WHAT DID JOHN HUNTER DO FOR MEDICINE?

BEING THE CENTENARY LECTURE TO THE HUNTERIAN SOCIETY ON OCTOBER 8TH, 1919.*

BY

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WHEN we are asked what Harvey, Pasteur, Lister, Jenner, Charles Bell, Marshall Hall, or Robert Koch did for Medicine we can give a definite answer: each of them opened a gate which led into a new field of medical knowledge; each one of them is labelled and distinguished by his great discovery. But how are we to label the patron saint of this society—John Hunter? He died as the medical schools of London commenced their winter session, October 16th, 1793, aged 65, and during the 126 years which have elapsed since then his admirers and his critics have been discussing his claims to our Medical Valhalla, and the proper inscription to place over the chair which has there been assigned to him. "Whenever I have asked," wrote his contemporary and critic, Jesse Foot, "what advances your preceptor has made in surgery or in anatomical discoveries of any value, I have never found one of you capable of fixing and dwelling upon anything."¹

Let us look for a moment at the answers which Hunterian orators have given to Jesse Foot's question to see if we can find a concise definition of what Hunter did for medicine. We find him defined as "the High Chancellor of the art of healing" (Carlisle, 1820); "the greatest physiologist which the world has yet seen" (Norris, 1817); the "expositor of the nature of disease" (Abernethy, 1819); "among all surgeons of all times the most renowned" (Paget, 1877); in scientific zoology there is no one between Aristotle and John Hunter (J. Hutchinson, 1891); he "remodelled the fabric of knowledge" (Buckle, 1861); he showed how to get by strategy what was formerly obtained by force (Ed. Stanley, 1839); he established a well of biology (Gulliver, 1863); he rationalized pathology and surgery (Hodgson, 1855); "his writings are the greatest and most valuable repository of fact and thought in surgery" (Humphry, 1879); "I would not part with the least of his works for cartloads of scholastic erudition" (Lawrence, 1834); "as a man of natural genius he resembled Shakespeare more than any other man" (Stafford, 1851); he takes a place with "Harvey, Sydenham, Bacon, Locke, and Newton" (Lawrence, 1834); "Newton is the only comparison possible" as a man of science, but as a surgeon "he ranks below Wiseman, Pott, Sharpe, and Scarpa" (Brodie, 1837); Pott improved surgery; Hunter revolutionized it (Lawrence, 1834). These are great and glowing tributes to Hunter's genius, but not one of them gives a clear and concise answer to Jesse Foot's pertinent question: What definite contribution did John Hunter make to our power to heal the human body?

When we turn to the authoritative edition of his works—Palmer's edition published in 1837—we find the various editors almost in an apologetic mood as regards Hunter's claims to be a discoverer in their particular section of surgical or biological knowledge. Thomas Bell, F.R.S., Lecturer in Comparative Anatomy at Guy's Hospital, introduces Hunter's *Treatise on the Natural History and Diseases of the Human Teeth* with the remark that it is "the least felicitous effort of this extraordinary genius, and that of which the errors are most obvious and striking"; while Dr. George Babington, in his preface to Hunter's *Treatise on the Venereal Disease*, frankly states that "the reputation of John Hunter rests more on his other works than this." In the opinion of the late Sir Jonathan Hutchinson, who, like Dr. Babington, served as president of the Hunterian Society, Hunter's venereal work was behind the treatises of his own time. Even the *Treatise on the Blood, Inflammation and Gunshot Wounds*

was found by Palmer to require heavy annotation. The surgeons, we find, base Hunter's claims to fame on his discoveries in biology, but when we turn to the introduction which Sir Richard Owen wrote to Hunter's *Observations on Certain Parts of the Animal Economy* we find him, while giving Hunter credit for extraordinary powers of industry and penetration, claiming a place for him as a zoological discoverer on a few minor points in comparative anatomy and referring to his work on blood and inflammation as the just basis of his fame. Even regarding the great museum he built up there was at one time a difference of opinion. "Had I thought," wrote Sir Joseph Banks, President of the Royal Society and an intimate friend of Hunter, "my friend John Hunter's collection an object of importance to the general study of natural history, or indeed to any branch of science except that of medicine, I hope that two years would not have elapsed without my having taken an active part in recommending to the public the measure of purchasing it." Hunter's commentators and editors fail to give us the definition of which we are in search.

What, then, was John Hunter's great service to Medicine and Surgery? If I had to inscribe the tag attached to the coat of arms of the shade of John Hunter as it applied for entrance to the Valhalla of the great medical dead, I would write: "This is the man who discovered that every measure to further healing and to preserve health and life must be based on an accurate knowledge of the vital processes of living flesh." He was the first to realize that the surgeon, physician, zoologist, botanist, anthropologist, embryologist, palaeontologist, and psychologist, were empirics or quacks, every one of them, and would remain mere opportunists until they knew the conditions and laws under which vital actions were maintained and regulated. Hunter was the first to found the practice of the surgeon on the actions and reactions of living matter. He was a surgeon of a new kind—a "vitalistic" surgeon; it is a realization of that fact which gives us a sure clue to all he did and thought; to all he taught and wrote. He grasped as a fundamental fact that living matter was akin in all its forms; he found that the study of the hydra or "polypus" could throw a flood of light on the more complex manifestations of life in the human body. All living matter, he found, was endowed with the power of mending a breach in its substance and of throwing off disease. He had the audacity to believe that he could, by the application of special methods, wring the secrets of life from living bodies, and that by studying closely the manner in which Nature effected her cures in the human body, he could steal her secrets and apply her methods. From his arrival in London in September, 1748, until his death in October, 1793—forty-five years all told—he dogged the footsteps of Nature day after day, spying out her mysteries and gathering in his museum every specimen which threw light on the conditions and laws of growth and repair. It is when we compare what he did and what he thought with the deeds and thoughts of the medical men with whom he has been compared that we are forced to place Hunter in the same unique position in Medicine as that assigned to Shakespeare in Literature. The gates which Harvey, Pasteur, Lister, and Koch pushed open led to wide and important fields of new knowledge, but it was on the gate of life itself that Hunter brought his battery to bear.

There is no part of the human or animal body on which Hunter did not throw a new light, and of which he failed to give an improved interpretation; there is no page of his voluminous works that does not teem with facts which are of use for modern application; there is not one of his 10,000 specimens which, when seen with Hunter's eye, does not reveal one of Nature's many-sided operations. We can but cull a sample or two from his riches to illustrate the methods by which he made his discoveries, and the manner in which he sought to give surgeons a rational basis for their art. If Hunter were to return to life, nothing, I believe, would grieve him so much as the fact that tying the femoral artery where its coats are sound for the treatment of popliteal aneurysm is counted one of his major contributions to surgery. That operation was merely a side issue in a great chain of discoveries that revealed the nature of the vascular system. Hunter was the first to discover the mechanism of arteries. He demonstrated that they had an inherent and independent

* The Hunterian Society was founded by medical practitioners in the eastern part of the City of London, February 3rd, 1815, its first meeting being held in the London Orphan Asylum, St. Mary Axe, April 21st, 1819. Sir William Blizard, Surgeon to the London Hospital, was chosen as first President. He was one of Hunter's most distinguished disciples; it was he that proposed the name "Hunterian" for the society. It has been the custom, from the inception of the society, to elect the conservator of the museum of the Royal College of Surgeons as an honorary Fellow.

life and action; he showed that the muscular coats of the umbilical artery were still alive forty-eight hours after the cord had been separated from child and mother; he discovered that the elastic coat of arteries was the antagonist or opponent of the muscular coat, and that the outer fibrous coat was the safeguard of both from over-distension. He showed that the small arteries were the more muscular by studying the *post-mortem* changes in the uterus of the cow; he exposed the tibial artery of a dog, and showed that, when stimulated, its muscular coat could act as completely in regulating the flow of blood as a stopcock. He knew nothing of vasomotor nerves, but he was fully aware that the distribution of blood in the body was regulated by the muscular coats of the artery. He spoke of the living and sensitive principle of arteries. He exposed and cut the femoral artery of a living boar, and watched how its open and free proximal end became closed by a plug of blood clot. He exposed the carotid artery of a dog, and tried, unsuccessfully, to produce an aneurysm by weakening its outer coats.

He tied the femoral artery for popliteal aneurysm in his first case in December, 1785. In the summer of that year he had been studying the most remarkable manifestation of bone formation and bone necrosis to be seen in the whole realm of Nature—the growth and shedding of antlers in deer. Hunter has left us no exact record of these experiments; they were probably amongst the papers burned by Everard Home, but we can easily guess why he tied the carotid artery of the stag. He wished, no doubt, to see if he could thereby produce a necrosis of the antler. The velvet of the antlers became bloodless and cold; in a week's time they had again become warm. His attention was naturally switched from the problems of bone growth to that of collateral circulation. Had he known less of the nature of arteries than he did, had he looked upon them as the great Stephen Hales had done—as mere passive pipes of a hydraulic machine—he would probably have concluded, as most surgeons still do, that the pressure of the blood had forced the minute collateral channels open. He knew that the muscular coats were regulated by his mechanism of sympathy, for which Claude Bernard, sixty years later, substituted a vasomotor mechanism; he knew that when antlers commenced to grow there was a mechanism by which they could call upon the arteries of the neck, leading to a vascular enlargement and an increased supply of blood to the head. He saw that when the carotid arteries were tied the antlers and other parts cut off by ligature of the main artery could again call on their “sympathetic” mechanism and bring about a complete structural alteration in the collateral blood channels. It was an easy step from this observation to the realization that if the main artery of a limb were tied the parts beyond the site of the ligature would bring into play the mechanism which secured a blood supply for them. Hunter's ligature of the femoral artery for popliteal aneurysm was but a minor issue of a great discovery—namely, that Nature has provided every part of a living body with a mechanism which secures a sustenance when the main blood channel has been blocked. No doubt this vascular provision is part of the great vasomotor mechanism of the body, but so far as our knowledge of its exact nature is concerned, it stands to-day just where Hunter left it.

One familiar with Hunter's works and specimens could produce from them scores of discoveries of equal or even of greater importance than the one just cited. His aim was to give surgeons a basis of definite fact to guide them in the application of curative measures to the human body. When we inquire how it has come about that such a wealth of discovery has been neglected or overlooked we find that Hunter himself supplies us with the first reason. “I have used,” he said in his lectures, “the word *consciousness* because we have no language existing answerable to all my views of the animal economy, and to coin words would not answer the purpose, because then I must have a dictionary of my own. I have not a word for expressing the cause of those actions which take place in the body, as if it was conscious that such and such things are going to take place. There are actions in the body which come nearest to consciousness of the mind of anything that I can conceive, and therefore I make use of this word; but it is commonly applied by philosophers only to the mind.” The truth is that Hunter not only used *consciousness* in his own particular sense (with a meaning

which, in modern language, we may translate as *reflex* in many of his instances)—but he also wrested many other words from their original or recognized meanings and used them for the designation of phenomena which he was the first to observe and explain. There is a second reason for the general neglect of Hunter's writings. Since his time the terminology applied to the microscopic machinery which carries on the functions of the body in health and in disease has been completely altered. Hunter knew nothing of neurons, ions, cells, or reflexes; all to him were particles of living matter and sympathies. For him arteries were bone builders; the open mouths of lymphatics were bone modellers. But such conceptions did not hinder him from unravelling all the laws relating to the behaviour of living bone under all conditions of health and disease. The discovery of bone cells, instead of relegating Hunter's observations to mere history, won for them, or ought to have won for them, a more general recognition of their truth and importance. Leaving on one side Harvey's demonstration of the circulation of the blood, there has been no great truth so completely demonstrated by observation and experiment as Hunter's law relating to bone absorption and bone modelling. To account for all the phenomena of the remodelling processes seen in living bones he had to resort to his particular use of the word *consciousness*, and even at the present day we still await for someone to coin a word which will express the sensitive manner in which bone cells react to the functional forces and stresses which are brought to bear on them in the daily routine of life. It is not only that Hunter has his own technical terms and that a new microscopic machinery has replaced the one employed by him, which has reduced the number of Hunter's students to a mere handful; his neglect is also owing to two further circumstances. He has packed his observations so closely together in his printed page that their study needs the closest attention; and further, it is only on the rarest occasions that he condescends to show how his facts are to be brought to bear in practice.

There can be no greater mistake than to suppose that the discovery of micro-organisms, phagocytes, toxins and antitoxins, and all forms of serum-therapy, have placed Hunter's writings out of date. No discovery made in the present or in the future can do that. His “morbid poisons” become micro-organisms in our modern parlance; the manifestations to which he applied the term “sympathies” have to be translated as toxin-effects, or in some cases as hormone-effects. Whatever may be the underlying machinery, the phenomena he observed and described are the manifestations of living matter reacting to disease, and will be seen and recognized by medical men so long as life continues.

Perhaps his chief contribution to the art of healing was a full and clear recognition of the mechanism with which Nature has endowed living things to effect repair and to resist or overcome disease. He saw that the chief curative means in Nature's armamentarium was inflammation, and therefore to the manifold manifestation of that process he applied his sharpest powers of observation and discrimination. “Nature resorts to vascularity if she has work to do,” he said. He did not suppose that vascular changes constituted the essential phenomenon of inflammation; he conceived that a non-vascular tissue could show inflammatory reactions. His recognition of the nature of inflammation was based on the results of experiments carried out to reveal the true nature of vital processes. He was the first to perceive that the thermometer (the exact measurement of the heat production and heat regulation) was the most reliable instrument for the investigation of living processes. The crucial tests as to whether matter was living or not was the manner in which it reacted to cold and to putrefaction. He designed scores of experiments for testing the reaction of living matter to cold, and assured himself that life depended on a chemical “decomposition” and “combination,” which in modern language would be translated as “katabolic” and “anabolic” changes. If I had to design armorial bearings for Hunter, a thermometer—such as he got Ramsden to design for him—should be the most prominent figure on his escutcheon. It was the instrument by which he sought to prod the secrets of living matter. Nothing is more characteristic of Hunter than that while using the thermometer to measure the manifestations of life in beast and tree, he never sought to apply it to

estimate the degree of fever in his patients. He had a real aversion to the practical application of discovery. Twenty years after his death medical men began to use the thermometer for clinical purposes.

Some day I hope to deal with Hunter's unique position in the world of biologists and with the discoveries he made in anatomy, physiology, anthropology, botany, and geology. As a biological philosopher he is by far the greatest our country or any country has yet produced. His day is not yet come. In the meantime my chief object is to congratulate this Society on its fortunate title and to try to tempt young men who have to bear the burden of medical progress in the future to look into the riches which Hunter has bequeathed to posterity.

REFERENCE.

¹ *Dialogues between a Pupil of the late John Hunter and Jesse Foot.* London, 1795.

SURGICAL TRAINING:

REMINISCENCES AND SUGGESTIONS.*

BY

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REMINISCENCES.

THE man who first inspired me with enthusiasm for surgery was my grandfather, Thomas Stiles, who was born in the village of Pinchbeck in the Fens of Lincolnshire, in 1798—one year before Syme. He practised there for over fifty years, and died in his 97th year, seven years after I had taken my degree. I can claim, therefore, that from my close association with him, and the many conversations I had with him about his own life and his own teachers, I possess almost first-hand knowledge of surgery and general practice as it existed a century ago.

It was Sir Astley Cooper who inspired my grandfather with his enthusiasm for anatomy and surgery, just as it was Syme who inspired Lister. Cooper and Syme were alike in that they were the foremost surgeons of their generation. Both men were great teachers, and both had the priceless gift of inspiring their pupils with a love and enthusiasm for their work. Both were equally beloved and revered by their students.

It may at first appear to be a piece of presumption on my part to speak of a humble village surgeon in the same breath with such great men as Syme and the immortal Lister. My excuse, however, is twofold: first, that a century ago the means of transit were such that every country doctor who lived, as my grandfather did, miles from assistance, had to be his own surgeon; and, secondly—and this is just as true to-day—there are, and always have been, men doing general practice in the country who, owing to force of circumstances, have been unable to specialize. It is surely only natural that some of these men—and I personally know more than one—might have been—well, perhaps not exactly Listers, but at any rate ordinary professors of surgery had they had the same opportunities that I and some of my colleagues have had.

[Sir Harold Stiles then made a number of quotations from an autobiography written by his grandfather, illustrating the admiration felt for Cooper, and said that all who had studied the life of Lister knew that Syme had the same gift of inspiring his pupils. The operations Mr. Thomas Stiles recorded in his autobiography showed that he was no mean surgeon; in 1830 he successfully performed the operation of perineal lithotomy, and later entered notes of an operation of special interest:

Amputation of a very large malignant breast (Mrs. W.). Glands in the axilla also enlarged. Put a ligature around the base and removed them. Perfect recovery. Health good for nearly two years; then died of cancer in the pelvis.

Sir Harold Stiles compared this brief and matter-of-fact statement with a quotation from Sir Rickman Godlee's *Life of Lister*, giving an account of Lister's pioneer work on the operative treatment of carcinoma of the breast:

The first large radical operation planned on anatomical principles was that performed by Lister in 1867—twenty-one years later. This patient, a relation of his own, was found to have

such an extensive carcinoma that no surgeon would touch it, and she was thinking of handing herself over to a quack.

Though he must often have followed the policy of despair and left poor women thus affected to their fate, yet, when the question was thus forcibly brought home to him, Lister made up his mind that the employment of antiseptics would justify a bolder course. But, as the operation was a new and dangerous one, he could not possibly entrust it to another man, even if he could have found a surgeon willing to undertake it. He had accordingly the double anxiety of performing it for the first time on a member of his own family. After it was over he wrote: "The disease is, I believe, all cleared out, the armpit as well as the breast. I explored the former in my proposed manner and found the proceeding very satisfactory, involving but slight additional wound of the skin, and yet affording free access to the region."

Turning then to his own career, Sir Harold Stiles said that under the inspiration of his father, Dr. Henry Stiles, he determined to be a surgeon, and when he went up to Edinburgh in May, 1879, he had gained an elementary knowledge of anatomy by the study of osteology and dissection of the fetus. He then proceeded to enlarge on the importance of a knowledge of anatomy to a surgeon.]

In those days (he continued) we spent three years at anatomy, and during that time I almost dissected the whole body twice. I am afraid my distinguished colleague, the Professor of Physiology, would say I spent far too much time over anatomy. I venture, however, to differ from him. Professor Schafer's contention is that physiology is the pivotal science around which all the medical sciences are centred, and that it furnishes a basis on which the whole of medicine and surgery is founded. While I do not wish in any way to belittle the fundamental importance of physiology, I maintain that anatomy is, and always must be, the most basic of all the medical sciences. Professor Schafer goes so far as to say that "most of the time which the student gives to dissection is—to make no bones about it—wasted." Personally, I hope that the "flat of the General Medical Council which prescribes that every student shall dissect the whole of the body in the course of his anatomical training" will be adhered to. Despite my devotion to anatomy, I am convinced that I did not spend one day too much in its practical study. I quite agree that physiology has now become an essential part of the training of the present-day surgeon, because surgery has now become as much a science as an art. For this reason I should welcome a class on surgical physiology run on parallel lines to the class on surgical anatomy.

With regard to the position of anatomy in the curriculum, it is evident that something will have to be done to keep this fundamental subject alive in the student's mind after he has passed his second professional examination. While this can be done to a certain extent by means of classes on applied anatomy, it is my opinion that the clinical teacher should take full advantage of his excellent opportunities for teaching anatomy on the living subject, both in the wards and in the operating theatre. With regard to surgical applied anatomy, I am convinced it should be taught in the anatomical department by a practising surgeon who has been a demonstrator of anatomy. If the class were made compulsory, as it certainly ought to be, and if the teachers of clinical surgery were careful to describe and review all their operations from the anatomical point of view, then I am at one with those of my colleagues who would do away with the present classes of operative surgery. A reform such as this would do much to keep up and augment the student's knowledge of practical anatomy; moreover, it would convert what many students regard as a dry, burdensome subject into one full of life and interest.

The extension of the medical curriculum to five years was a great advance in medical education, but the full benefits of the additional year will not be realized until further modifications in the methods and arrangement of teaching have been devised. Time does not allow me to pursue this matter in detail, but I will make brief reference to systematic lectures, which have justly brought fame and renown to this school. In former days, when textbooks were few and incomplete, these lectures necessarily occupied a large place in the time table; but now that textbooks have reached such a high standard of completeness and excellence I venture to think that some of the time expended on systematic lecturing could be usefully transferred to practical demonstrations in ward and laboratory. In the rearrangement of the curriculum I doubt the wisdom of the student commencing hospital

* An inaugural address on his appointment as Regius Professor.