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RUDOLF VIRCHOW.

AN ADDRESS,

INTRODUCTORY TO THE COURSE OF LECTURES OF THE TERM, 1881–82.

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BY

A. JACOBI, M.D.,

CLINICAL PROFESSOR OF DISEASES OF CHILDREN.

Reprinted from THE MEDICAL RECORD, *October* 22, 1881.

NEW YORK:
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An Address, Introductory to the Course of Lectures of the Term, 1881–1882.*

Mr. President, Gentlemen of the Faculty, Fellow-Practitioners, and Fellow-Students--The bust exhibited here, and the portrait shown, are those of Rudolf Virchow. His name is familiar to all. His renown as a great scientist is older than probably any student in this hall, of as long duration as the life of many a practitioner of great skill and deserved reputation, and has been firmly established so long as to have accompanied the oldest of us through the best and most efficient part of our career. Him I selected for the subject of our conversation this evening. In my opinion there is nothing we can learn so much from as from the life of a great man. If that man be dead, his biography is a source of valuable instruction and admiring appreciation; if he be among the living, and known not to have spent a day of his life except in the service of science and mankind, he is deserving of being extolled to the young—and old too—as a praiseworthy example. And if he can be shown to unite with the accomplishments of a savant the traits of genius, a universality of interests, and the beauties of a manly and refined nature; and further, if it can be demonstrated that no man in old or modern time crowded more successful scientific work into one lifetime, that man ought to stand out before the eyes of the young man entering upon the study of medicine as his guiding-star, as his ideal. For an ideal it is which the young want and require. Fortunate are

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* Delivered in the lecture-room of the College of Physicians and Surgeons, New York, October, 3, 1881.

those who look for theirs among the best and most perfect.

Rudolf Virchow was born on October 13, 1821, in a little Pomeranian town—Schivelbein—in Northern Germany. In 1843 he graduated in medicine at the University of Berlin. In 1846 he was made prosector of the Charité Hospital, and controlled in that position the whole anatomical material of that great institution. His facilities he utilized at once in delivering courses of lectures on the subject of pathological anatomy. In 1847 he was appointed a regular lecturer in the University. In the same year, together with Reinhardt, who died in 1852, he founded his *Archiv for Pathological Anatomy and Physiology and for Clinical Medicine*, which has since completed its eighty-fifth volume.

In 1848 the Government sent him to Upper Silesia to study the typhus fever begotten by the misery and starvation of a vast population. His report was a masterpiece, containing close observations both of medical and social facts, highly valued by the profession, and, like his later book on the misery in the Spessart Mountains, by those in power and responsibility.

In 1849, together with Leubuscher, who also died young and too soon, like Reinhardt, he edited the *Medical Reform.* The ideas proclaimed by him, and his participation in the liberal tendencies of the revolutionary movement of 1848 were disliked by the Government. He was dismissed from his public positions. But the medical societies of the city were so unanimous in their efforts to retain him that he was reinstalled; *for there is, after all,* ONE *force* more powerful and influential than swords and cartridges, even in soldier-stricken Germany, viz., public opinion. Still he did not remain long in Berlin, but accepted the Chair of Pathological Anatomy in the University of Würzburg, which he held until 1856, when he returned to Berlin in the same capacity.

Before he left Würzburg, he published his "Collection of Contributions to Scientific Medicine" (Frankfort-on-the-Main, 1856). His celebrated papers

on "The Movement in Favor of Unity in Scientific Medicine," first published in 1849, head the list. I shall simply mention the titles of the rest in order to recall to the older gentlemen in this audience the great revolutions in physiological and pathological knowledge which have taken place in our lifetime. There are his essays on "The Physical and Chemical Properties," the "Metamorphosis," the "Origin and the Coagulation of Fibrine," all of them written in 1845 and after. There are his celebrated papers on "White Blood-Corpuscles" and "Leukæmia," dated 1845 and after, and his five hundred pages on "Thrombosis and Embolism," "Inflammations of Blood-Vessels," and "Septic Infection," dated from 1846 to 1853; also "Contributions to Gynecology," with papers on the "Puerperal Condition" (1847); the "Formation of the Placenta" (1853); "Uterine Flexions" (1850); "Prolapse of the Uterus" (1846); and "Extra-Uterine Pregnancy" (1850–56); on the "Elimination of Uric Acid in the Fœtus and Newly Born" (1846); "Congenital Hydronephrosis" (1854); and on "Apoplexy in the Newly Born (1850); "Contributions to the Pathology of the Skull and Brain," which contain papers on the "Granular Appearance of the Walls of Cerebral Ventricles" (1846); on "Cretinism" (1851 and 1852); on the "Development of Cretinism" and "Cranial Deformities," on the "New Formation of Gray Cerebral Substance" (1851); and on "Senile Involution of Flat Bones" (1852); finally, a "Paper on Cancroids and Papillomata" (1850).

About the same time he was active with other problems. The "Collection of Treatises connected with State Medicine and Epidemiology" (Berlin, 1879), contain a number of papers written at that time. The two volumes treat in scores of different articles, written between 1848 and 1879, on subjects connected with public hygiene, reform of medicine, epidemics and endemics, statistics of morbility and mortality, hospitals, military medicine, cleaning of cities, school hygiene, criminal law, and forensic medicine.

However, when Virchow's name is mentioned, it is

customary to think of him first as a great discoverer on the field of pathological anatomy.

Pathological anatomy is that part of pathology which treats of the origin, development, and nature of such changes in the solid and liquid parts of the body as constitute disease. The changes most thoroughly and profoundly studied, were, in the beginning, the gross and macroscopical, afterward the morphological ones, inclusive or exclusive of pathological chemistry, which is still younger than pathological anatomy proper. If I speak of origin, development, and nature of changes, I characterize the science as it is to-day. For neither Theophil Bonetus, who, in 1675, collected the three thousand post-mortem examinations recorded for two thousand years past, nor Morgagni, in his celebrated book on "The Seats and Causes of Diseases studied Anatomically" (1761), nor Bichat (1801), with his attempts at studying the diseased tissues, nor Aloys Vetter (1803), in his "Aphorisms from Pathological Anatomy," nor the first prosector, Biermayer, of the Allgemeine Krankenhaus, in Vienna—founded by Emperor Joseph, *Saluti et Solatio*—nor his successor Wagner, considered anything but the completed changes of the organs. Wagner's successor in the place, which was founded on the 26th of June, 1812, was Carl Rokitanski.

To estimate at its full value the influence exerted by *him*, let us consider the facilities for diagnosis at those times by choosing an example from the large class of fevers. There were catarrhal fevers, with the symptoms of a slight catarrh prevailing; when muscles or joints ached, the fever was catarrho-rheumatic or rheumatic; when the gastric symptoms prevailed, it was gastro-catarrhal or gastro-rheumatic; with a yellow tongue and pain in the right epigastrium, it was bilious, or gastro-bilious, or bilious-rheumatic; with prevailing headache or delirium, it was gastric-nervous, or bilio-nervous-rheumatic. There was no end of complication of terms, just as little as there can be an end to the complication of symptoms. That was a time in which nothing better could be done. Most diseases

were estimated from the nature of either the subjective or the most superficial objective symptoms of the pulse, the tongue, etc. It was exactly the period in which even the Hahnemannian system, school, sect, was just as easy of existence as any other system, school, sect, or self-styled scientific silliness. Rokitanski's great function was to find, as Andral had done shortly before him—to proclaim louder and more effectually than Andral ever succeeded in doing, that disease meant a change of structure and not of sensations and symptoms, and to point out, as Virchow happily expresses it, "a number of natural and easily recognizable types of disease." If I call your attention, by a simple example, to typhoid fever, which Rokitanski installed as an anatomical entity, instead of the nervous, and bilio-nervous, and gastric, and what-not fevers, you have at once an instance of the blessing conveyed by one great man on both the anatomist and the physician. He proved that the most various symptoms can depend on the very same or similar anatomical changes, and could prove that sometimes the same or similar symptoms might depend on different conditions. Thus, the similarity of many symptoms in typhoid fever and acute tuberculosis gave rise to many errors, many studies, until Skoda's skill and genius solved the grave problem of differential diagnosis. To treat of Rokitanski's merits fully is not appropriate to-night. His place in the history of medicine is secure. But still he will not appear—nobody will—as the last and unimpeachable judge in all matters anatomical and histological. On the contrary, his labors, as laid down in the first volume of his pathological anatomy, were undertaken, and in part finished, during the time in which Schwann first found all animal tissue to consist of cells. Thus, the histology even in his *second* volume (1846) is of inferior character. This is the first defect. His second error and that of his school is the assumption of humoral pathology in a somewhat new shape. The mixture (crasis) of the blood, engendered by the chemical examination of the blood by French authors such as Andral and Gavarret, was consid-

ered the main cause of many general, constitutional, or feverish diseases. The third great mistake of Rokitanski was this, that he felt convinced, and acted upon the conviction, that *his* special branch of pathology contained everything worth knowing in medicine. Remember, however, *he* lived in the dissecting-room; remember that from November 1, 1817, to October 8, 1878, seventy thousand and eighty-seven post-mortem examinations were recorded in Vienna. If you do, you will understand, and, though you deplore it, pardon the one-sidedness with which he considered that his efforts were everything required, not only for the theory, but for the practice of medicine. He found organs destroyed, or changed to such an extent that life was incompatible with that destruction or those changes. Where was the remedy which could have restored to health the organ which had caused death? *Non possumus.* Impossible. Thus he became the intellectual head of the so-called school of Vienna, which, while it increased rapidly the anatomical knowledge and differential diagnosis of the conditions of diseased organs, threw up its hands in despair when the living patient clamored for relief and recovery.

Thus, the three great defects or errors of Rokitanski and his school were: ignorance and regardlessness of histology, the clinging to humoral pathology, and the therapeutical nihilism originating in Vienna and infecting a large portion of the practitioners of the world. Let us now turn to Virchow to discover how he dealt with these defects, errors, and difficulties.

Before and about the time when Rokitanski worked and wrote, and Virchow prepared to commence his career, medical science in Germany was by no means independent and self-governing. There was no country in Europe in which observation and regard for facts, and facts only, was less esteemed than in Germany. England had enjoyed a predilection for pathological anatomy since John Hunter; Carswell had studied the elementary forms of morbid processes in his pathological anatomy (1833); physiologists such as Bell and Marshall Hall had

added to the stock of positive knowledge; great physicians, such as Bright, Abercrombie, Hope, Williams, and afterward Stokes, enriched special fields of pathology. France lived through its most brilliant medical career. Never before, or after, have more illustrious, sober, and painstaking men worked in the same field with more success than those who sustained French medicine up to 1840 in its high rank. Bichat, Bayle, Dupuytren, Laennec, Cruveilhier, Rostan, Chomel, Gendrin, Bretonneau, Andral, Louis, Billard, Piorry, Magendie, and many others, placed French medical science far above the level of any other country. Meanwhile, German medicine was controlled by what was called philosophy, and mainly by the so-called philosophy of Nature. The only great philosopher of the end of the eighteenth century was no longer appreciated or understood. Immanuel Kant, with his clear intellect, his unbiassed judgment, his mathematical training and scientific method, was forgotten or misinterpreted. One hundred years ago this year, his "Criticism of Pure Reason" made its appearance. This very year the orthodox churches of all sorts of denominations have claimed this scion of natural facts, of mathematical problems, this personification of pure reason and unfettered logic, as their own, in this very city of ours. We need not wonder, then, that neither Fichte, nor Schelling, nor Hegel, nor even Hegel's greatest pupil, Feuerbach, followed the road opened by the unsophisticated, shrewd, far-seeing, untrammelled genius of Kant. Under the influence of the German philosophy of that whole period, after Kant, which has been so unintelligible that it was called profound, and so abstruse that it has procured for the whole German nation the title of the people of thinkers, everything in medicine not accepted because it was old and traditional was a matter of speculation *a priori* only. The bases of speculation were premises construed by reasoning not founded on facts; by theories not built on experience, far less on experimentation. Both facts and experimentation were claimed by Virchow as the only admissible foundations of scientific medicine, no matter

how long it would take to collect them or to establish it. At the same time he was perfectly well aware that the literature of the last two thousand years contained a great many available points; nobody ever was more honest in collecting material and giving credit. Every one of his books, orations, speeches, essays, lectures, teems with literature carefully collected and critically judged, and proves his appreciation of the necessity of historical studies. As the organism of the human body cannot be understood without the knowledge of its gradual development, thus the present condition of medicine, or the present condition of a doctrine, cannot be appreciated without the history of the labors spent on its gradual completion, no matter whether it was obtained by uniform progress, or, what happens much more frequently, by alternations of progress and retarding relapses. For the history of human progress is, in part, the history of errors.

The young student cannot possibly imagine, without historical studies, the condition of our knowledge as late as thirty or forty years ago. Many of the distinguished men here assembled—many of your celebrated teachers on whose lips hang your eager eyes, and whose every word is cautiously remembered by willing ears, lived and studied in a time when capillaries were not known to be true vessels with a wall of their own, when the distribution of the peripheric nerves was not even believed by the most poetical imaginations, when the action of organic muscular fibres, with its universal influence on the function of every organ, was not deemed a possibility, and trophic nerves were not even dreamed of.

The first opposition to the influence on medicine of the so-called philosophy of nature, was made by "rational" medicine and the "physiological" school of medicine. It was formed by such learned and ingenious men as Wunderlich and Roser; it controlled the minds and influenced the action of many good men in the profession a number of years. At that time, and long after, pathology was acknowledged as only a part of physiology. At all events

it had no independence of its own. Pathology was an appendage of the natural sciences then recognized. *The emancipation of pathology*, its rise into the number of independent sciences, with, *in its turn*, its fertilization of anatomy and physiology, dates from April, 1847, when Virchow wrote on the *standpoints in scientific medicine*, in the first volume of the *Archiv for Pathological Anatomy and Physiology and for Clinical Medicine*. At that time he wrote as follows:

"We ought not to deceive ourselves or each other in regard to the present condition of medical science. Unmistakably, medical men are sick of the large number of new hypothetical systems which are thrown aside as rubbish only to be replaced by similar ones. We shall soon perceive that observation and experiments only have a permanent value. Then, not as the outgrowth of personal *enthusiasm*, but as the result *of the labors of many close investigators*, pathological physiology will find its sphere. It will prove the fortress of scientific medicine, the outworks of which are pathological anatomy and clinical research."

Five years afterward he could say: "The scientific method of medical research is firmly established. It is not my merit to have discovered it. Without me it would have been found, and the new trail would have been followed. But I trust that the battle against the existing mixture of arbitrary rationalism and gross empiricism, fought by the *Archiv*, in which I aided by the introduction of genetic investigation, must have contributed much in procuring new aims for pathology."

You remember that, but little more than forty years ago, Schleiden discovered the cell to be the elementary basis of the vegetable tissue. Schwann recognized the same element as the foundation of the structure of all animal tissues. A long series of observations and experiments convinced Virchow of the continuous propagation and proliferation of cells within the individual. After five years of hesitation he published the first preparation for, or introduction to, his cellular pathology, in the fourth volume of his *Archiv*, and another contribution

to the same, three years afterward, in the eighth volume.

He proved, and all our experience proves, that life requires a special formation to manifest itself, and certain conglomerates of substance. These conglomerates are the cells and their compounds. Like the individual in its totality, the cell in its turn is the physical body with which the action of mechanical substance is connected, and within which the latter can retain its functions which alone justify the name of "life." In the normal state of this conglomerate it is mechanical substance which acts, and acts only on chemical and physical principles.

The pathological process within the elements, according to cellular pathology, is as follows: a living cell is acted upon by something outside. The latter works a mechanical or chemical change in the cell. This mechanical or chemical change is disorder or disease. If an action or reaction take place in the cell through that cause, the change is called irritation, the cause irritant. If no reaction take place, there is a mere lesion, or perhaps a paralysis. The same cause may act as either an irritant or a simple lesion, or be a source of paralysis. The difference of the results depends on a difference in the condition of different cells. This difference in the condition of the cell is, or rather forms, its predisposition.

Cellular pathology was intended to demonstrate the cellular nature of all vital processes, both the physiological and pathological. Thus, in contradistinction to the humoral and "solidar" (or neuristic) theories handed down from almost prehistoric times, the unity of life in everything organic was claimed as a demonstrable fact, and the minute mechanics and chemistry of the cell were placed in victorious opposition to the course explanation based on the mechanics and chemistry of the compound mass. With the improved instruments, and by means of the newly established principle, "all medicine got nearer the natural processes by at least three hundred times" (Virchow).

All medicine; for it is a peculiarity in all of Vir-

chow's researches and conclusions, that none is without its immediate results on the theory and practice of medicine, even on diagnosis.

Diagnostic powers have increased with the growth of positive knowledge. Diseases become recognized as local anomalies in the same degree that the old humoral pathology, first objected to by Vesal and Paracelsus, was finally undermined in its position as the general explainer of physical disorders. One hundred years ago the diagnosis of most local diseases was a very imperfect one. A fever with dyspnœa, with cough or without it, was a thoracic fever—a pulmonary fever. When Morgagni had published his "Seat and Causes of Diseases," and Laennec and Dupuytren had developed more proficient means of diagnosis, the disease was sought for and found in organs—even in parts of organs. A pleurisy was diagnosed from a pneumonia, a pneumonia of the right from that of the left side, of the upper from that of the lower lobes. Bichat, though he could not prove it, yet insisted even upon the necessity of diagnosing the diseases of the several constituent tissues.

Virchow's cellular pathology is claimed by him as the consistent execution of the principles and postulates of his predecessors. The localization of disease is taken as a necessity. It is looked for in the smallest composing elements—the cells, for there is no organ but consists of cells or cell-production. Blastoderma, protoplasma, are not characterized as something independent, as organisms by themselves, no matter whether they be considered to be the changed condition from the blood, as the older writers would have it, or the shapeless, amorphous mass of the recent authors. The smallest organism we know of, and which has an independent action and a life of its own, changing under the influence of external irritants, is the cell. To fix the disease in a cell, or a group of cells, is the finest localization possible. As a rule, we have to deal with a group of cells, like the chemist, who works with and on a group of atoms.

But not only does the practitioner enjoy the benefit

of a diagnosis and prognosis based upon the knowledge of local organic alterations, but his therapeutics also have undergone important changes. They, again, are mostly due to more correct observations, and mainly to the experimental method which has been generally adopted these ten or fifteen years, in the study of the effects of medicines on the animal system or organs or tissues. Therapeutics have become more and more local. The hypodermic method has taught us that the local effect of a narcotic is so much more distinct when the remedy is applied to the affected part. Strychnia, injected into a paralyzed limb, a deficient sphincter ani, or near an anæmic amblyopic retina, is much more powerful than when given internally. Relations between certain organs and certain remedies have been discovered. Quinine has been found to affect white blood-corpuscles and blood-vessel nerves; ergotin has its specific action on unstriped muscular fibres; atropia on the intestinal ganglia and on the iris; eserine, calabar are justly credited with local effects. We have remedies with specific effects on the muscle, such as salicylic acid; on the nerves, on the brain or spinal cord; we use the faradic and continuous currents for local purposes; influence local changes, pains, anomalous functions by cold, heat, moisture, contra-irritants; even remedies known for their general effects alone are used for the purpose of reaching local changes. For not only is mercurial plaster used for the purpose of dissolving local indurations, mercury is given internally for the purpose of influencing local gummata; iodine in order to remove local periosteal swellings, or chronic local adenitis. By becoming experimental, therapeutics have become sound, not only for the benefit and in the interest of diseases, but also of surgical interferences. These have never been rendered so safe and innocuous by all the accumulated experience of justly celebrated operators, of justly condemned wars, as by the theoretical reasoning of a living English surgeon, whose name is on the blessing lips of every modern physician.

But cellular pathology does not claim to be a *sys-*

tem which contains everything, *but a principle.* Thus far, every new discovery of pathological facts has found a ready explanation by it and its methods. The changes worked in and by white blood-cells, the transmutation of epithelial cells into benign results or malignant growths, the influences, real or imaginary, worked by bacteria, have but strengthened its plausibility. If there be a pathological entity, this entity is the cells in a state of disease. Despite the multifariousness of the vital processes in different organs, life is—no matter whether the cell-group, the organ, the individual, well or sick, are concerned—one and the same, and depending on the same and uniform action of the independent cell.*

The three volumes on *morbid tumors*, published between 1863 and 1867, are a work which might have filled the lifetime of a great student and thorough pathologist, and perpetuated his name in the annals of medicine. Never before was sarcoma treated of so extensively and monographically. Never before was the whole literature of the subject searched with so much knowledge and conscientiousness. The etiology, development, and prognosis of morbid tumors were at last intelligibly discussed on the principles of cellular pathology, while even therapeutics were not neglected. The chapters on scrofulosis, tuberculosis, and syphilis, though the subjects were treated of in many, perhaps too many publications previously, exhibit new researches, new results on every page. The congenital deformities are always described in relation to the embryonic development of the parts, partly as arrests of development, partly as the results of inflammatory action. And not the least beauty of the great work is the fact that the material belonging to medicine and surgery, superficial and deep-seated organs, ophthalmology, dermatology, and gynæcology, is treated of under common and uniform points of view. Thus, as Virchow has proclaimed the unity of life under the most manifold

* See Virchow on the Essence and Causes of Disease, in his Archiv, vol. lxxix., in regard to many of the above statements.

manifestations, he facilitates the knowledge that, after all, the specializing tendencies of modern medicine, natural and necessary though they be to a certain extent, admit of correction and limitation.

The "Investigations on the Development of the Basis Cranii in its Healthy and Morbid Condition, and its Influence on the Shape of the Skull, the Formation of the Face and the Structure of the Brain" (Berlin, 1857), are, as it were, a continuation of the essays alluded to among the contents of the "Collection of Treatises." They have been fruitful for anatomy, psychology, and pathology. The two works have yielded the anatomical basis of my own papers on the pathological and diagnostic importance of the premature closure of the cranial sutures and fontanel (1858 and 1859) and of many more important additions to the literature of science. For himself, these studies have been of the greatest importance also. On the base created by him, his main predecessors in this field being Leuret and Gratiolet, and Huschke, he has merged into his anthropological studies, foremost among which is his book on "Some Cranial Peculiarities of Lower Human Races" (1875), and "Contributions to the Physical Anthropology of the Germans" (1876). Before these publications, however, saw the light, his cranial studies led him into palæontology and archæology. From the beginning of the existence of the Anthropological and Archæological Society of Germany, he was a member—in the second year its president. Without being able to follow him in all these studies, I lay stress only on the fact that they are by no means adverse or foreign to strictly anatomical and medical studies. The connecting link is sufficiently clear, though the literary notes I have given must, unfortunately, be but too short. His paper on prehistoric tombs, and many others, in part published in an anthropological journal, prove at the same time his varied interests and his mental powers, enabling him to combine such a variety of studies and occupations.

Still, his main labors have been spent on pathology and subjects connected with pathological anatomy. His papers on thrombosis and embolism alone

would have immortalized him. They acted like a new revelation, by which a host of pathological occurrences and processes, formerly not understood, became intelligible.

The number of his other contributions to pathology is large. I remind you of his investigations on caseous and tubercular degeneration, and on diphtheria. What our Dr. Billings lately said in his London discourse is certainly true. For pathology we do look to Germany—he might well have said, to Virchow and his pupils. Never can too much credit be given to him—never ought he to have been compelled to express himself as follows:

"For years," he said lately, "I became accustomed to the fact that others utilize my labors. I complained of that in 1856, and have more reason now. Many pupils who learned the new results of my researches in my lectures have not always remained conscious of the source of their knowledge, and thus they have not always been in a condition to give me due credit in their publications. I do not propose to attribute that to ill-will in every case. We all live in motion and turmoil, and are the recipients of much which, without recalling the giver, we consider our own. Whoever has gathered around himself many pupils through many years, must expect that his own thoughts may return to him from afar."—Preface to *Ges. Abh.*, etc. (Berl., 1879).

The first university establishing a full chair of pathological anatomy in Germany—Vienna not counted—was Würzburg. There and in Berlin he taught hundreds and thousands, and educated the men who were to occupy the chairs of pathological anatomy in the other universities. Rudolph Mayer, Rindfleisch, Recklinghausen, Bezold, Cohnheim, Grohe, Klebs, Ponfick, and many others owe him their opportunities and their places. Since, and through him, the appearance and working of German universities have greatly changed. Through this whole long period he has worked steadily, and always more efficiently than noisily. His not rushing into print with every little observation has now and then raised the doubts of some of his former pupils, who

would be gladly considered his peers, whether he worked at all. This doubt has even been expressed publicly, and, in regard to some points, he has been attacked because of his alleged want of progressiveness and thoroughness. Such is the case, for instance, in regard to the modern parasite theories of infectious diseases, and to Darwinism. Let us inquire.

Berzelius and Liebig developed the theory of chemical catalysis to such an extent that not only was organic chemistry enriched by it to a considerable degree, but the symptoms of infection (not, however, those of contagion) found a satisfactory explanation. Still, at that time, in 1854, Virchow's essay, in the first volume of his Pathology and Therapeutics, on parasitic plants, gives sufficient proof of his interest in and knowledge of the subject. A special paper of his, in the ninth volume of his *Archiv*, in 1856, demonstrated the botanical nature and classification of some forms of parasites to which an important part in nosology was to be attributed. At that time it was when he invented and first used the term of Mykosis, which has been generally accepted since.

Davaine in 1854, and Pollender, in 1855, found in anthrax the parasite which has since been given the name of Bacterium anthracis Cohn. Brauell's papers on the same subject appeared in the eleventh and fourteenth volumes of the *Archiv*, and were the forerunners of an immense literature which has since, in the *Archiv*, other journals, and independent publications, assumed vast proportions. In Virchow's hospital division it was, where Obermeier, in 1873, found the spirochæte in the blood of relapsing fever. Again, it was Virchow who, when travelling in Norway at the request of the Swedish Government, for the purpose of studying lepra, insisted upon the necessity of paying more attention to the dietetic basis of the disease, particularly to the fish eaten in large quantities. He has been severely reproached for not finding the bacillus lepræ, which, after the preparatory labors of four years, has been finally discovered by Armauer Hansen, twenty years after-

ward.* That very reproach proves that everybody expects everything of him, and sometimes too much. Now, the discovery of every sort of possible and impossible parasites is the regular order of the day, and has been for many years. On this side of the great water it has been Salisbury who has sharpened the appetite for numerous and uninterrupted discoveries of the kind. Every disease, every microscopic lens, every craving for notoriety, swelled the supply; endless was the number of new names, never was Greek dictionary more diligently consulted. Among the last diseases, in which Klebs and Crudeli claim to have found vegetable parasites which at once are taken to be the very causes of the same diseases, are intermittent fever and rheumatism. Here again, Virchow has been reproached for not publicly accepting the bacilli of malaria and rheumatism. The very men who insist upon Virchow's incompetency in regard to what they consider as the only basis of the nosology of infectious and epidemic or endemic disease, still appear to address every paper they write, every little observation they publish, to him. He is expected to repeat the experiments at once, appreciate and praise the results, and come to the same conclusions. If he does not, he is incompetent. One of his best known, but not best deserving, former pupils and assistants, is Klebs, but lately an essayist before one of the London Congress sections. He appears to have proved to his entire satisfaction that his poor master ought to be his attentive pupil. Among other novelties he has found that cellular pathology is incompatible with the new gospel of the parasite theory in regard to infectious diseases. Let us hear what Virchow himself has to say about this accusation (*Archiv*, vol. lxxix., p. 209, 1880): "Klebs has placed the whole dispute on a wrong basis. Vegetable and animal parasites *are* among the causes of diseases. Their place is in *etiology*, and therefore it is easily conceived that, as Klebs expresses himself, they found no place in my cellular

* Archiv, vol. lxxix., l. c.

pathology. There it was not any more my domain to offer an extensive paper on parasites, than it was to treat of traumatic injuries and corrosions. In my cellular pathology I meant to demonstrate the changes which take place in the elements of the organism in the general forms of disease. Thus, I meant to build up a theory of the essentiality of disease. Specified causes were mentioned only as examples—for instance, intoxication; and though but briefly alluded to, parasites have not been entirely overlooked. Cellular pathology never meant to be a general pathology. If that were the case, certainly etiology would have found its place in it without abridgment."

Virchow has often been blamed for reserving his opinion, or rather not expressing it at once in favor of those who fain would have availed themselves of his approval of their rapid strides in discovery and unprecedented quickness of conclusion. We are all probably in favor of judging slowly in regard to assertions which require confirmation. For to what extent hastiness, coupled with gentle ignorance, can prove dangerous, Professor Klebs has shown but lately. In a recent number of a European journal, I find, under his name, the description of a cooking-apparatus, which is credited with keeping bacteria out of the milk which is to be boiled in it. Klebs is quite enthusiastic over it, because, as he asserts, now that bacteria can be kept out of cow's milk, no summer diarrhœa has a chance to develop itself. For summer diarrhœa is all at once, according to him, the result of millions of bacteria in the intestines of the babies, the said bacteria being the same which are found in the decomposing cow's milk. And how does he prove this sweeping assertion? Very simply indeed. While the babies had diarrhœa, he found the bacteria in the fæces, and thus he demonstrates that the diarrhœa is the result, and the only one, of the presence of bacteria. If, however, the Professor had examined the fæces of healthy babies, he might have counted the same number of millions of bacteria. The wise omission of such an examination saves his theory. Thus, if it be true

that a little knowledge is a dangerous thing, I am afraid that a little ignorance is just as dangerous.

The parasite theory is not yet a scientific system. In most of its claims it is not yet sustained. Many alleged discoveries of characteristic disease-germs have seen the light in a few years, and disappeared in utter darkness. In regard to the whole question, while anxiously and willingly waiting for further facts which would simplify the pathology of infectious and contagious diseases, I still maintain, as in the preface to my "Treatise on Diphtheria" (1880), the verdict "Not proven."

Another point which has been raised against Virchow is his hesitancy in accepting not only what has been called Darwinism, but at the same time the teachings and postulations of Darwin's followers and apostles.

As early as 1849—in his "Movement in Favor of Unity in Scientific Medicine," Virchow claimed the origin of life to be a mechanical necessity. In an oration delivered in 1858, a year before the publication of Darwin's "Origin of Species"—printed in a pamphlet containing "Four Orations on Life and Disease" (Berlin, 1862)—he pointed to the changeability and transmutability of species as a necessary basis for the mechanical theory of life. Thus, he was by no means unprepared for *Darwin's* theories. But he knew—and nobody knows it better than Darwin himself—that the transmutability of species, the battle for existence, the theory of selection, even the doctrine of inheritance, were by no means Minerva's springing from the head of Jupiter, unprepared and unexpected. For Goethe and Lamarck were not unknown, and the term of self-preservation was a stock in trade of the biology of bygone times. And nobody knows better than Darwin and Virchow, that hypotheses are not facts, problems not articles of creed, and the exaggerated generalizations of enthusiastic pupils not the outgrowths of superior minds. On the other hand, much of what was twenty years ago the fear and anxiety of many men and women, has greatly settled down as established facts. Twenty years ago

the pulpits teemed with attacks on Darwin and what was called his monkey-theories, mobs gathered to stone public lecturers, and extra hells were heated to consume him and his followers. For did he not intend to annihilate the belief in everything that was sacred, even Judaism and Christianity themselves? Was not religion based on the certainty that the world was created five thousand and seven hundred years ago—some thousand years after they enjoyed established civilizations in China, the East Indies, and Egypt—and was it not known that the monkey was constructed on Friday, and man on Saturday?

Many, most of you, remember the time quite well —it has not passed away entirely—when strong expressions were used concerning and against, the theories of Darwin and his pupils and collaborators. Many, however, are aware also that some of these pupils and collaborators fell into the same errors of expression and behavior we have to complain of in their opponents. Whoever was not with them totally, and in all their *conclusions*, was considered to be against them. And in this respect no illustrious man had to suffer more from the exaggerations of zealotism on the part of really scientific men, than Virchow.

A number of public meetings of several of the annual congresses of German physicians and naturalists, mainly those of Munich and Cassel, were taken up with a dispute principally between Virchow on one side, and Haeckel and Klebs on the other. It is mainly Haeckel to whom the popularization in Germany of Darwin's ideas and theories are due. Himself distinguished by original researches, and an enthusiastic scientist, imbued with the instinctive belief that science must fertilize individual and public life, his sustaining Darwin and his theories have greatly contributed to making what has been called Darwinism the intellectual property of most educated Germans. But in one of his public speeches he insisted upon the theories on selection being admitted among the subjects to be taught in the public schools of the most elementary character. It was to

this that Virchow objected, on the ground that only established facts and results, and not theories, should be taught in schools. To this objection it was due that he was overwhelmed with reproaches. It was said that the man was so taken up with work of all kinds, that embryology and Darwinism were sealed books to him, and that he to whom—it was true—science owed so much, was to be pitied for his advancing age, which prevented his keeping up with his former pupils, who now stood on his shoulders enjoying a larger mental horizon. These attacks on the part of Haeckel, and mainly of Klebs, are not pleasant reading. There is more eagerness and bitterness in them than we desire to meet with in scientific productions and strifes, or have ever met with in any words penned by Virchow.

There is a peculiar undercurrent to this controversy which is but rarely visible on the surface, but at the same time is readily recognized by a careful observer. To understand it, it must be remembered that German higher education is mainly classic, and irrespective of religious or anti-religious views or tendencies. The latter certainly are in the majority. Statistics do not prove that in any country and among any people, virtue, vice, and crime depend upon the presence or absence of positive creeds, be they Judaism, Christianism, or any other form of belief; but among other influences on the amount and nature of education and training. Even the anti-semitic persecutions in modern Germany have their cause, not in the prevailing influence of the Christian religion, but in the absence of schools; for it is a statistical fact that those Pomeranian and Mecklenburg districts, in which Jews are killed and Jewish windows broken and stores robbed, are less supplied with schools, and can less boast of mastering the mysteries of reading and writing, than any other part of the land of Bismarck.

Thus, it will be admitted that the mainly classic education and agnostic tendencies of the higher classes of Germans do not debar them from being good students, good men, and honest friends and enemies. But, after all, Hellenism and Latinism

were human too, and Greeks and Romans hated and loved, scolded and praised, kicked and kissed, like people before and after them. There were zealots among them, too. Socrates was killed because he believed differently from other people, on the plea, however, that he subverted the State, as two thousand years afterward, the Church burned a hundred thousand adversaries. Something reminding of that has occurred in the land of free thought and profound philosophy lately. Haeckel, the classic scholar, the thorough philosopher, the original worker, is aggrieved at Virchow's not seconding all his propositions, favoring all his plans, agreeing with all his opinions and methods. There is one peculiar trait in Haeckel, too, which is rather uncommon in a German savant. His studies have been mainly in embryology and biology. His religious views are of a negative character. He believes that these ought to be strongly stated, contrary to those who think and write, that creed, faiths, and religion have nothing to do with scientific researches. With these he differs. When his book on Evolution carries him to the conclusion that there is no need of a personal God—just as Laplace said he did not require that hypothesis—he not only expresses that conclusion in strong words, but devotes a whole chapter to it. But others are of the opinion that the finding of truths and expounding them has nothing to do with the fighting of opinions and articles of faith, and that religious controversies must not form a part of scientific books. This opinion Virchow has shared all his life. More than thirty years ago (*Ges. Abh.*, p. 6) he wrote as follows:

"Faith does not admit of a scientific discussion, for science and faith exclude each other. Not to such an extent, however, that one of them renders the other an impossibility, but in such a way that within the range of science there is no place for faith, and the latter can commence only where the former ends. It need not be denied that, if this boundary line be respected, faith *may* have actual objects. It is not, therefore, the domain of science to attack

faith or its objects, but its duty is to mark and consolidate the present termination of knowledge."

Such is his position this very day in regard to this question, and thus it is that much of the bitterness of feeling which appears to be engendered by strong anti-religious feelings almost as much as it is known to have generated ferocious persecutions and atrocious wars of religion, has been spent on him. He has borne it placidly, but we have to be sorry for the fact that he could not be spared it. If there is anything in science, that something is its influence in elevating, refining, humanizing, and the scientist ought to be, and will be, the very apostle of humanism. As science clears the brain, so it ought to purify the heart. Knowledge, logic, reason, ought to go hand-in-hand with feeling, sympathy, and fellowship. Let me dismiss, then, the controversy, commenced in an evil hour by a man otherwise great and good, by again quoting Virchow, who has remained true to what he expressed more than thirty years ago in the following words (*Ges. Abh.*, p. 7): "Humanism, in its true meaning, is no apotheosis of mankind—for that would be anthropomorphism—but the scientific knowledge of the manifold and various relations of the thoughtful individual man to the ever-changing world. *Its* base is the science of nature, its very expression anthropology. For that reason humanism is neither atheistic, nor pantheistic, for, in regard to everything beyond the reach of actual knowledge, there is but one formula: *I do not know* (as Liebig said, the science of nature is modest). Humanism is neither spiritualistic nor materialistic, for to *it* constancy of force and constancy of matter are facts of equal significance, and the unity of man's nature is a settled conviction. It is neither grossly egotistic nor sentimentally self-sacrificing, for, while recognizing the claim of everybody else upon existence and full development, he must demand equal rights for himself."

The humanism so well described by him, Virchow has lived up to. In his early political efforts, which necessitated his removal from Berlin to Würzburg, he showed his sympathy with the oppressed

mass of the people; in his famous papers on the famine-typhus in Silesia and in the Spessart he showed his appreciation of the necessity of radical changes in the position of the neglected and starving members of society. Thus, you observe that, while engaged in professional researches, which, in regard to universality, novelty, and reforming power, are surpassed by those of none whose name is immortalized in the history of medicine, Virchow never ceased to feel that he did not only belong to abstract science, but to his people; and again, as his science has always a practical aim and result, so his political and social views have a practical bearing. He was born one of the people, and a friend of the people. He need not turn politician; he was a politician born. We, in this our country, are often in danger of forgetting that at one time, at least, the most intelligent, wise, and pure men of this nation of ours were our foremost politicians. Men of courage, character, and genius guided the rising star of the republic through the night of despair, and the ship of state through the storms of strife and battle. Without the controlling sympathy of the very best, the Constitution of the United States would not have seen the light, and could not have been sustained to its approaching centennial anniversary. We have since descended, sometimes, to the fear that only a second-class intelligence and a third-rate morality make a successful and eager politician, losing sight of the fact that Aristotle already defined man as a "political being," and insisted upon the labor of all in the interest of all.

In many communities a politician is considered a man whose character is not above suspicion, morals doubtful, and social integrity shaky. If, however, there be any truth in this, the fault is neither in politics, nor in the politician or office-holder, but in us who feel so indifferent about our own and public matters as to close our eyes when watching is required, and to bemoan the result of an election instead of once appearing at the polls. When we happen to find a man of genius and integrity in a high or low public office, we are more apt to wonder how he came

there, than to feel the necessity that our offices should be filled by just such men only. Virchow's example should teach, particularly young medical men, that thorough science and good citizenship do not exclude each other. Indeed, there is nobody so removed from the midst of his fellows, so absorbed by abstract studies, but has interests in common with the rest of mankind; and nobody so raised above the level of his kind but can and ought to contribute to the elevation of his nation or race by personal contact and the attendance to daily duties. These twenty-two years Virchow has been a member of the administration of the city of Berlin. In his place as an "alderman" he has given his attention to the minutiæ of city government. A number of his papers, written within this period, treat of subjects of hygiene, drainage, canalization; and while they point to local necessities and improvements, they give the scientific reader copious material of general importance and new ideas. His regular re-election to the same place, his elevation to the vice-presidency of the board, prove two things: first, that his efforts in the direction of turning science into practice are appreciated by the population of his city; and secondly, that he is not tiring of keeping up his contact with his fellow-citizens, of feeling his obligation to the commonwealth, and acknowledging his duties to his neighbors; and that much, as the Scriptures have it, is demanded of the man to whom much is given.

But more. A man of his attainments can be made useful in a wider sphere; a man of his sense of responsibility will shoulder more important duties. Since 1862 he served in a constant succession of terms as a representative of the people of Berlin, in the Prussian Lower House. In this capacity he acted as a member of finance and other committees, always ready to work, to learn, and to teach.

However, to go into his history as a politician would require a review of Prussian and German politics. This may be said only, that, though he be not at all a brilliant speaker, his words are always list-

ened to with attention, his wisdom is always honored, his courage and moderation are always admired. It is not necessary to add that he sides with the party of liberal views and progressive tendencies, and is in constant opposition to the one man who, through nearly twenty years of oppressive measures, dissolution of parliaments, governing without the assent of the representatives of the people, sudden changes both of economical and ecclesiastical policy and party affiliations, brutal assaults on the rights of individuals, the freedom of the press, and the principles of the constitution, though he succeeded in throwing into the lap of the Prussian reigning family an addition of large territories, and gaining for Germany a partial unity, has done more than any German man in history to emasculate German politics and demoralize the public conscience. I am no prophet, but this I predict: when that man of iron and blood will have closed his career, no sorrowing fifty millions will drape their doors, as we did a week ago, and feel that every household has been bereaved, as we then felt. A seat in high politics will be vacant, but no place in the hearts of the people will need to be filled. Bismarck has not found a more persistent and conscientious adversary than Virchow through all his parliamentary career. In regard to the latter I will predict that among the German politicians who resisted, to the utmost, the lawlessness of absolutism, and claimed that law should be supreme, the rights of citizens respected, the office-holders know and live up to their duties, the constitution be carefully guarded and protected, and peace not rendered so expensive and exhausting as war, Virchow's name will, for all time, be mentioned among the first and wisest and purest.

Did time permit, I would fain go into particulars: his contributions to the legislature on infectious animal diseases; on fisheries; his participation in the debates and legislation on the arbitrary expulsion of Jesuits; of his introduction of the term "Kulturkampf" — battle for culture — in connection with the dissensions between Bismarck and the Pope, which commenced with the boast of the former

that he would not go to Canossa, and ended with the victory of the latter four weeks ago; his many lectures for workingmen's societies; his superintending, with Prof. Holtzendorff, the fortnightly publication of a number of series of popular lectures; his supervising the erection of public hospitals and the first barracks; his conducting the first sanitary train into France during the Franco-German war, and his serving as an officer in the army auxiliary societies centred in Berlin.*

When he first became noted in politics the admirers of his genius became anxious concerning the influence politics might exert on the rest of his labors. There were those who predicted that politics meant the closing of his scientific career, and others—not rarely those who owed him their education, first ideas, and positions—jealous of the great king's powers, who supplied the cartmen with jobs while he was building—as Schiller has it—took it for granted that he could not even keep up with the rapid strides special branches of science were making through their and others' efforts. But the facts point the other way. Since he almost filled the first volume of his *Archiv* with his introductory "On the Standpoints in Scientific Medicine," and his researches "On the Development of Cancer," and "On Pathological Pigments," and an "Essay on the Reform of Pathology and Therapeutics by Microscopical Investigations," almost no volume has appeared to which he has not himself contributed. Many of his papers are elaborate and lengthy, and would, if written by most others, according to the habit prevailing in Germany, have swelled the number of pamphlets and books published with independent title-pages, instead of forming parts of journals. Gigantic work like that performed by him in his first twenty years cannot continue forever; one new era created cannot be replaced by another by one man. If he had done nothing since besides writing his occa-

* One of the latest cable news speaks of Virchow as one of th speakers in a public meeting held in memory of James A. Garfield.

sional reviews and summaries, such as, "Old and New Vitalism" (vol. ix.); "Our Programme;" (vol. l.); "War and Science" (vol. li.); "On the Standpoints in Scientific Medicine" (vol. lxx., 1877, thirty years after his first article in the *Archiv)*; "The Nature and Causes of Disease" (vol. lxxix.), he would have deserved the thanks of the medical world. That he has done more, we know. Some remarks of his own in regard to the subject are found in the preface to his first volume on tumors, and are very characteristic. He says:

"The dates of many of my lectures will prove that even on those days on which important matters claimed the attention of Parliament, I have attended to my duties as a teacher. To set at rest the anxiety of my friends, I will add that the silent and often unnoticed labor of a scientist requires more energy and greater effort than the activity of the politician, which is both noisier and more speedily appreciated. The latter has appeared to me often to be rather a recreation than otherwise."

Of such "recreations," as Virchow calls them, he has, however, more than one. His practice among the forlorn herdsmen of Asia Minor is an instance.

Schliemann, by whose modern witchcraft holy old Troy is just leaving its tomb, invited Virchow to aid him in his work of discovery of the buried city. He went—partly to aid, partly, as he says, to escape from overwhelming labors at home, only to be engrossed in just as hard work, though of a different nature. In regard to the latter, Schliemann's recent book on *Ilios* contains some very interesting material. But what has engaged my attention and interest most has been to observe the humanity and indefatigability displayed by the great man in the service of the poor and sick. To read of his constant practical exertions in behalf of the miserable population of Hissarlik, how he taught the aborigines the efficacy of chamomile and juniper, which grow about them, unnoticed and unused, in rare abundance; how a spring he laid open for archæological purposes has been called by them the physician's well, and is believed to

have beneficial effects; how he was, on leaving the neighborhood, loaded with flowers, the only thing they had and knew would please him, has charmed me intensely. To admire a great man for his professional labors, eagerly undertaken and successfully carried out, is a great satisfaction to the scientific observer; to be able to love him in addition, for his philanthropy and warm-heartedness, is a feast of the soul.

On this platform, and on the seats in front of me, there are masters of our profession, not a few known wherever medical science and art are appreciated, studied, and practised. There is, however, none among them but has learned from the great genius whose name I have so often mentioned in the course of this hour. There are practitioners here, learned, shrewd, successful; every one of them uses the terms invented, knows the theories proposed by the same powerful mind. Those who are young have grown up under the shadow of this tree; those who are old have been taught by him to look through his eyes and follow his methods. Schools have been overturned by his efforts, science and scientific method reign supreme. The last dangerous doctrine of the crases of the blood, so long upheld by Rokitanski, belongs to the past. Pathology is, since and through Virchow, founded on the smallest organism—the cell—and is, as Huxley but recently proclaimed it, nothing but that branch of biology which treats of peculiar disorders of cellular life, or of the co-ordination of cell-complexes, that give rise to every vital process. We cannot to-day read a medical book or monograph without Virchow's name being inscribed on many pages. When it is not mentioned, it is because the facts have become as self-understood, almost, as a mathematical axiom or an occurrence in history. There are hundreds of journal articles in our literature commencing with the phrase, "Virchow says." Modern medicine without his name cannot be written. They belong together. Nevertheless, I repeat, his is not a school. His methods are simply scientific, based on facts and

leading to facts. Schools are built on ingenious ideas, which are not based on facts and experiments. It is not probable, I cannot imagine, that after the schools of Broussais and Brown and Schönlein, and that of Vienna, there will be another one. Our school, the school of the future, is scientific medicine. The greatest glory of Virchow, for all time, is that he was too great to establish one, and too universal to ask us to *jurare in verba magistri.* All of us, old, or young, knowingly and unknowingly, are his pupils. The young men who to-night enter upon the study of medicine will hardly be taught a chapter in pathology which does not exhibit the impress of his genius.

Was I right in presenting, as an ideal pathologist, this man to the old and young engaged in medicine, and particularly those here this evening? Virchow has done enough to immortalize his name by his researches and the progress medicine has made through him. His rank in the history of medicine *is* assured. Among archæologists, also, he ranks high. The Anthropological German Society made him president after the first year of its existence. Schliemann calls him to Troy to avail himself of his superior knowledge. Numerous discoveries among old tombs, and valuable essays, are due to him. His scientific mind and exact methods prove as successful in archæology as in pathology. Even purely historical researches, like those undertaken of late on the battle-field of Fehrbellin, owe him their success.

His position in politics, his participation in all humane endeavors, I have alluded to. No longer is he to us only the man of pure science, but also the practical statesman and philanthropist. Moreover, he is the practitioner of medicine among the poor, like the best and noblest of us, as also, for the rank and file of the practitioners of medicine, he is the model of a professional brother and colleague. He is one of the most assiduous and regular members of the local medical societies, participating in scientific discussions, and serving the common interests of the profession. The same spirit of human-

ism and solidarity which presses him into the service of the city and country, makes him an active associate of the medical community. Too often do we meet the contrary. Those who have risen and advanced, partly through their own efforts, partly, however—and not very rarely—through the favor of their fellows, are too apt to forget that they are but branches of the same tree. In our own midst we notice too frequently, that those whose co-operation and example would make them the most desirable members, keep away from the societies of the county, State, and others. The individualism and egotism of the industrial period of the nineteenth century, so rife among the manufacturing and commercial classes, threatens to invade the medical profession to an undue extent. There is no man, however, who sacrifices more time, and does more work to foster professional feeling and brotherhood, than Virchow. Hardly any of the great scientific national and international associations and congresses takes place without Virchow being present. No question arises where universal knowledge and the weight of a great name are required, but his voice is heard. But lately, in London, he raised it in favor of protecting and saving the physiological experiment.

Both his universality and urbanity, as also his sense of justice, are of peculiar interest to us, the American profession. Many are the occasions on which he expressed his appreciation of the republican autonomy of the medical men in this country, of the efforts on the part of medical societies in behalf of the suppression of quackery, and also of the scientific results of American medical labor. Let me quote but one passage from an oration delivered on August 2d, 1874, "On the Progress of Military Medicine." Virchow says (page 6):

"The French army lost, in the Crimean war, thirty-three per cent. of its men, viz., 95,615. Of this number, 10,240 were killed on the battle-fields, and about as many died of their wounds in the hospitals. More than 75,000 men died of infectious diseases. In the American civil war 97,000 died of their wounds,

and 184,000 perished of infectious and other diseases. What a vast amount of pain and misery! What an ocean of blood and tears! And besides, what a number of errors, mistakes, and prejudices! It is not necessary to now enumerate the long list of blunders and sins. They are so well known as to serve in the future as warning examples.

"Let me say here that it was not misfortune alone that showed where the cause of the evil was, and then provided aid. If the French learned little or nothing in the Crimea, and the Americans so much in their civil war as to create a new era in military medicine, the explanation is not to be sought for in the immensity of misfortune and misery undergone by the Americans, for they did not suffer any more than the French did in the Crimea. The explanation is in the critical and thoroughly scientific spirit, the clear perception, the sound and practical common sense which penetrated gradually every part of the American military administration, and which, with the astounding co-operation of an entire nation, accomplished more humane results than any great war ever produced before. Whoever studies the copious publications of the medical staff of the American army, must again and again be astonished at the vast experience collected in them. Absolute accuracy of details, the most painstaking statistics, acquaintance with all branches of medical learning, and a comprehensive style, are united in them for the purpose of collecting and preserving, in the interest of the present and future generations, the new knowledge so dearly bought."

So says Virchow.

Thus, we have in him a man who has done more for pathology then any single dead or living man. He has been foremost in raising, when the time was ripe for it, medicine to the dignity of a science, with purely scientific methods. He has served his country as he did science, and humanity as he has his country. Was I right in speaking of him in the first hour of your medical studies, young men, as the ideal of a medical man, and a man? There is

but one thing I have to add—it is this: that, as a rule, biographies are written, and held up to admiration and imitation when great men have long completed their labors with their lives. Let us rejoice that Virchow's biography is not completed yet, and that he will, I hope, long live to contribute to medical science, as your teacher and the teacher of your teachers.