratory worker the strong instrument of research.

So rapid has been the advance of surgery, so exacting the demand made upon those who practise it to train themselves in the manipulative skill necessary for the performance of newly conceived and newly designed operations, that in recent years few surgeons have found it possible to give adequate time to laboratory research. Surgeons have been regarded, and have certainly too narrowly regarded themselves, as mere executants. They are in truth experimental biologists; and in the last two generations have carried out valuable researches into the etiology, clinical manifestations, and therapy of disease. Their observations of the structural changes which in the human body cause the symptoms they sought to relieve have brought about a complete revision of our knowledge of visceral disease. Their work has been research in its highest form: it has been carried out upon the bodies of men; it has afforded eagerly taken opportunities for observing a host of new facts; it has exercised the faculties of induction and deduction; it has often linked unsuspected causes with remote effects. This it has done, mindful all the while of the purpose for which it exists—alleviation of suffering or rescue of threatened life.

The story of the conquests of surgery to-day would be received with incredulity by Lister himself. It is not known that the master ever performed an abdominal operation; yet he it was who made all our triumphs possible. Before Lister's day the opportunities for investigating the processes of diseases in the patient's lifetime hardly existed, and the dangers of even the slightest experiment upon animals were so formidable as to be almost prohibitive.

Research in the science of medicine, it is clear, is of two kinds—direct and analogical. Direct research is carried out by the surgeon as he conducts an operation. Analogical research is conducted upon animals or in the laboratory, and its chief purpose is to test, to illustrate, to interpret, to explain, or to expand the lessons learnt by direct research, or to explore the paths suggested by it. The difference between direct and analogical research in surgery is the counterpart of the difference which existed in Galen's day

between direct and analogical research in anatomy. Much of Galen's work is based upon observation of the structure of animals; by analogy this knowledge was applied to man. Are not the physiologists to-day perpetrating the very same error as our great forerunner? Are they not neglecting opportunities for direct research and too implicitly trusting to analogical research? Anatomy as a science applied to man was firmly established by Vesalius. Do we need in physiology to-day a Vesalius to lead us to the true faith? Why, when investigations into the normal processes of physiological activity or into aberrations from the normal can be conducted upon human beings, are so many opportunities neglected? Why are animals selected for the demonstration of certain physiological truths, and why are physiologists content merely to expound truths obtained by observation and experiment, when a visit to the wards would enable the teacher to imprint in indelible characters upon the minds of his pupils these same truths demonstrated upon the human body? Why are so many anatomists content to teach only on the dead body?

Lister made analogical research safer than ever before, but he was the one and only creator of direct research. His labours freed experiments upon animals from all the risks attaching to infection, and thereby powerfully increased the opportunities of the biologists. The new weapon of direct research upon man during remedial operations or after grave injuries was forged by him alone.

The simplicity of analogical research is of immense advantage. It demands ingenuity in devising and high technical skill in executing experiments, and intellectual honesty in observing and recording results. But the whole analysis of the experiment is objective. A plain answer is given to a plain question; and interpretation should offer few difficulties to the trained mind. In direct research, observations and their interpretation present perplexities which appear to be almost beyond the reach of analysis, for subjective sensation and complex emotional states are so apt to confuse the issue. Man, being a far more sensitive creature bountifully endowed with the gifts of expression, can tell us more of himself, of his discomforts, pains, and other manifold clinical occurrences, than any animal submitted to experiment. And elucidation, not only of facts directly observed, but of sensations of all kinds, their chances and changes, as experienced by the patient, is a matter requiring great industry, the skill of an expert cross-examiner, and a high degree of intellectual integrity free from all prejudice to appraise all matters with accuracy. He who is to carry out direct research should therefore first be trained in analogical methods.

For research into the conditions and causes of disease in man both methods of intellectual approach must be traversed. We need direct research to give us our first facts, to set the problem; through analogical research we seek the solution of our difficulties, an annotation upon our disclosures, and an analysis of individual factors in a complex problem wherein many are involved.

As an example we may take the subject of gastric and duodenal ulcer. Its submission to direct research has changed the whole front of our knowledge of this disease. Duodenal ulcer, indeed, except as a pathological rarity, did not exist for the clinician until the surgeon revealed it. He created its clinical existence, differentiating it from those other diseases which so closely mimic it; he has devised the methods of its surgical treatment when it has proved recalcitrant. He has not only brought duodenal ulcer into the open, he has shown its frequency as compared with gastric ulcer; he has discovered something of its most impressive antecedents; he has studied conditions which coincide with, and perhaps contribute to it. Of the morbid anatomy of gastric ulcer we had learnt a great deal from Matthew Baillie, Cruveilhier, Brinton, and others, but its clinical recognition was fraught with grave inaccuracy. Even to-day the diagnosis of "gastric ulcer" made upon clinical evidence alone is perhaps more often wrong than right. But clinical inaccuracy and bewilderment are at last yielding to patient research by the surgeon, ably supported by the radiologist. We are substituting truth for make-believe, gradually clearing away the multitudinous errors which have so long encumbered this subject. We seek to walk by sight, not by faith alone.

In surgery the hand of the beginner is heavy. In our earliest experience of gastric operations we found not infrequently that where a confident diagnosis of "gastric ulcer" or "duodenal ulcer" had been made, based upon the clinical knowledge of the times, the stomach and the duodenum showed no slightest lesion. A few little tags between the transverse meso-colon and the stomach were held to confirm the diagnosis; or a blanched area on the anterior wall of the duodenum was regarded as the scar of a superficial ulcer. Gastro-enterostomy, so marvellously successful in case of obstruction at the pylorus, was then performed: for at that time the short-circuiting operation was credited with almost magical therapeutic power. When the after-history of such patients was traced the results were always indifferent or bad, sometimes lamentable. It was not long before I was driven to enunciate the doctrine that a chronic ulcer in need of surgical treatment only existed when it was "visible, palpable, demonstrable," and that surgical treatment should be adopted only when the presence of the ulcer was thus indubitable. I regret to find that in all countries there are still surgeons whose practice does not endorse this teaching.

When in my own work the "ulcer" so confidently diagnosed did not display itself, wider search was made as soon as this became safe, other abdominal organs being in turn scrutinized. The results of this extended inquiry were most interesting. We sometimes discovered a gall bladder full of stones, an appendix showing advanced disease, a group of tuberculous mesenteric glands, or, again, a patch of tuberculous ulceration in the intestine, large or small. Sometimes it was an enlarged spleen of splenic anaemia, and, in rarest instances, a malignant growth of jejunum or colon. And so by degrees we were brought to realize the inaccuracy of many clinical descriptions of intra-abdominal disorders, and of the estimates of their relative frequency. We learnt that many diseases betrayed themselves by symptoms confidently ascribed to defects in organs other than that attacked.

For the vague, loose, inaccurate account of symptoms something approaching precision could now be substituted, to the great advance of our clinical knowledge. This extended research was soon made as a matter of routine, and, to our surprise, isolated disease within the abdomen was found to be far less frequent than we had supposed. A patient suffering from a duodenal or a gastric ulcer, or harbouring gall stones, was discovered to have a diseased appendix. And it soon became evident that this association must not be regarded as accidental—that, indeed, the infection of the appendix was certainly the precursor and very probably the cause of pathological conditions present elsewhere. We now regard all ulcers and all gall stones, except the solitary cholesterol stone, as consequences of infection conveyed from a distance. William Hunter's thesis—his application of Lister's teaching to general medicine—was true here also. For it was rare to find any patient suffering from gastric or duodenal lesions in whom a focus of infection was not present, and the evidence is now, I think, incontrovertible that it is from such centres of infection that organisms are carried to far distant parts, there to induce a gross organic lesion, whose connexion with its cause seems remote and improbable, and whose symptoms completely overshadow those of the original infection if, indeed, these latter have ever been present.

If, now, this subject is submitted to experimental analogical study we find, at first, that there is an insuperable difficulty in causing conditions identical with those observed in man. The chronic gastric or duodenal ulcers with their seasonal variations in activity—periods of remission alternating with periods of liveliness, times of healing with times of destruction—do not occur, and have not yet been artificially produced, in any animal. But the cultivation of organisms from ulcers removed by operation has had interesting results. Rosenow's work upon the elective localization of microbes indicates that certain organs provide a more suitable culture medium than others, that there is affinity between soil and seed. He and his pupils Nickel and Hufford have shown that there is a green-producing streptococcus which, cultivated from specimens of gastric or duodenal ulcers removed by operation,

has an affinity for the stomach and the duodenum. After inoculation it causes haemorrhage and ulceration in different species of animals. These analogical researches suggest that, though other factors doubtless are at work in addition to infection in leading to the development of an ulcer, they appear to be powerless to develop the chronic form of ulcer of the stomach or duodenum unless infection is added to them or precedes them.

Experiment and observation were never more happily united than in Lister's work. The discovery by Pasteur of the fact that fermentation was due to living micro-organisms was illustrated by Lister in a variety of experiments. The method of controlling or preventing the activity of microbes within the area of operation and within wounds was studied upon man—was, in fact, a piece of direct research. One germicide or one mode of dressing after another was tested and for a time adopted, only to be finally discarded or retained as clinical experience seemed to decide its value. For Lister realized that it is not merely killing of microbes which is to be desired; the problem is to render them inert within a wound without injury to the sensitive tissues of the body, whose helpful activities might be lessened or destroyed by the corrosive action of a germicide. A host of observers have laboured earnestly to discover new antiseptics, bactericidal power in contact with germs in a test-tube being regarded as the index or the proof of their clinical value. We know only too well how illusory are such beliefs. For the death-dealing power of a chemical agent *in vitro* is no measure of its full value in clinical work. Wound secretions add a new factor to the problem. Indeed, I have little doubt that, as far as wound applications are concerned, the value of an antiseptic is not to be gauged by its bactericidal but rather by its antitryptic power. We do not so much seek to kill germs within a wound as to encourage the wound in its process of resistance to their attacks—to exalt the natural bactericidal power of wound discharges. This is perhaps not the best, but at the moment it is the most apposite, of the illustrations which might be given to show the mutual interdependence of clinical and laboratory work, of direct and analogical research. To the clinician this needs no demonstration, but I fear the laboratory worker is in danger of becoming a little too eager to exert dominion in territory which his skill has not yet conquered. Lister's work is now being enlarged and perhaps completed by Almroth Wright, who by his study of immunity has made it clear that, whereas Lister sought only to diminish or to destroy bactericidal attack, success may also be found in our increased defence against microbial invasion.

The changes that have taken place in surgery, the great increase in the number, intricacy, and scope of operations, have made it far more necessary than ever before that the surgeon should be a skilled craftsman. To practise the craft with something near perfection a man must surrender his whole life. To attain a certain facility in operative work is not difficult: to imitate the master's methods and to follow the movements of his skilled hands is within the easy competence of many. Man, Aristotle tells us, is the most imitative creature in the world, and learns at first by imitation. It is natural for us all to delight in works of imitation, but in imitation there lies a great danger. Many of the operations in surgery have now become so standardized, so perfected and simplified by a multitude of workers, that they can be imitated by others with a degree of success which, though falling short of the best, is yet, by comparison with the results of a generation ago, worthy of high praise. This has unhappily led to the too frequent performance of operations, and to their performance by those whose judgement has not kept pace with their technical accomplishments. Perhaps the most abused operation in surgery is gastro-enterostomy. A distinguished Continental surgeon has fathered a paper by one of his pupils on "gastro-enterostomy a disease." The anastomosis is in all truth a disease when performed in the absence of a sufficient cause or in an inartistic and vicious manner. That it is frequently performed when not needed—that it is performed by the clumsy imitator, is certain. Many of us have had the bitter duty of undoing such anastomoses or of resecting the ulcer which has developed in consequence of them. The physician who sees

such cases condemns the operation: in that, surely, he is wrong; his strictures and ours should fall not upon the operation but upon the operator. I conceive that a duty rests upon the physician greater than he realizes. When a physician for whose talents and devotion I have great respect expressed his regret that he could not agree with my advocacy of surgical treatment for chronic incoercible duodenal ulcer because the mortality of the operations practised upon his cases was over 10 per cent., I was constrained to say that, were the mortality in my own hands so high, I should abandon surgery. The duty rests upon the physician, if he advises operation, to point out that the mortality of operative work varies with the operator; that though in general terms there is an average mortality for every operation, in cases of difficulty or danger, where the fine issues between medicine and surgery must first be decided, and much depends upon experience, the choice of a competent and practised operator is necessary. Many of us, I suspect, are at times placed in very difficult positions. A patient is sent for our opinion as to whether an operation shall be performed for a certain condition, and the medical man or the patient himself tells us that in the event of an operation Mr. Blank will perform it. We may agree with the diagnosis, we may agree that an operation is certainly necessary, and we may know that the suggested operator is by no means a wise choice. If it is true that all patients cannot have the best, all ought at least to have the best possible.

There is no doubt that a change in the training of the surgeon is imminent, and is certainly overdue. What should be the approach to surgery? It has long been the custom for those waiting to obtain a post on the surgical staff of a hospital to spend months or years in teaching anatomy. And what anatomy have they been compelled to teach? "Descriptive anatomy," the bare record of the physical characters of the various structures of the human body. Students, in accord with modern custom, must be taught the origin and insertion of muscles; the origin, course, branches; and destiny of nerves; the source, divisions, and direction of vessels and the like—a dull catalogue of dead things. For descriptive anatomy has in all countries of the world for a century been divorced from functional anatomy. Sir Arthur Keith has told the story of this lamentable severance. The early English anatomists, from William Harvey onwards, were not content merely to say in words what any man could see with his own eyes. They were deeply concerned not only with the appearance of parts, but with the meaning attached to structure. They desired to know not only how organs of the body were constituted, but why they were so made. Their interest was engaged by the function no less than by form. John Hunter was intensely occupied with dissection; hardly a day passed without his spending many hours in studying the anatomy of parts in man, and in any animals whose bodies he could beg, borrow, or steal. But he sought to know not merely what and where the various structures were, but even more the function they fulfilled. For him, as Keith says, "it was not enough to recall that the wall of the aorta was twice as thick as that of the pulmonary artery, or that the walls of some veins were thick, and of others thin; he immediately set to work to find out the significance of these facts; he appealed to comparative anatomy, to embryology, to pathology, and experiment for an explanation." In February next we celebrate the 200th anniversary of John Hunter's birth, and we hope then to display Hunter's own handiwork in such manner as to show the variety of his intellectual appetite and his unsurpassed skill in dissection. But dissection was always a search for the reasons of the actions of parts, not merely for their structure.

How, then, did anatomy go astray? Keith rightly traces the catastrophe to the influence of France and to the delightful gifts of our Gallic colleagues for systematic and logical thought with orderly and luciferous expression. It seems that the determining influence was that of Winslow (1669-1760), professor of anatomy in Paris. His teaching, accounted the best in Europe, was eloquent, formal, precise. "Whilst merely conveying to his hearers or readers what they might see with their own eyes at a glance, he left them with the pleasant impression that they were drinking

at the very fountain-head of pure knowledge." He purposely abstained from attempting to explain the meanings of the structures he described, and in doing so impoverished the study of anatomy. The standard set by him was universally followed, and was to find its highest expression in one of his successors—Bichat (1771-1802). At the time when I became a student, forty-four years ago to-day, we were taught anatomy as we should be taught the plan of a city, learning the names of houses, of main streets, of their branches and turnings; by whatever gate we entered we thus learned to find our way about. But to the people who lived in the city, their industries, their way of life, the part they filled in the community, we were hardly expected to give a thought. For all we knew the city might be dead.

It is true that the surgeon must know the formal anatomy of the human body—no very difficult attainment, though he will sometimes find that he still must make his own fresh investigations. When, for example, certain problems presented themselves in connexion with the operative treatment of gall-bladder disease, my colleague Mr. Flint, at my suggestion, examined in the *post-mortem* room 200 bodies, and was able to teach us new truths relating to the vascular supply of the gall bladder and the anomalies of the ducts of the liver. But to be constrained by custom to teach successive generations of students the details of descriptive human anatomy, to be compelled day after day, year after year, to restrict one's teaching to the elementary parts of a finite subject, human anatomy, is insidiously to develop an intellectual complacency, a feeling that one is master of one's subject. Nothing so easily destroys a man's capacity for thought and his delight in indulging it (it is, alas! sometimes a torture) as the restriction of his mental efforts to a limited part of a subject now hardly capable of extension. It is difficult to imagine any training less fitted in these times for the young surgeon. Anatomy as an approach to surgery cannot long continue to be the descriptive anatomy of recent years, a sterile derivative of true anatomy which embraces a study of functional activities and purposes. We must return to the anatomy of the English school, the science founded by Harvey and pursued by Hunter, Charles Bell, and Lister; the science which searched in the Aristotelian phrase for "final causes," and which tried to answer the question "To what end?" In my days I did my best to escape from the insipid routine teaching of anatomy by devoting a part of almost every day to original work in the *post-mortem* room and in the dissecting-room, and upon foetuses which I besought my friends in general practice to send me. I worked upon the subject of internal hernia, and upon the rarer forms of external hernia. And I was saved from the cramping influences of the dissecting-room by the surprising desire of many medical men to surrender their patients to my immature skill at a time when abdominal surgery, having survived the dangerous pioneer period through which it had just been steered by Spencer Wells, Lawson Tait, and Mayo Robson, was at length becoming so safe that many diseases hitherto beyond the reach of the surgeon were now being successfully attacked.

But all my life I have wished that my training had been different. Were my days to come again I should, after leaving examinations behind, spend the time necessary to make an adequate knowledge of human anatomy my permanent possession, and should then escape to experimental research and, in a community of like-minded people, endeavour to train myself for the high destiny of a surgeon, the one man who may engage in direct research. My time would be spent in the laboratory, where a youth of plastic mind may learn the methods of approach to new problems or to new extensions of old problems; where old knowledge is merely an impulse to the search for new; where intellectual dissatisfaction is victor over narrow complacencies; where the religion of research inspires him and equips him for his work in days to come. If surgery is to be something more than a wonderful craft, if it is to be the instrument of research which I believe it to have been, and to be destined to be in the future, those who practise it must have their minds shaped and strengthened by conflict with unsettled problems, not cramped and sterilized by mono-

tonous exercise within a narrow province of static knowledge. Their minds must be trained in the laboratory, in analogical research, so that they may be more effectively exercised both in the operation theatre and in the wards upon direct research; not, I need hardly say, to neglect of the dissecting-room, but to its relegation to a subordinate position. The comradeship of laboratory workers and clinicians should be intimate and unbroken. The scientist at work in the laboratory can never reap the full reward of his lonely researches without close and loyal collaboration with the clinician. Nor can those who serve the same cause in a different atmosphere give to their patients the best aid of medicine and surgery without the help of the scientist. The training of the surgeon must not only allow, it must urge, his mind to stray beyond the hard boundaries of old knowledge, over the edge of firm beliefs, into wide territories as yet unexplored and even undivined. In this way only is there escape from the danger which besets the surgeon in the future, the peril of a facile automatism. In this way may the physiologist be brought back from his vagrancies and encouraged to realize that his science best fulfils its destiny when it is applied to the understanding of the functions, normal and aberrant, of the organs of man. It is a delight to me to see that a few of the younger surgeons in this country are taking the path which I should follow if I were on the threshold of a surgical career.

Lister was thrice, four times, happy in growing up under the sway of men steeped in the old ideals of anatomy. The intellectual influences of his life came from Sharpey and from Wharton Jones—dirty, despised, yet passionate in his zeal for the discovery of truth by way of observation upon living structures. Like their teacher, Alexander Monro (*secundus*), these men never wearied in the search for reasons. They were not content with mere knowledge of the construction of parts, but in that knowledge sought the clue to the several actions of which those parts were capable. In Lister's early papers, "Observations on the contractile tissue of the iris"; "On the muscular tissue of the skin"; "An inquiry regarding the parts of the nervous system which regulate the contraction of the arteries"; "An inquiry into the functions of the visceral nerves," we see clearly that he was carrying on the high tradition in which he was trained. I have not gained the impression that Lister was a man of really exceptional intellectual gifts. Rather was he a man of great intelligence trained in the very manner which helped his mind to work to highest advantage in his special calling. Advances in medicine and surgery are made by men who to the faculty of observation add the power of conceiving and carrying out experiments, not in the laboratory only, but also in the operation theatre and in the wards. For disease and accident alike may be regarded as beginning experiments for us; and it is for us to add factors of our own devising, to exert influences designed to check or to change the course of events, and, in so doing, to judge both causes and effects and the range of our power over both.

No training of the surgeon can be too arduous, no discipline too stern; and none of us may measure our devotion to our cause. For us an operation is an incident in the day's work, but for our patients it may be, and no doubt it often is, the sternest and most dreaded of all trials, for the mysteries of life and death surround it, and it must be faced alone. Those who submit to operation are confronted, perhaps after long and weary days or months of suffering, with the gravest issues, and far more often than many of us suppose they pass into the valley of the shadow of death, and, in stark dismay, wonder with Beatrice in her aching solitude and panic what will come to pass

"If there should be
No God, no Heaven, no Earth in the void world
The wide, gray, lampless, deep, unpeopled world."

To give courage to those who need it, to restore desire for life to those who have abandoned it, with our skill to heal disease or check its course—this is our great privilege. Ours are not the mild concerns of ordinary life. We who, like the Happy Warrior, are "doomed to go in company with Pain and Fear and Bloodshed" have a higher mission than other men, and it is for us to see that we are not unworthy.