Contributions of the nineteenth century to a living pathology / by William J. Mayo.

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Ether Day Address

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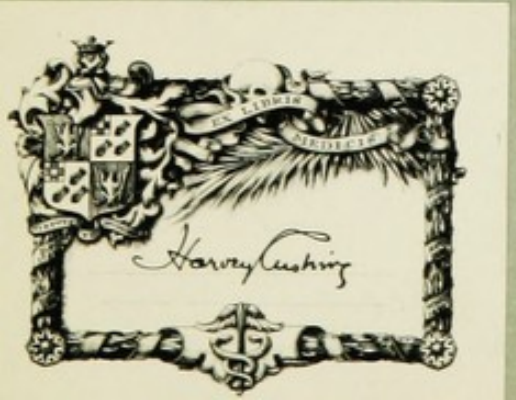

Contributions *of the* Nineteenth Century *to a* Living Pathology

BY

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ROCHESTER, MINN.

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CONTRIBUTIONS OF THE NINETEENTH CENTURY TO A LIVING PATHOLOGY.*

BY WILLIAM J. MAYO, M.D.,

ROCHESTER, MINN.

I WISH to thank the Trustees of the Massachusetts General Hospital for the high honor conferred in asking me to deliver the Ether Day address for 1912, an honor which is emphasized by the eminence of the men who have preceded me in addressing you on previous occasions.

The nineteenth century introduced methods of investigation which made the practice of medicine one of the sciences. Previous to this time clinical observation with all its vagaries had constituted the basis of medical practice. Anatomy, physiology, chemistry and pathology had been studied and valuable material obtained, but as yet no sound theories had been advanced from which deductions applicable to the treatment of disease could be made.

The figure presented to my mind as the dominant one of the eighteenth century is that of John Hunter. Hunter was anatomist, physiologist and pathologist and the great surgical philosopher of his time. His vision was prophetic, and he employed methods of experimental research which are a model for this day. Jenner introduced immunity by vaccination, and in presenting his subject said that he thought certain hypotheses to be correct. Hunter wrote to Jenner and said, "Why think? Try it on a hedge-hog and know." Hunter persistently and conscientiously

*Address delivered at the Massachusetts General Hospital on the sixty-sixth anniversary of Ether Day, Oct. 16, 1912.

studied the gross manifestations of disease so far as they could be studied by the unaided eye, and as a result of his work, macroscopic pathology became definitely established. He made classifications and arrangements of findings in gross pathology, especially as related to surgery. These specimens were secured largely from investigations made at post-mortems, and, because of them, pathology was taught, not as before from the standpoint of clinical observation, but from the actual material taken from the diseased body. I believe it to be the duty of every surgeon who can do so to make a pilgrimage to the Royal College of Surgeons of England for the purpose of seeing the hundreds of specimens labeled in black with Hunter's own hand. Hunter's preservation of these carefully recorded specimens saved for teaching purposes was instrumental in establishing a school which made England the center of research in the field of scientific medicine, and this work resulted in an enormous impetus to scientific investigation the world over.

Pathology is the foundation of scientific medicine. Without a correct understanding of the nature of disease the practice of medicine as a science would not be possible.

For the purpose of this discussion, pathology will be divided into two parts: First, a pathology representing terminal conditions, and which, for want of a better name, we will term "post-mortem" pathology; and second, the pathology which deals with disease in the living when the condition is still curable, and which we will call "living" pathology.

Post-mortem pathology furnishes valuable data for teaching purposes because it is obtained from advanced

processes which best represent the characteristics of the condition and adds greatly to the science of medicine. Unfortunately, from a therapeutic standpoint, the data is obtained too late to make restoration to the normal possible.

Living pathology deals with disease during the period in which a restoration to the normal or physiologic condition can be brought about by appropriate therapeutic measures, and to this end the art of medicine is directed.

In studying the nature of disease, as exhibited by the terminal pathologic findings, an intense desire was inspired to deal with these processes in the early and curable stage. As a means to this end, anatomy, especially regional anatomy, became the subject of more accurate study. France led in this field of work, bringing anatomy to a high stage of development, and with it a specialized surgical technic, thus in her turn becoming the great medical center of the civilized world.

In those early days operations were fraught with terrible suffering to the patient. They were undertaken only under dire necessity, and scientific method was sacrificed to speedy manipulation. The speed with which some of these old-time surgeons worked was phenomenal, major operations being performed in two minutes.

The knowledge acquired concerning gross pathology and gross anatomy introduced a great necessity out of which developed the priceless boon to humanity — anesthesia. Influenced and aided by this discovery surgeons could now operate upon pathologic processes in the early stages, and the art of surgery developed rapidly.

Although operations were performed upon the surfaces of the body and the extremities, the cavities of the body containing the important organs remained as a closed book to the surgeon. The pathologic changes found within the cranium, thorax and abdomen at post-mortem seemed to indicate that surgery could not be developed to an extent which would enable the adoption of remedial measures.

Because of certain uncontrollable conditions with which surgery was surrounded in the early days, the mortality which followed directly upon even minor operations was appalling. Then came Pasteur, who, like Hunter, brought the sense of sight, but aided by the microscope, into the field of science. The discovery of the germ origin of disease made Pasteur the greatest benefactor the world has ever known. The only name in science which ranks with Pasteur is that of Darwin, whose discoveries revolutionized the natural sciences and had a most profound influence upon scientific medicine. Virchow's splendid work had placed cellular pathology upon a sound footing, preparing the way to a prompt recognition of the role of bacterial agents in the production of disease. In Germany especially was the relation of the germ theory to the origin of disease studied zealously, and many of the discoveries which reconstructed the foundation of medicine were the result. Germany thus in her turn became the center of the medical sciences.

With Pasteur's name must be associated that of Lister. The theory of the germ origin of disease suggested to Lister the explanation of certain phenomena in which he was greatly interested. Investigations followed which developed the crowning triumph of modern surgery — antisepsis, and led to the final

achievement — asepsis. Lister showed the application of the germ theory to the treatment of wounds, and under his teaching operative procedures became comparatively safe.

The prevailing views concerning the pathology of the organs in the cavities of the body were not sound. Clinical observations gave rise to conflicting opinions, and many symptom complexes were supposed to be pathologic entities. Attempts to clear up the confusion by post-mortem observations were not successful, because autopsy did not disclose the condition as it existed during life, but rather the particular lesion which caused the death of the patient. In acute conditions this information was, of course, valuable, but in chronic conditions it often added to the confusion and gave rise to theories which later proved untenable. It is a true saying that "Few die from the disease with which they suffer during life." A few years ago no fact in pathology was considered indisputable unless derived from the post-mortem, and this attitude of the medical profession was responsible for much of the pessimism directed toward therapeutics.

A series of studies made by various investigators on terminal infections revealed the nature of the processes which cause death and produce many of the conditions found at post-mortem, — conditions which were previously believed to be a part of the original lesion instead of a sequence to it.

Anesthesia and asepsis enabled surgery to assume an important part in solving the discrepancies between post-mortem findings and the nature of the disease as it existed during life. Surgery was positive and active, and one organ after another became the object of this form of study during life. Though not always

successful from a therapeutic standpoint, surgical investigation did not fail to yield new truths to the science of pathology. In this manner our views concerning diseased conditions in parts previously concealed from the sense of sight were greatly advanced.

The abdomen was a locality well suited to surgical investigation, and surgical procedures had become so safe that this great cavity could be opened and explored at a time when the disease was in a curable stage, before secondary complications obscured the real nature of the malady.

Tait was the pioneer in abdominal surgery. He was a general surgeon who had become interested in the special branch of gynecology. This specialty at that time was largely concerned in the local treatment of diseased conditions and minor operations. It had some real triumphs to its credit in the removal through the abdomen of certain large tumors of pelvic origin. In general, however, the views upon the nature of diseased conditions in the pelvis of women were notably incorrect. Extra-uterine pregnancy was believed to be a broad ligament hematocele. Pelvic infections of tubal origin were supposed to be pelvic cellulitis. The fallopian tube directly connects the outside of the body with the peritoneal cavity ; various defenses exist to protect this portal against the invasion of bacterial agents, but they are often inefficient and pelvic infection results. Tait opened the abdomen and demonstrated the exact nature of these debated conditions. He attacked these problems with vigor and greatly advanced our knowledge of pelvic pathology. Tait was a brilliant but eccentric man. Dogmatic in statement, his debates were characterized by an intolerance for the opinions of others which created much ill-feel-

ing in the profession against him, but his contributions to the living pathology of the abdomen were greater than those of any surgeon of his generation. His later years were made unhappy by hasty and ill-considered statements in regard to vivisection.

The greatest original contributions to our knowledge of infections in the abdominal cavity came from a physician and pathologist. Before Fitz made known to the world the part played by the appendix in the causation of these infections, many supposed diseases in the abdomen were named and described. The most common pseudonym was "inflammation of the bowels." The appendix in both sexes, like the fallopian tubes in women, is a weak link in nature's chain of defense, and when diseased is capable of causing various manifestations from dyspepsia to a fatal peritonitis. Fitz made further important original contributions to the subject of intestinal diverticula and especially to the infections of the pancreas.

A third weak point in nature's defense is the gall-bladder, and infections from this source are exceedingly common and vary from the colic of gall-stones to fatal involvement of the liver and pancreas. Knowledge in regard to disease of the fallopian tube, the appendix, and the gall-bladder is common property, and deaths from these causes are now as rare as they were formerly common.

In spite of all research, we do not as yet know the essential cause in the production of malignant disease, but that chronic irritation is a factor in the causation of carcinoma cannot be denied. Cancer is found in all vertebrate animals, and always in a situation in which the habits of the animal cause an irritation of the parts affected. We have recognized the fact that

precancerous lesions due to chronic irritation occurred in organs like the skin, which are open to direct inspection, and based upon this fact irritated warts, moles, scars, etc., have been promptly removed. We seem, however, to have overlooked the fact that a like precancerous condition might exist in the internal organs. When modern methods of investigation brought the real facts to light, it was shown that chronic irritation of the internal mucous surfaces is as important in the development of cancer as it is on the cutaneous surface.

Cancer of the stomach, which comprises 30 per cent of the total number of cancers occurring in the human body, was formerly known only from its post-mortem characteristics, and the prognosis was wholly unfavorable. The demonstration of its living pathology has shown that it frequently arises in points of chronic irritation which are themselves capable of relief, thereby removing from the stomach the cause of a serious disability, distress and malnutrition, as well as removing a cancer menace. Instead of the hopeless condition known to post-mortem pathology, cancer of the stomach is to-day curable in a considerable per-centage of cases.

Cancer of the gall-bladder is seldom seen without gall-stone irritation. It is found in about 4 per cent of those cases which come to operation for disease of the gall-bladder. The danger attending an operation for gall-stones in the early stage does not exceed one-half of one per cent. The patient with irritating gall-stones appears to have eight times the possibility of death from cancer that he would have in their removal.

In cancer of the large intestine, the irritation caused

by material which has escaped into small mucus pockets or diverticula exert a chronic irritation which is one of the rather frequent determining factors in the causation of cancer of the colon. A high percentage of the patients subjected to operation for the removal of cancer in this region have been cured.

Surgical investigation, like Hunter's pathology, was based upon the macroscopic evidence of disease. The surgeon exposed the parts to sight and, after making his examination, proceeded as appearances seemed to indicate. Unfortunately, correct information concerning the nature of the process could not always be obtained by such examination. The exact condition was revealed some days later by microscopic examination, but at a time too late to benefit the patient.

By the aid of the microscope and frozen section, as perfected by Mixter and Whitney in this Hospital, the surgeon's vision has been extended into the minute structures of the processes of disease during the progress of the operation. This innovation in surgical pathology is of the greatest importance since it enables the surgeon to be guided by the microscopic as well as the macroscopic aspects of the condition.

The sense of sight was also being brought to bear upon various organs by means of instrumentation as well as by surgical operation. The ophthalmoscope and laryngoscope permit exact investigation and supplant supposition with demonstrable facts. By the aid of the esophagoscope the esophagus is brought into view and the terminal portion of the intestinal tract can be viewed through the proctoscope and sigmoidoscope.

The urinary bladder, which was supposed to be so

often diseased, was found upon inspection through the cystoscope seldom to be the seat of primary lesions, although for years subjected to unavailing treatment for secondary conditions. Based upon clinical findings, tuberculosis was believed to involve both kidneys in the large majority of cases, and it was therefore believed to be a hopeless condition from its inception. This conclusion was apparently demonstrated by the fact that both kidneys were usually found to be involved at post-mortem, an opinion later disproved by means of the cystoscope and the ureteral catheter, which in the majority of cases showed the disease to be unilateral until a late stage, and the second kidney involved by a terminal infection shortly before death. This knowledge converted an incurable into a curable disease.

In the process of building up living pathology, experimental investigation has been an important factor. It reconstructed physiology through vivisection. Pavlov, Starling, Cannon, and others demonstrated the nature of the digestive processes in the living, without which knowledge pathologic perversions could not be understood. The criticism which, in the beginning, pursued the scientist in this field of research, is now passing away. More humane and highly scientific methods of investigation have gradually brought the fair-minded individual to view vivisection as a legitimate and, at present, the only sure means of obtaining certain important truths to aid in the preservation and prolongation of human life. As these methods continue to develop toward a more perfect science, so will adverse comment and opposition to its practice disappear.

Surgery within the cranial cavity and of the spinal

canal has been greatly improved within recent years by surgical experimentation. The work of Horsley, Cushing, and others has lighted up the gloom which existed in this field, and many intracranial conditions formerly considered hopeless have been converted into surgical triumphs.

In the thoracic cavity advances have also been made through knowledge obtained by experimental surgery. Methods of preventing the collapse of the lung upon opening the cavity of the chest have been evolved by Sauerbruch and Meltzer by means of animal experimentation which enables direct attack upon the lungs, pleura, heart, and great vessels.

The work of Carrel, Crile, and Matas in experimental surgery of the blood-vessels reveals another field of scientific progress. Heretofore surgery has been associated with purely pathologic problems, but it is now attacking problems in physiology. I will but mention the transplantation of organs, which has been successfully accomplished in animals, as one of the possible means by which diseases now beyond the reach of human endeavor may be relieved.

At the close of the nineteenth century a discovery which may be classed with anesthesia and the germ origin of disease was brought out. Roentgen added another means of extending the use of the eye to the study of disease, and the X-ray has disclosed many of those inner secrets which have heretofore baffled alike the clinician and the surgeon. This agent has made possible the investigation of numerous conditions which previously could not have been made without operation.

We can readily understand the importance of the X-ray in the development of a living pathology. For

the first time in the history of medicine diseases of the bones and joints could be inspected directly, and at an early and curable period when a return to the normal was possible. By its aid fractures, dislocations, and similar traumatisms of the osseous framework could be restored without those deformities which so often occurred in the past.

The X-ray also added greatly to our knowledge of the hollow viscera and often revealed processes which heretofore were discoverable only by the aid of the knife.

Diseases of the thoracic cavity were marvelously revealed. Surgery could not claim the triumphs in the thorax it had achieved in the abdomen, and until the X-ray enabled us to view the heart, lungs, and pleura, our actual knowledge of the living pathology as it might occur in this region was less than in the abdomen. Even in the cranial cavity with its dense covering the X-ray has been valuable in locating tumors and other diseased conditions.

One far-reaching result of these newer methods of investigation has been the development of medicine as a whole. Specialists of the past generation attempted to divide man into parts for examination and treatment. To-day our subdivisions are more minute because of a wider knowledge, but no part stands alone as in days gone by. So vast is the extent of knowledge to be gained of disease that no one man can hope to accomplish more than a small share during his lifetime. The old-time family practitioner has passed away, and with him has passed individualism in medicine.

By what means can this great accumulation of the knowledge of disease be applied to aid individual

patients? There is but one answer to the question, — co-operation in medicine. Medicine must no longer be practiced individually but by groups of men, each one bringing the result of his work and studies to bear upon the case. In no other way can the patient receive the benefits to which he is entitled. How this co-operation can be satisfactorily brought about is our present problem. In foreign countries the State has been the controlling agent. Resources of medicine are brought to the aid of the sick by co-operative effort through the various clinics. Unfortunately this privilege is accorded only to the charity patient and the poorer working classes. The so-called well-to-do are not eligible to this form of treatment and are forced to the private clinics, many of which have not the necessary facilities for diagnosis and treatment.

In our own country the initiation of a progressive policy appears to be coming from the medical profession. The staff of our large hospitals co-operate in the treatment of charity patients quite as is the custom abroad, but there is a strong tendency toward co-operative service for the private patient as well, and groups of men are joining their forces for this most beneficial purpose.

The nineteenth century worked for the individual. One by one each disease was investigated and the results applied to the relief of the individual patient. The twentieth century starts out with a broader conception of the function of medicine. It is working for the masses in the prevention of disease. Care of the public health has become the most important duty of the State.