

“John Hunter”  
The Founder of Pathological Anatomy  
and Experimental Surgery

by  
Junji MACHI

The 18th century has been called the century of systems in the history of medicine. In particular, in the history of pathology and surgery, the 18th century saw the development of modern pathology and experimental surgery. This development was often associated with the name of John Hunter.

The age of John Hunter was the late Baconian scientific age which was a forward step of humanism far removed from the dark ages of the 11th and 12th centuries. Beginning with Roger Bacon, Leonardo, Copernicus, Galileo, Vesalius, Harvey, et al., contributed their expanding knowledge to science. During this period, scientific inquiry grew, fear and superstition decreased and people thought more of overcoming the unknown and less of worshipping it. However, before science could make its contribution to Hunter's age, it had much to unlearn. It was necessary to cast off many of the trappings of the medieval world of thought.

John Hunter was born in Scotland in February 1728 and died in October 1793. He was one of the greatest men the English nation had ever produced. His areas of interest and studies included biology, entomology, anatomy, pathology, dentistry and surgery, among others. His anatomical museum, containing thousands of preparations, has formed the basis of the marvelous collection at the Royal College of Surgeons of London. He was the founder of pathological anatomy and raised English surgery from the position of a technical trade to its proper rank in medicine. Above all, he was important in the

history of medicine for his lifelong insistence on investigation and experimentation. He was declared to have been one of the greatest biologists, as well as surgeons of all time, and the greatest naturalist between Aristotle and Darwin.

John Hunter was the youngest son in a large family and was a spoiled and problem child. He was a poor student and was uninterested in his studies except for those having to do with natural history. Books had no attraction for John Hunter and, much to the distress of his family, he was slow in learning to read. He remained obstinately impenetrable to everything in the form of book learning. He would do nothing but what he liked; rambling amongst the woods, looking for bird's nests, comparing their eggs-number, size, marks and other peculiarities. He wanted to know all about the clouds and grasses and why the leaves color in autumn. He watched ants, bees, birds and worms, pestering people with questions about what nobody knew or cared anything about.

John was a slow starter. His early efforts included becoming a cabinet maker. It has been said that this craft and the required sensitivity of dexterity led him later to the highly successful surgical expertise. He showed great neatness of hands and quickness of perception in anything that interested him.

At the age of 20, John had failed to find a job and wrote to ask his brother, William, if he might join him in London. William Hunter, 10 years older than John, was successful in his career. He was more formally educated, well groomed and successfully accepted by British society. In 1746, he became Professor of Anatomy of the Society of Navy Surgeons and began giving private anatomic lessons for surgeons. William replied encouragingly to his younger brother and in 1748, John moved to London.

From 1748 to 1751, John spent most of his time hard at work in the Covent Garden Anatomy School run by William. The 18th Century dissecting room and the summer stench was a most unhealthy place to work in. However, John got used to performing dissection immediately and his brother quickly recognized his talents. In his youth, John Hunter had run wild but he finally acquired his first

solid achievement, a knowledge of anatomy which opened the door to a vast world of natural science. He succeeded so well in anatomy that William made him demonstrator in the School as early as 1750. After a while, with the cooperation of William and John, the Hunter School in Covent Garden became the most important center of anatomy in London. Students attended from far and wide.

Since the summer months were too unwholesome for work in the dissecting room, John Hunter spent them in clinical work at a hospital. His brother introduced John to William Cheselden who combined a gentleness in surgery, rare in those times, with great dexterity and who was then one of the best known surgeons in London. With Cheselden's assistance, John could work and study in a hospital during summer time. In July 1753, John Hunter was elected Master of Anatomy at Surgeons Hall. He was then 25 years of age; he had spent five winters in the Anatomy School and three summers studying clinical surgery in a hospital.

John's insatiable thirst for knowledge was, however, not satisfied with human anatomy and he began to study comparative anatomy also. He applied to the keeper of wild beasts for the bodies of dead animals, bought them from showmen - even purchasing sick animals in advance - and indeed procured any rare animal for dissection that came his way. Through the study of comparative anatomy, John learned a lot about the various organisms by which the functions of life were performed and he gleaned some knowledge of general principles.

In 1760, John Hunter joined the British Army as a surgeon and fought for King Frederick who was himself a great medical innovator. During his military service, John was given extensive opportunities of attending to gun-shot wounds and seeing the errors and defects in their treatment at that time. These experiences planted the seed for his later masterful treatment of gun-shot injuries. In addition, these were the means of drawing his attention to the subject of inflammation.

John Hunter was 35 when he returned to London to start again his studies and investigations. The dead body might well serve for

dissection and morphology, but function could be satisfactorily understood only by observation of the living. Therefore, in 1764, he bought two acres of land and built a cottage and soon purchased more land. The cottage quickly became menagerie (zoo), laboratory and museum. It began as a plain two-story square brick building, but as time went on, house and grounds were altered and adapted as occasion demanded in order to accommodate the vast collection of strange birds, beasts and fishes, not to mention plants, which John accumulated. The collection grew with the years and the strange family of beasts came and went - buffaloes, rams, sheep, a shawl goat, jackal, zebra, ostrich, leopards, snakes - but the list is endless.

This field laboratory, situated as it was on the outskirts of London, must have afforded great satisfaction to John Hunter. Gradually, it came to express something of his natural philosophy. Later, this led to the establishment of John Hunter's Museum in London, where it still exists. The individual parts of Hunter's collections illustrate his foresight. For after 100 years, his ideas became more and more relevant to the problems of contemporary science.

In 1767, Hunter was elected a Fellow of the Royal Society. That John should have received this honor so early was probably a recognition of his established reputation as an anatomist. At the end of the following year, he was appointed Surgeon to St. George's Hospital and shortly afterwards became a member of the Corporation of Surgeons.

John Hunter married Anne Home when he was 43 and she was 29. Anne and John endured a long engagement. One reason was that his surgical practice came slowly and times were hard. Another explanation was that he waited for years before marriage to treat himself after the disastrous self-inneculation with *Treponema pallidum* (as mentioned later). Anne Hunter had a cultivated mind and special gifts for poetry and music. She was a writer of no little accomplishment. She wrote lyrics as well as librettos, and also published two volumes of her writings. Four children were born to Anne and John during the first five years of their marriage. In a way, John's marriage to the almost level of royalty of Anne raised him to the

social status of his bothter, William.

It must have been a full and anxious life for Anne Hunter with children and a husband who always worked too hard and would not take care of himself. The management of the house must have called for all the patience Anne could muster. John invaded the rooms with his endless queer specimens and made the place a veritable natural history museum. Anne must have become inured to the sight of many strange beasts in the house. There were few holidays. In spite of the temperamental handicaps of a husband with genius and ill-health, the marriage was a happy one, and the credit is largely due to the patience and good temper of Anne. She survived John by 22 years and lived quietly. The gay heart and gallant spirit which Anne had given to John seemed to have remained resolute to the end.

Medical education in Hunter's day was a thing of shreds and patches. Students wandered about from one university to another in search of such teachings as they could come by - and it was generally anatomical. The time was not ripe for seeing proposals for medical education and so John Hunter set about the matter in his own forthright and individualistic manner. He started the series of his own private lectures by emphasizing his personal experiences and many new opinions. These lectures were to begin with the physiology of the animal economy, to pass on to pathology, to consider Nature's means of restoration and then to illustrate the principles of diseases which were the object of surgery. He also performed hospital teaching which was entirely different from that of the private lectureroom. The former was concerned with the practice of surgery rather than the principles - Hunter in his matter-of-fact mood.

He was naturally a diffident speaker and conscious of his own inability readily to communicate what he knew and thought, and unable to trust his memory. Sometimes the number of students in his lecture was small, but numbers were not everything and among those whom John Hunter taught and inspired were Abernethy, Carlisle, Cline, Astley Cooper, Home, Physick, Thompson, Jenner, Matthew Baillie and Thomas Young, who later became experts in their own

fields'anatomy, physiology, pathology, surgery and among other basic and practical medicine.

Happily, in Hunter's teaching, a close bond of enduring friendship began with Dr. Edward Jenner. Jenner threw himself with enthusiasm into Hunter's work on comparative anatomy and acquired Hunter's beautiful technique in preserving specimens. He spent two years as a member of Hunter's household and then returned to the life of a country doctor. Since then, an interchange of letters began which lasted until Hunter's death. Dr. Albert Einstein characterized the longing search of both Hunter and Jenner when he stated: "Do not stop to think about the reasons for what you are doing, about why you are questioning. Curiosity has its own reason for existence. Never lose a holy curiosity." On the other hand, Hunter's method was illustrated by his often-quoted reply to Jenner regarding Jenner's idea on vaccination: "Do not think, but try."

John Hunter's daily work has been described. He was generally to be found in his dissecting room before six in the morning and worked there until breakfast at nine. Then he saw patients at his house until twelve, after which he went out on his rounds. He dined at four, slept for an hour and then spent the evening working. At twelve, the family retired to bed, but Hunter continued his labors until one or two in the morning, or even later in winter. He went on year after year, bringing an original challenging mind to every problem which came his way. In order to allow time for research, he organized his day's work strictly, was punctual in fulfilling his appointments and was annoyed when others dislocated his time-table. Everything and everybody around him were pressed into service. Even his coachman was occasionally called upon to act as amanuensis. The pace became more furious as years sped on.

There were the numerous contributions by John Hunter to the field of medicine and other science. Along with William Hunter, John made important contributions to vascular surgery that have prevailed until today. He studied aneurysmal formation in terms of pathology and treatment which laid the foundation of many modern surgical concepts. He defined true and false aneurysms. By supposed experi-

mental study on the deer, John realized that collateral circulation would probably suffice if the vessel involved by aneurysm was ligated in its healthy part. By this means, amputation, if the aneurysm was in the femoral or popliteal arteries, for instances, could be avoided. A successful operation for popliteal aneurysm was developed by John Hunter.

One well-known animal study by Hunter and Jenner was the experiment on hedgehogs and cockoos. For many years Hunter was absorbed in the study of animal heat, especially during hibernation. His enthusiasm for hedgehogs was so insatiable that he finally constructed a thermometer with freezing-point marked on the stem and a movable scale and successfully achieved temperature-recording during hibernation.

Hunter's study on gastric temperature and peptic ulcer was perhaps rival in importance of any of his many significant contributions to surgery. His interest and curiosity concerning digestion in poikilotherms were famous and published in his "Philosophical Transactions" paper in 1774. Hunter suggested that cooling of the stomach might be used in arresting gastric digestion during massive gastric hemorrhage. Contemporarily, Drs. Otto and Wangensteen, as a result of the animal experiments done by John Hunter, devised a shaped tube for the esophagus and stomach and circulated iced water therein controlling bleeding esophageal varices.

"A Treatise of the Blood, Inflammation and Gun-Shot Wounds", one of Hunter's books, was gleaned from his military experiences. In this book, he wrote: "inflammation may arise from a vast variety of causes with which we are not acquainted. . . . inflammation is not only occasionally the cause of disease, but it is often a mode of cure." He realized that the natural tendency of all such inflammation was to heal, although infection as a cause of inflammation was not understood. To him, the process of healing during inflammation was a natural vital phenomenon. Inflammation, thus, became the first principle in surgery.

It was not surprising that in an age when phlebotomy was so commonly practiced he should speculate quite early on the cause of

coagulation of the blood. He investigated the process of coagulation in and out of the blood vessels using animals under various conditions and concluded that "the fluid state of blood is connected with the living vessels which are capable of keeping the blood in a fluid state and where there is a full power of life." From the blood experiments, he then turned to a consideration of a heart and blood vessels and performed many experiments as usual.

John Hunter spent a great deal of valuable time for the research on venereal diseases. His work on venereal diseases revealed the differentiation of the hard and soft chancre, but confused syphilis and gonorrhoea. In those days, it was quite difficult to establish the facts concerning venereal diseases without laboratory control and, particularly, where there were obvious reasons for concealment. After being frustrated by inconclusive evidence of clinical practice, he set to work upon a crucial experiment. In May 1767, he deliberately infected himself with venereal poison (*Treponema pallidum*) with a lancet, watched the early signs and symptoms and then delayed treatment month after month so that he might better study the effects of the disease. Eventually, after three years' close observation, he considered himself cured. As he told the story of his self-innoculation, there was no self-pity, no self-conceit, no expression of foolhardiness; it was just a plain unvarnished account, quietly recorded, of his search for the truth about a problem of infective disease which baffled him.

Much more could be written to apotheosize John Hunter. These include his extensive anatomical studies on the teeth with their diseases and treatment, his repair of ruptured tendons, his pioneering work on the use of cardiopulmonary resuscitation, his views on cancer, his demonstration and preparation of microscopic slides and his other contributions to a variety of fields in medicine in addition to the arts. Among his errors was his controversy with Spallanzani on the nature of digestion and his failure to distinguish between homografts and autografts.

John Hunter had no great literary gift. His was a world of deeds, not words. Perhaps, in his earlier day, he was self-conscious about his lack of education and did not find it easy to put pen to paper.



But as he grew older, writing became less of a labor. When he did put pen to paper, it was with the simple purpose of recording facts accurately. His language was terse, direct and without embellishments. The books which John Hunter published during his lifetime were four and were widely read by many scientists. These are "The Natural History of the Human Teeth" (1771); "On the Venereal Disease" (1786); "Observations on Certain Parts of the Animal Oeconomy" (1787); and "A Treatise of the Blood, Inflammation and Gun-shot Wounds" (1794, published posthumously by his brother-in-law, Everard Homes). His bibliography contained also a large number of articles of the greatest variety of subjects.

John Hunter, F.R.S., Surgeon-General to the Army and Inspector-General of Hospitals; Surgeon to St. George's Hospital; Surgeon-Extraordinary to the King; etc., died on October 16, 1793 - on the same day and, perhaps, hour that the unfortunate Marie Antoinette, Queen of France, was beheaded in Paris. The body was privately buried under St. Martin's Church. Thereafter, he was reinterred in Westminster Abbey in 1859. His death occurred in a dramatic manner at a board meeting in St. George's Hospital. Subjected to attacks of angina, John recognized that "my life is in the hands of any rascal who chooses to annoy and tease me." Opposition about the appointment of his successor at the Hospital roused his ire and might bring on a fatal attack. It is generally assumed that John Hunter died of angina but there were many other complications which were possibly syphilitic in origin. The postmortem on the body of John Hunter was performed in 1794. It revealed syphilitic aneurysm of the ascending aorta, probably syphilitic aortitis and severe coronary artery and generalized arteriosclerosis.

John Hunter successfully applied his passionate love for research to the many branches of experimental and surgical pathology. His methods of investigation were entirely his own and were characterized by simplicity of apparatus and delicacy of touch, while the breadth of his interests and his choice of subjects for research were almost bewildering. He pursued many novel lines of studies and his very lack of previous education prevented him from wasting time on

the many confused hypotheses of the day. He sought truth fearlessly and the research cost him his life. He taught it as he saw it, earnestly, simply and directly. In his age, many doctors still held the old theories of Hippocrates, Galen and Arabic medicine and it did not always occur to them to question these or to observe perfectly obvious things with their own eyes. Hunter was writing a new chapter which was a complete reversal of the old.

When one considers that John Hunter was a relatively poor lecturer and an obtuse writer, it is the more remarkable that he should have been the preceptor of so many pupils who later became very famous in their own right. The influence of John Hunter was still keenly felt for a long time after his death. Many of the leading researchers and physicians of England and America had been his pupils. He made certain that all his students received thorough grounding in anatomy, physiology and surgical pathology. Through his efforts, medicine began gradually to take on a more scientific character.

There have always been two types of innovators in medicine: those who have had a single new idea and have pursued it - sometimes obsessively - to the end, and those who have brought a reforming spirit with them, which has vitalized and enlarged every subject they have touched - the rebels of medicine. Most prominent innovators have been included in the former. John Hunter belonged to the latter class and it was this challenging spirit which was the keynote of his influence over his students and many successors. He was a philosopher whose mental grasp embraced the whole range of nature's works and since his death until now, John Hunter has been described as "The Shakespeare of Medicine."

#### *References*

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