Stiles (R. G.)

INTRODUCTORY LECTURE

IN

HISTOLOGY

AND

PATHOLOGICAL ANATOMY.

AN

INTRODUCTORY LECTURE

TO A

COURSE OF DEMONSTRATIVE INSTRUCTION

IN

HISTOLOGY

AND

PATHOLOGICAL ANATOMY.

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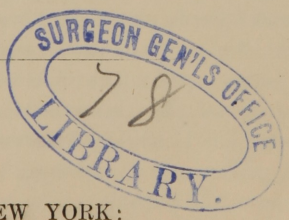

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INTRODUCTORY.

GENTLEMEN:

The course of demonstrative instruction in the statics of disease which you have called upon me to give, is not the result of a sudden determination, but of the design and preparation of years. An article published in the "Berkshire Medical Journal," for April, 1861, gives expression to the following unusual, but not altogether unreasonable opinions on the subject of medical education. The knowledge of the material derangements in the structure and composition of the body in disease, "which lies at the foundation of all true advance in medicine, our present system of medical education bestows in a very inefficient manner. When a student wishes to prepare himself for the profession of a practical chemist, he is not so unwise as to content himself with merely listening to lectures: he enters a laboratory, learns practically the art of chemical manipulation, practises all the tests, cultivates his senses, analyzes and experiments; and not until he has given a long period of patient toil to this exercise is he considered to be fitted for his profession. A medical student, on the contrary, enters a class of from one to four hundred, and listens day by day to a distant lecturer, whose ideas only have access to his mind. He is taught that a diseased organ is but an aggregation of diseased elements, but he receives his diploma while still unable to distinguish the elements, whether healthy or diseased. He has heard that certain physical signs accompany certain diseases, but of the realities he has no conception. He has not at command the instruments of research; and, what is worse, the taste for accurate investigation has not been acquired. He leaves his alma mater, and the centres of learning, practically ignorant of the very constituents of the human body; and if the acquisition is ever made, it is through bewilderment and error, for want of an educated and experienced guide. He is fitted to tread the beaten track prescribed by authority, but science need not look to him for appreciation or conquest. If physiological laboratories were founded, and a course of instruction in them demanded

as a condition of graduation, throngs of trained observers would leave our schools. In many schools the student is required to present a hospital ticket before he is entitled to his diploma; if it were also demanded that he should present tickets in evidence of having attended the demonstrative course of instructors in General Anatomy, Anatomical Chemistry, and Auscultation and Percussion, designated by the faculty, encouragement would be given to numbers of young men, thoroughly educated and zealous in the pursuit of medicine as a science, who are turned by the exigencies of life from their chosen pursuits to seek a precarious livelihood by practice; and more advantage would accrue to students and to medicine than by adding years to a course of mere verbal and dogmatic instruction. Medical teaching is becoming less metaphysical and rhetorical, and more demonstrative. To encourage this movement is to further real progress."

It is evidently impossible that instruction of the nature designated in the foregoing extract, and of that which we are now about to undertake, should be supplied by our medical colleges. The size of the classes in our best schools is of itself sufficient to necessitate an utter inadequacy in demonstrative teaching; but there is a weightier reason for the neglect with which these studies are treated. For the size of classes certain shifts of compensation may be devised, but a disparagement of the fundamental branches in question is a necessary result of our system of medical instruction. What is taught in the practical branches, in the chairs of Practical Medicine, Surgery, and Obstetrics (which chairs control every medical institution), rests upon the basis of the authority of the great masters of the medical art, of the accumulated wisdom of the wise in our profession from remotest antiquity—a basis broad enough and solid enough for a towering superstructure fitted to have answered the needs of humanity and to have commanded the admiration and veneration of the world. General Anatomy and Physiology, on the contrary, are in a state of adolescence; they are growing, strengthening, advancing daily by observation and experiment; their hope is in the future; they pay little respect to tradition; they are forced to become militant. In our medical institutions they stand in inevitable conflict with traditional medicine; or, if they do not, physiological teaching must forfeit its distinctive excellence—must narrow its range, and submit to be overborne by the traditional and dogmatic element; and the consequent anomaly is presented of a medical teacher, whose vital air should be the atmosphere of new truth and of progress, asphyxiated beneath the oppression of a dull routine or of a politic reticence, winning the tolerance of the traditional

powers—never their hearty good-will—by tacit acquiescence in all the absurdities of medical doctrine. Let us admire, rather, Magendie's boldness in denunciation of medical errors: "You see then that the doctrines of which you speak are mere words, with which you cheat yourselves, and with which you nurture your ignorance, instead of endeavoring to escape from them by experimentation." In the same tone also Bernard: "The revolution which the experimental method has produced in the sciences consists in having substituted a scientific criterium for personal authority." "Medicine is still in the darkness of empiricism, and suffers the consequences of its retrograde condition. Sorcerers, clairvoyants, and those who cure by a special gift of Heaven, are listened to with the same respect as physicians. Medical personality is placed above science by physicians themselves; they seek their authorities in tradition, in doctrines, in medical tact." The following is Professor Tyndall's declaration of war: "Surely, the men whose noble vocation it is to systemize the culture of England, can never allow this giant power to grow up in their midst without endeavoring to turn it to practical account. Science does not need their protection, but it desires their friendship on honorable terms; it wishes to work with them towards the great end of all education, the bettering of man's estate. By continuing to decline the offered hand, they invoke a contest which can have but one result. Science must grow; its development is as necessary and as irresistible as the motion of the tides or the flowing of the Gulf Stream. It is a phase of the energy of nature, and as such is sure in due time to compel recognition, if not to win the alliance of those who now decry its influence and discourage its advance."

There is another reason for the tendency which exists in medical institutions to sanctify and perpetuate established errors. Through the great misfortune of lack of endowed chairs of medical science, our medical colleges, dependent upon the support of the profession, must not teach truths unacceptable to the professional mind—not even to that of the farthest lagging but respectable minority. If the professional mind has been nurtured on tradition, the schools must teach tradition. The medical schools are the servants of the profession. If their course does not satisfy us, we condemn them to an abortive and uncertain existence by withholding our support. It is true that they have a certain independence of us, but it is only by lowering their standard and cheapening their degrees, which, in the end, proves as disastrous an expedient as that of the monarchs who in time of need debased the coinage of their realms. The teaching of the schools must be, therefore, what they call

an "enlightened eclecticism." They dare not seize upon the firmly established truths of pathological physiology as they are successively evolved, and follow them to their legitimate results in the practice of medicine, seeking in them immutable indications of treatment, while in the ten thousand varying relations of medicinal agents to the organism ample scope is given for the exercise of judgment and intelligent discretion. In the treatment of pneumonia, for example, their doctrine is that venesection is often very beneficial; that calomel and antimony are exactly suited to certain cases; that occasionally stimulants and analeptics will not be out of place; that some cases recover most happily without medication; and that, in a few rare instances, if the medicine be given in drop doses or minute pellets, the effect upon the patient's mind will be salutary. Amid a wreck of traditional principles of treatment, their therapeutics is chaotic, guided by meaningless fashions, for their tendency is to degrade the studies which imply research, discovery, progress. The very announcements of most of our colleges bear on their face a hint of satire on the studies for the value of which I am now contending. General anatomy is announced as "microscopic anatomy," with the same propriety as a professor of astronomy in Harvard might be called "Professor of Telescopic Astronomy," or a professor of physics in Yale, "Professor of Prismatic and Lenticular Optics." The term "microscopic anatomy" does not convey the true idea, that the anatomical elements and tissues are the seat of all the phenomena of life, and *must* be studied if we would know the truths of organization. You may have seen, perhaps, a minute and faint blur on a plate of glass, which, under the microscope, revealed the Lord's Prayer or Creed in perfect lettering. The creed of the pathologist and his prayer for light are written in just such characters, and must be so studied, also, if they would be learned at all. But the science, the intellectual conception, is above its instruments, and the science of anatomy embraces a complete knowedge of the structure of the organism, irrespective of the instruments it employs.

My endeavor has thus far been to show that the branches of medicine which, though young, are already strong, and are still growing and maturing, will not flourish inclosed within the gloomy walls of tradition. If this be the case, they must be prosecuted, and instruction in them may well be sought, apart from our established medical institutions. We wonder that the discovery of the circulation of the blood should have emanated from a purely medical institution, but we know how the discoverer's colleagues were scandalized, and how he lost their confidence and that of his patients in consequence; and we see in the light which has streamed upon medi-

cine from the College of France throughout the present century, what a chair of medicine can effect, well supported side by side with the experimental sciences, and imbued with their spirit of earnestness and freedom.

Secondly, the instruction I propose is undertaken as a protest against utilitarian encroachment on the honor of our profession. I find ready to my service a page from Monneret, Professor of Medical Pathology in the School of Medicine at Paris, which now bears the authority of a position without its superior in medical influence, and which I have translated, to use in the furtherance of an endeavor to arouse an interest in studies too lightly esteemed by a large proportion of practitioners of medicine. It is as follows:

"There are in reality few minds at the present day who are willing to give any attention to or admit any value in a work, if it has not, as its necessary and immediate consequence, what they are agreed to call an application. He who devotes himself to a research, of whatever nature, demands first of all that it shall be useful. Utility, that is the ponderous word which weighs heavily on medicine as on all branches of human knowledge. Let us seek the cause of this false direction.

"It will be found first of all in the present state of society. Ever occupied with interests and not with ideas, with the matter of fact and not with the thought which vivifies, physicians, like the rest, must absolutely draw profit from their intellectual labors, and find their equivalent in hard cash. In this beggarly century, in which every one feels himself driven by the hard law of necessity, we work no longer for art in itself: we commence by magnifying the importance of a fact, however insignificant or well known it may be; we then try to present it well, to give it an *ad captandum* form; we talk constantly of its numerous applications, above all for the relief of humanity; we always end by making believe that it is useful; then, after these theatrical representations, in which more is seen of the man than of his idea, the whole thing is neglected and forgotten. The effect produced is not on that account less disastrous. By dint of hearing the demand for applications, we abandon profound, general, or purely didactic studies; we fear that we shall be accused of giving ourselves up to idle speculations, of being mere students, of neglecting the practical side of questions. Thus languishes and will soon die out the deep and vigorous thinking of which the old authors are full, which raised medicine above other sciences, and to which we beseech our countrymen to return."

"The spirit of science must be very poorly understood, if we would banish from it general studies. A pure abstract speculation, without

influence to-day, may have an immense value to-morrow. How many examples, borrowed from physics and chemistry, prove beyond contradiction that it is never justifiable to neglect the study of the sciences in their most theoretical aspect! Let us moderate, then, our zeal for applications—for practice taken in its restricted sense: let us by labor and thought raise medicine above the low level of interest to which it is being degraded. To act otherwise would be to misunderstand the laws of that eternal movement which is called progress, and which is not merely the satisfaction of material wants."

In old men, as a rule (with many noble exceptions), we look for the full development of the utilitarian tendencies of which Monneret speaks; the love of gain and of material prosperity, rather than zeal for professional honor and for the sway of the truth. This instinct of avarice has been developed in the old man's constitution in obedience to a law of nature, doubtless a wise one, for the material benefit of a generation into which he has lived, outliving his professional prime, and has the same final cause as the maternal instinct—is only lower in grade, and less admirable; and so old men become tolerant of that which in the vigor of manhood they would have scorned, and call their tolerance prudence and conservatism: but for this there is no remedy; we may ourselves expect, some of us at least, to follow the same down-hill road of life.

The young man falls into error through the weakness of youth, and needs the directive and corroborative influence of scientific pursuits to keep his aims honest and single. I cannot better illustrate this need than by taking an example from one of the commonest downfalls of professional honesty. A young physician has had the misfortune to settle in a locality where he has for neighbors a number of empirical and recreant practitioners, most probably operose members of numerous popular associations, to which, having nothing in their own calling worthy of serious pursuit, they can give unlimited attention, and so spread themselves over a community. At the outset the young physician would repel the very imputation of an unprofessional act; but waiting for practice is the extreme of wearisomeness to one who has no scientific resources; perhaps necessity urges; he begins to see in a new light the associations he once abhorred; the gilding of a seeming respectability hides the base counterfeit; he becomes tolerant where complacent tolerance implies a want of decision in the condemnation of wrong; and we find him in social companionship, in consultation even, with men whose ignorance and incapacity, for any case of serious emergency, he freely admits. Where he has erred himself he justifies himself boldly to others, and his influence becomes pernicious in the profession,

not only lowering its standard of integrity, but encouraging direct violations of our excellent ethical code. For the young physician incurring the hazard, or having borne the stain of such associations, we recommend the path of science as the only resource for bracing his wavering moral sense; religious conformity alone will not suffice, for the mercenaries of medicine have often a special prerogative of sanctuary in religious associations. God forbid that I should utter a syllable against Holy Religion, the soul's guide, the Beatrice of its adoration; but it is the old story, older by far than Galileo and the cardinals, than Calvin and Servetus, of the conflict between science and the interpreters of religion; and still, even at the present day, the latter, unfitted by exclusive attention to certain phases of thought for the due appreciation of the claims of material precision, throw the weight of their influence, either consciously or unconsciously, where there is least show of opposition to their spiritual teachings, or most show of immaterial confirmation of them. These good clergymen, these honest abettors of quackery, hopelessly, helplessly bewildered by the logic of material facts, cannot appreciate the just condemnation which physicians bestow on these petty practitioners, whose pretended exclusive dogma would break the scalpel of the anatomist and the crucible of the chemist, and darken the eyes to which any new truth of the human organism might be revealed, and who, taking advantage of the tides which are constantly swaying the system between bounding health and deep prostration back and forth, prate to the public of their cures; for it is the very essence of quackery to seek the judgment of a popular tribunal in medicine, the most difficult of sciences. There is no better probe than true science affords to detect the weakness and disease in the professions of such pretenders; it is doubtless to its more general cultivation that must be attributed their waning fortunes—the deserted benches of their schools—the public renunciation of their creed by some of the most prominent of their class. It is little to the credit of a great city to be the last stronghold of a popular delusion, which is on its way to join Thomsonism and Perkinism, *et id genus omne*, in the limbo of medical heresies no longer fashionable. But for the true physician, science and philanthropy will ever dignify the humblest professional service; will fill with a bright presence the lowliest dwelling of sickness, for the heart of a royal favorite cannot beat truer to a monarch-master than does the heart on the pallet of straw to nature, the monarch of science, the ancient enemy of tradition. Love of science is more powerful for good than hatred of error.

Lastly, I reach the most valid of all the inducements which have weighed with me to become your instructor in the course proposed.

The history of medicine abounds in instances in which a discovery in human anatomy has modified the prevailing practice of medicine: how much more must this be the case with the creation of an entirely new branch of anatomical science! The great era in intellectual and social advancement which dates its origin at the commencement of the present century was ushered in by the creation of a new department of knowledge, that of General Anatomy, as it came from the brain of Bichat. It has grown with the addition of the microscopic discoveries of the last thirty years into a body of facts and doctrines, of more importance in its relations to medical pathology and practical medicine than all the knowledge of anatomy before acquired. If Rokitansky could introduce his great work by saying, "The present work will at any rate tend to show how thorough is my conviction that Pathological Anatomy must constitute the groundwork, not alone of all medical knowledge, but of all medical treatment; nay, that it embraces all that medicine has to offer of positive knowledge, or, at least, of what is fundamental to it," we are hardly in danger of estimating our proposed studies too highly. A fundamental change is being wrought in our conception of the healthy and diseased activity of the body. Where our predecessors recognized organs and members in its composition, we see in the functional activity of organs and members the sum of the working of countless individuals, of innumerable vital units (*vitaler Einheiten* of Virchow; *organites élémentaires* of Milne Edwards), each possessing its autonomy. "Every animal," says Edwards, "is an association of living organs which react upon one another; and every organ is, in turn, an association of individualities or organites which work together, but have each its independent vitality. These organites do not appear to differ much in different animals, but their mode of association varies, and it is chiefly by reason of the differences in the combination of those associations in various degrees that each zoological species possesses the anatomical properties and characters which are peculiar to it." "Diseases," says Bernard, "are in reality only physiological phenomena under new conditions which it is required to determine; toxic and medicinal action is reduced to simple physiological modifications in the histological elements of our tissues." "It is evident to every unprejudiced mind that medicine is taking its definitive scientific direction. By the natural progress of its evolution alone it is abandoning little by little the region of systems, to take on more and more the analytical form, and is thus gradually entering upon the method of investigation common to the experimental sciences." Testimony might be further adduced in support

of the opinions I am advocating, and from those who are in the "foremost files" of the great advance of medicine.

To the recognition of the affections, properties, and powers of the anatomical elements should our researches be chiefly directed; for until our pathology has accounted for the mode in which they are affected in disease, and our therapeutics directs its agents according to the manner in which these elements are known to respond to medication, practical medicine will not have followed the plain path of scientific direction. Herein is involved a reform in medicine for which it is our duty to strive, for in so doing we may be sure that we are not obeying mere ripples of local influence, but that we are borne on a great tide-wave of medical progress. To this recognition of the rights and powers and welfare of individual units in the bodily organism, there has been a corresponding movement in the frame-work of the social organism. This tide-wave has again swept over our reunited country, and the Old World is again destined to feel its inevitable and irresistible reflux from our shores. But this new conception of organic structure and function demands new modes of study; the grosser resources of our medical schools will be exhausted before the knowledge it requires can be obtained. To fulfil the new requisitions physiological laboratories must be established; private and demonstrative teaching must be encouraged; teachers must be multiplied, and the medical education demanded for a right to a place in the profession must be of a much higher grade.

In confirmation of the views just presented we will next proceed to examine in detail the cases in which disease is known to occupy, or to have commenced in, certain anatomical elements and tissues to the exclusion of others; and those in which agents that may be used as medicines are known to affect the function or nutrition of certain elements to the exclusion of others. Let us hope that the facts of this nature will multiply under our researches.

On the march of the Union army from the Rappahannock to Gettysburg, in the month of June, 1863, cases of sun-stroke were of frequent occurrence, and the nature of the disease was often a subject of discussion among the medical officers of Hancock's Division, with which I was then connected. The symptoms of most of the cases which fell under my observation pointed, I thought, to the heart rather than the brain as the seat of the disease; and I determined to take advantage of the earliest opportunity of having recourse to experiment to throw light on a pathological condition, the causes of which are so easily brought to bear on the lower animals. The exciting causes of the cases I had witnessed

were evidently muscular exercise and heat. The direct heat of the sun is unnecessary; in India the disease occurs on night marches; our hospitals in the city are often supplied with cases from laundries and sugar-refineries. Of internal causes of heat it is now admitted that the principal source of animal temperature is in the muscular system, which, according to Bernard, forms nineteen-twentieths of the mass of the body; the tonicity of the muscles is a state of activity; the heat generated by them in this state is only less in degree than in continued and violent exercise. The influence of the muscles in producing heat when at rest is best seen on post-mortem elevation of temperature, when the circulation no longer distributes the heat generated. In eight cases reported by Bennett Dowler, and cited by Carpenter, the mean temperature in the muscles of the thigh was 109.6° Fahrenheit to 100.6° in the brain, where it was lowest.

A mammal cannot survive a temperature of 115° of the blood in the left side of the heart. When it is exposed to a heated medium long enough to produce this result, it dies, as I have shown, with the phenomena of sunstroke. If there is interference with the refrigeration of the body by evaporation, either through lack of water in the blood or failure of the action of the skin, a high temperature, with muscular exercise, will readily raise the heat of the blood in a human being to the fatal point. But that with which we are chiefly concerned at present is the mode of action of the heated blood in producing the fatal result, viz., the paralysis of muscular tissue, and the proof that the degree of heat capable of effecting this has no injurious influence upon the nervous tissue nor the blood. For the paralysis of the muscular tissue of animal life by a heat of 115° Fahr., we have the authority of Edwards and Bernard; that the nervous tissue is left unharmed by a temperature which will paralyze the muscles, was proved in the following manner: A cold-blooded animal, in which the circulation is sluggish, and the heat, therefore, slowly distributed, is plunged into the heated medium (115°), leaving only the lower extremities, or the tail, above the surface, until every muscle, even the deepest seated in the portion immersed, has become rigid, and even for a longer period, to insure the exposure of the spinal cord to the same elevation of temperature. If now the spinal cord in the anterior portion of the body is irritated, the part not immersed manifests muscular contractions; while, therefore, all the muscles immersed have been paralyzed, the spinal cord has remained unaffected.

The proof desired may be obtained in the following manner: The hind leg of a frog is removed from the body, with a considerable length of sciatic nerve, in the usual mode of preparation for the simplest experiments on

muscular and nervous irritability. The thigh and projecting unprotected nerve are immersed in the heated medium, leaving the leg and foot free. After the thigh has become completely paralyzed, irritation of the projecting nerve will cause active movement in the leg and foot.

That the blood is not affected injuriously by a heat of 115°, was proved by drawing blood from an animal, immediately heating and injecting it back from the heated instrument into the veins, or by injecting into the veins of an animal the blood of one of the same species that had died with the phenomena of sun-stroke from exposure to a heated medium. In neither case, when the experiment was carefully performed, did toxic symptoms show themselves: moreover, defibrinated blood, long kept at a temperature of 115°, manifested its usual reactions with oxygen and carbonic acid.

In animals dying from the effect of heat, the heart is found rigidly contracted, when examined a short time after death; in hospital cases of sun-stroke the heart has been found rigidly contracted when examined within an hour after death. When the beating heart of a cold-blooded animal is immersed in a medium which is gradually heated, its motion is arrested just before the temperature is reached which rigidly contracts it.

There is another point of the highest interest in the pathology of sun-stroke. Sun-stroke is a febrile disease; it has been called sun fever, thermic fever; and the explanation of the febrile phenomena I have also submitted to experiment. The difference between the striated and non-striated muscular fibre is one of physical and mechanical rather than of molecular constitution. Both contain syntonin or musculine; both develop lactic acid during their contraction; in some animals a delicate striation is evident in the smooth fibre-cells; they react alike to physical and chemical reagents. The direct effect of a temperature of 115° suddenly applied to the non-striated muscular fibre, as in the umbilical arteries, where it is remarkably well developed, or in the alimentary canal, is its rigid contraction; if, however, the heat is gradually applied, the most complete relaxation precedes this *rigor mortis*. In experimenting on the ears of rabbits, in which artificial sun-stroke had been produced, I found this relaxation so complete that it could not be overcome by immersion in ice-water, nor by galvanic irritation. We have in this circumstance the explanation of the febrile phenomena. The blood-vessels throughout the body are paralyzed; the blood pours from arteries into veins; the heart is aroused to tumultuous action, hastening the period of its complete exhaustion or paralysis. The brain is overwhelmed by the pressure of the torrents of blood in its dilated vessels, and the *stroke* marks the period of

vascular paralysis, and of the release of the muscular tunic of the vessels from the control of the sympathetic nerves.

Cold water was found a most valuable remedy by some of the best observers on our medical staff. It acts in two ways: to directly cool the heated body and blood, and, by absorption, to furnish the material for refrigeration through evaporation.

In explaining the causation of sun-stroke, the nervous system was left out of the question, as an unnecessary complication; and that because, in experimenting on blood-vessels devoid of nerves, as those of the umbilical cord, the effects of elevation of temperature were as fully marked as on any vessel containing nerves. Whatever disagreement there may be with my explanation of the pathology of sun-stroke, it is none the less demonstrated that a temperature of 115° will paralyze muscular tissue, leaving the nervous system and the blood in a state of at least comparative, if not complete integrity; and it was for this purpose that the example was adduced.

On experimenting on the blood-vessels of the umbilical cord with the blood of patients suffering from typhoid and typhus fevers, similar phenomena of relaxation to those produced by a high temperature were observed; and it becomes a question of exceeding interest, whether febrile diseases generally, as I have elsewhere endeavored to show, are not produced by a direct action of a blood-poison on the muscular tissue of the blood-vessels, releasing them from the harmonizing and controlling influence of the nervous system.

We are assured, however, that so common a cause of disease as heat, when administered in a poisonous dose, singles out a definite tissue on which to exert its morbid activity; and we know that other agents manifest a similar power of election. It is also self-evident that in order that these relations, and many others which will occupy our attention (as that of the Trichina to the striated muscles; that of Carbonic Oxide to the blood corpuscles; that of Wourara to the motor nerves, &c.), should be understood, the elements affected must be objects of careful and constant study.