An address delivered at the opening of the section of pathology / by A. Sheridan Selépine, at the annual meeting of the British Medical Association in Carlisle, July, 1896.

AN ADDRESS

DELIVERED AT THE OPENING OF

THE SECTION OF PATHOLOGY.

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At the Annual Meeting of the British Medical Association in Carlisle, July, 1896.

ON THE PLACE OF PATHOLOGY IN MEDICAL EDUCATION.

"THEY DO NOT DEEM IT DISCREDITABLE TO DESERT ERROR, THOUGH SANCTIONED BY THE HIGHEST ANTIQUITY."—*W. Harvey.*[1]

GENTLEMEN,—We come once more, at the end of a scientific year, to bring to each other some of the fruit of our labours and help one another by friendly discussion. It is my privilege to have to welcome you, an honour which I feel too well to attempt to measure it in words. I will take advantage of this opportunity to bring before you a few considerations on some points which seem to me of actual interest to all pathologists in this country.

The tendencies of our system of medical education have for some time given rise to adverse criticism, much of which, I fear, is well founded. Quite lately the General Medical Council has had again under its consideration a motion regarding "the need for reform of the medical examination system."[2]

Pathology forms such an important part of medical science that any question touching medical education necessarily concerns teachers of pathology, who should do their utmost to make their subject useful and not a stumbling block to the medical student. This is all the more important as pathology has only of late been recognised in our universities or colleges as a subject worthy of a special chair.

To quote Professor Hamilton's words:[3] "It will, I think, be granted that the pathology of to-day is not delimitable merely as a matter of pure morbid anatomy, pathological histology, pathological physiology, pathological chemistry, or clinical medicine, but that these are simply the members of a great body, and that they are indissolubly bound together."

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[1] *Loc. cit.* (see end of paper).

[2] BRITISH MEDICAL JOURNAL, 1896, vol. i, pp. 1370 and 1397.

[3] *A Textbook of Pathology*, vol. i, p. vii, London, 1886.

For over two thousand years four great branches of medicine have been more or less clearly recognised. These are now familiar to us under the names of physiology (including anatomy), pathology, hygiene or preventive medicine, and therapeutics. I hardly need say that these branches of medicine are themselves founded on physics, chemistry and biology. To the initiated student of disease this subdivision matters little; the limits of his investigations are not indicated by the accident of his being either a physiologist, a pathologist, a therapeutist, or a hygienist. It is the nature of the subject investigated that should determine the scope of an investigation. Far from me the thought that anyone will ever be able to grasp all the aspects of a natural phenomenon and see it in its entirety, but I am quite certain that when we attempt to see nothing of Nature but what can be revealed by certain methods, we lose sight of many of the links which establish a connection between causes and effects. This obscuration is never so fatal as when, in addition to the limitations introduced by methods, are superadded those created by preconceived ideas or hypotheses (when these are used as permanent guides instead of as temporary helps). Hippocrates has well said: "Those who, having undertaken to speak or write about medicine, have first laid down for themselves some hypothesis to their argument, such as hot or cold, or moist or dry, or whatever else they choose (thus reducing their subject within a narrow compass, and supposing only one or two original causes of death among mankind) are all clearly mistaken in much of what they say."[4]

I have, so far, alluded only to the science of medicine; the art itself, however, does not simply consist in an application of science, but implies a knowledge of a number of social problems, and a certain *savoir faire*, and these may be used to such personal advantage as to make science of secondary importance. Dr. Clifford Allbutt has alluded to this when he says:

"The merely scientific physician is apt to be blind to useful manœuvres which rest rather upon the accidental than upon the more permanent qualities of things; indeed, the practical man often sees more of the surface of things than does the analytical man, and thus keeps more of the sense called 'common.' So it comes about that, in practice, personal tact and character are as important to the operations of a physician as scientific equipment. He has to deal with men of limited vision, full of accidental qualities, and subject to accidental disturbances; and the tact which deals with these confused and conflicting attributes is born rather of a wide survey of the outside of things, and of transitory conventions, than of a penetrating insight into causation. Excessive concentration, if it fit a man for analytical study, may unfit him for the world."

"Moreover, the purely scientific physician tends to undervalue opinion, as the man of the world to overvalue it."[5]

When the only object in consideration is success in practice, as estimated by the number of patients, there can be no doubt that this argument is correct. I feel, however, that a higher ideal is offered to us by many of the older writers for whom science was a harder mistress than she is now.

[4] Hippocrates, *Ancient Medicine*, p. 161, Sydenham Soc. London, 1849.
[5] Clifford Allbutt, *System of Medicine*, I, pp. xxi, xxii, London, 1896.

Over and over again Hippocrates lays stress on the importance of scientific inquiry. "Wherefore it appears to me necessary to every physician to be skilled in nature, and to strive to know, if he would wish to perform his duties, what man is in relation to the articles of food and drink, and to his other occupations, and what are the effects of each of them on every one."[6] Galen also tells us that "It was easy, after having rapidly learned what Hippocrates had taken a long time to discover, to devote the rest of one's life to the discovery of what he has left us to find still. He who estimates riches better than virtue, and who learns his art to gather money and not for the good of humanity, cannot possibly aim at the object of medicine," etc. I feel, therefore, inclined to believe with Hippocrates and with Galen, as well as with a host of great medical masters, that the study of science is not only to be regarded as a help towards the acquirement of a respected and remunerative art, but that its prosecution is also a duty which we inherit from the moment we take advantage of the discoveries of our predecessors—a duty which we owe to our followers.

Putting aside, however, this higher standpoint, I think it is easy to prove that science has, or should have, on purely practical grounds, a place of great importance, first in the education, and afterwards in the practice, of medical men.

I have already admitted that there is much truth in the objections which have been raised against the methods of imparting scientific knowledge, and the manner in which examinations are driving the student to forsake the benefits of genuine education for the worse than useless system of "cramming." The fault of this is not in science, but in the methods of teaching or in the nature of the examinations.

The observations of Mr. Teale, supported as they are by those of eminent teachers and scientists, may well be repeated here:

"The burdening of the memory with mere facts which have no direct or obvious connection with science or practice, with facts—that is, unassociated with ideas of practical utility—is on the whole of little value educationally or otherwise, and such facts make but a transient impression on the memory.

"Indeed, the examinations in each subject of professional study should be restricted to the general principles and the more important facts of the science, and should be of such a character as to induce students in their preparation for it to observe and think for themselves more than is now commonly the case."[7]

It is only when leading to excesses such as those just mentioned that scientific teaching can be objected to, and then the objection does not apply to science, but to the excess of mistaken zeal.

I do not contend the truth of the view expressed by Sydenham in his epistle to his dear friend Dr. John Mapletoft when he says: "The art of medicine was to be properly learned only from its practice and its exercise."[8] All I wish to say is that though the art, at any stage of its development, can be learned at the bedside, it would remain stationary from

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[6] Hippocrates, *loc. cit.*, p. 175.

[7] T. Pridgin Teale, British Medical Journal, i, p. 1371.

[8] *Observationes Medicæ*, 1685, Sydenham Soc., vol. i, p. 4. London. 1848.

the time no other form of research was resorted to. If we had had from the beginning no other source of information our knowledge of medicine would have remained entirely empirical and without any other foundation than misunderstood facts revealed by hazard and practices built upon rash and often cruel experiments on the sick.

The conditions of life are so complicated, especially in the case of the civilised man, that a mere superficial examination of natural phenomena, by means of our unaided senses, would seldom have led to more than rough guesses regarding the causation of disease. If this be doubted, let it be remembered that it is not many years since there was a general belief in the production of frogs out of mud, of maggots out of flesh, of micro-organisms out of infusions, and that even in this century it was only by very carefully planned experiments that it has been proved that life, as it is known to us, is invariably a continuation of pre-existing life.

The difficulty with which the nature of things can be apprehended might encourage scepticism and lead to a want of confidence in the use of science. I think this kind of doubt has been justly deprecated by Claude Bernard, when he says: "The sceptic is one who does not believe in science, but has confidence in himself; he believes enough in himself to deny science and to affirm that it is not governed by fixed and definite laws. The doubter is the true scientist; his only doubts are about himself and his own interpretations, but he believes in science; he admits that even in experimental science there is a criterion or absolute scientific principle. This principle is the 'determinism'[9] of phenomena which is absolute as well in the phenomena occurring in living organisms as in those taking place in non-living bodies."[10]

I think that such an attitude of mind should simply induce us to be modest in our conclusions, but should not deter us from studying the relations of phenomena occurring under our eyes and tracing these relations as far back as the possibilities of accurate observation and reasoning will allow. Primary causes may be left to the speculation of philosophers, and we should be careful not to fall into the errors of certain Greek medical schools, which, having the substance of the sound Hippocratic teachings, ran after the shadow of vain speculations regarding the ultimate nature of things.

Though some clinicians may sneer at the pretensions of science, they do, and must, as a matter of fact, constantly make use of results obtained by scientific workers. Whether they do so as a result of conviction or for appearance's sake does not matter, for, in any case, they obtain the benefit which they look for.

They often use tests for sugar, albumen, blood, or bile in the urine; elastic tissue or tubercle bacilli in the sputa; various parasites in the skin; they may even look for worms or protozoa in the blood; they will not scruple about recommending the use of anæsthesia, of vaccination, of antidiphtheritic serum, of antiseptic or aseptic dressings, of boiling of milk, of disinfection of rooms. They will know how to stop arterial and venous hæmorrhage; they may pre-

[9] By this word must be understood in physical science the invariable relation existing between cause and effect.

[10] Claude Bernard, *Introduction à l'Etude de la Médecine Expérimentale (De l'Idée a priori et du doute)*, p. 91 (Paris, 1865).

scribe such drugs as morphine, pepsin, nitrite of amyl, and take advantage of the ophthalmoscope, to say nothing of the *x* rays, and so on.

Where have the ideas which have led to the elaboration of these methods been worked out? At the bedside? No. The observation of patients at the bedside undoubtedly creates the desire to relieve suffering, and this desire urges the observer to ascertain exactly the nature and the causes of suffering and to find out the methods of treatment which will be most suitable for its relief. But it does not give the means of satisfying this natural desire, and deeper investigation is necessary in order to discover the essential effects of disease and of the ways of dealing with them. If this be doubted, I will simply refer to the names of Harvey, Jenner, Bright, Addison, Bennett, Paget, Virchow, Claude Bernard, Ludwig, Burdon Sanderson, Helmholtz, Marey, Pasteur, Lister, Villemin, Koch, Laveran, Lauder Brunton, to mention but a few. But, it will be said, more than half of these men were or are clinicians. This is true, and I have purposely selected their names to show that a clinician may also be a scientific man. Moreover—and this is an important point—these clinicians never trusted entirely to simple clinical observation, and I make bold to say that in most cases their discoveries were both prompted and tested by accurate scientific observation.

The scientific clinician is in a better position than any other observer to discover groups of symptoms indicating special diseased states. This is easily proved by the large number of diseases or symptoms to which the names of celebrated practitioners have remained connected—Pott, Dupuytren, Graves, Addison, Hodgkin, Erb, Friedreich, Duchenne, Charcot, etc. In the laboratory such opportunities do not occur, but principles which are used as bases of investigation are worked out, and nobody could say that such men as Harvey, Hunter, Goodsir, Waller, Wilks, Lister, Claude Bernard, Pasteur, Chauveau, Ranvier, Helmholtz, Du Bois Reymond, Ludwig, Virchow, Cohnheim, Koch, and others, have not done much for the advancement of medicine.

I think it is unnecessary to pursue this argument further, for I consider I have said enough to justify the opinion that scientific training is useful to the medical man. I feel also justified in saying that the bedside is not the place for prosecuting researches which might involve danger, or even serious discomfort to the patient on no other ground than mere fancy. As pathology concerns us more specially here than the other great branches of medicine, I will now confine my remarks to it. Let us first consider how the subject is taught in schools.

1. Under the name of clinical medicine, that part of pathology which deals with symptoms, diagnosis, prognosis is taught at the bedside with applied therapeutics.

2. The same subjects are also usually dealt with in systematic lectures on medicine and surgery, lectures which are also very often made to cover a considerable portion of other branches of pathology.

3. Pathological anatomy is taught in systematic lectures and demonstrations, and practically in the *post-mortem* room.

4. Pathological chemistry and histology are taught by means of lectures and demonstrations, and of practical classes.

5. Etiology and pathogenesis are taught by means of lectures, which are sometimes complemented by a practical course in bacteriology.

6. Experimental pathology is reserved for advanced students, and does not form a regular part of any curriculum.

If all these subjects were taught by the same man, he would certainly not require to say in systematic lectures what he had already clearly explained at the bedside, or in the *post-mortem* room, or in the laboratory; he would as much as possible try to save his own time as well as that of his pupils by not repeating himself. He would reserve for lectures those subjects that cannot be easily and better taught by actual demonstration.

Is it possible for three or four men teaching the various branches of the same subject so to combine their efforts as to give students the benefit of advantages which they would derive from being taught by a single man? I believe that, within certain limits, such a thing is possible on condition that the following principles be kept in mind by all teachers:

1. Every fact capable of simple actual demonstration should be taught by means of demonstration whenever this method does not involve excessive loss of time, considerable expense, wanton cruelty, or a knowledge of methods unknown to the student.

2. In each department the teacher should, as much as is compatible with clearness, confine his teaching to the demonstration and exposition of those facts which fall within the natural sphere and the actual work of his department.

It may be said that a teacher of, say, gynæcology may be a better authority on bacteriology than the colleague who has charge of that department. I select on purpose the most unlikely accident. Would this justify the teacher of gynæcology in lecturing on bacteriology? Certainly not, for the student would in the end be the loser; his time spent in the bacteriological department would be wasted, and in the gynæcological department his opportunities of learning gynæcology would be diminished.

The morbid anatomist, who, giving a demonstration on carcinoma of the rectum, would lecture at length on the symptoms of intestinal obstruction, instead of attracting the attention of the student to the anatomical lesions found in such cases, would cause the student a serious loss of time; for there are better opportunities offered to him in the wards for learning by personal experience under the direction of competent clinical teachers the symptoms in question.

In the same way it would be a serious mistake on the part of the clinical teacher to devote the greater part of a clinical lecture on tuberculosis to a detailed account of the various methods used for cultivating and for staining the tubercle bacillus. His duty does not go beyond showing the application of some of these methods in practice, and the more time he gives to the description of the symptoms which he can show to the student, to the methods of diagnosis and treatment, and to the course of disease during life, the more the student will benefit from his teaching and use his time profitably.

3. It seems to me also important that the time devoted to the study of each branch of medicine should be proportional to the relative importance of the facts and principles taught rather than to the number of details which have erroneously

been thought to be necessary elements of certain studies. And in determining the relative value of scientific courses from an educational point of view, I would feel inclined to give the preference to those in which it is possible to make the student see and judge for himself. Lectures should be reduced to the smallest number compatible with a clear exposition of those principles which would otherwise have to be constantly repeated in the course of practical demonstrations, or to those subjects which are not capable of demonstration at all.

Long discourses on purely hypothetical matters are, however, of little use to the student, for they foster in his mind the habit of doubting the value of scientific work at a time when he is not able to judge of the value of arguments. I am quite prepared to hear that such an attempt to deprive education of much of what is speculative in science would lead to a loss of fertilising influence which would more than compensate for the advantages gained. To this I would answer that it is more by explaining to the beginner the subjects where speculation has given good results than by teaching him doubtful hypotheses that have borne no fruit that the proper methods of observation and reasoning will be impressed upon him. For the same reason I doubt whether up-to-date teaching, when pushed to the excess it is sometimes, confers a lasting benefit on the student. In his anxiety to give out the latest information the teacher is often exposed to speak of things which he has hardly been able to grasp fully himself, and which in most cases he has not been able to observe.

Having now explained to you in a general way my reasons for holding certain views regarding the teaching of medical science, I wish to submit to you certain suggestions regarding the teaching of pathology, and, if time permits, I hope some time will be found at the end of one of our meetings for a discussion of this question. I may say at once that what I consider true with regard to teaching seems to me equally true with reference to examinations, for teaching, properly conducted, should provide the information wanted by the student in order that he may prove a good and successful worker during his professional career, and examinations have no other object than to find out whether this result has been attained. They should give the means of testing whether a man is capable of using in practice the knowledge which he has acquired.

It will simplify matters if, in order to give a more concrete form to my ideas, I ask you to suppose that we follow a student desirous to gain personal experience in his study of cases surgical or medical.

1. In the wards of the hospital he is shown how to recognise the presence of certain symptoms, and from this to establish a diagnosis; he then sees various modes of treatment, surgical or medical, applied, and is made to note the course of events that follow, being thus initiated to the art of prognosis. Here the only means he has to test the accuracy of the views expressed to him by his teachers are the effects of treatment and the correctness of the prognosis.

2. In the *post-mortem* room he has an opportunity to see for himself what gross lesions correspond to some of the symptoms to which his attention has been attracted during life. The meaning of the appearances due to alteration of size,

shape, colour, etc., have to be explained to him as far as it is safe to do so from a naked-eye examination. The teaching in the *post-mortem* room cannot go further, and is necessarily fragmentary.

3. It must therefore be supplemented by demonstrations of museum specimens by which complete series of lesions, some of which occur rarely in the *post-mortem* room, can be made to illustrate the coarse anatomical changes produced in the body by disease. Such specimens being provided with short clinical histories, there should be as little room for speculation as possible regarding the nature of the symptoms associated with the lesions. This general study of morbid anatomy is specially useful in directing the mind to the parts of the body which are most generally affected by disease, and to the way in which certain symptoms are mechanically produced. Naked-eye anatomy, however, gives very little information regarding the nature of the reactions of the organism to morbific agents; it seldom gives the means of finding the actual cause [11] of diseases, and it must be admitted that many of the naked-eye appearances are so ambiguous that even an experienced morbid anatomist is often mistaken as to the meaning of lesions observed in the *post-mortem* room or in the museum.

4. In the histological laboratory the student sees the changes of structure which give rise to the appearances observed in the *post-mortem* room, and here he begins to be on firmer ground and better able to acquire a knowledge which will depend less on an extensive practical experience than on well-trained powers of observation. The reasons for this are: (1) that all the organs of the body are composed of a few elementary tissues; (2) that these tissues are composed of cells which have many properties in common; (3) that the morphological changes indicating the reaction of these cells to pathogenic agents are comparatively few. It is, therefore, possible for a teacher to impart within a limited space of time and by means of actual demonstrations a tolerably complete and accurate notion of the anatomical changes produced in the organism by disease. It is owing to these advantages and not to any special fancy for microscopical work that pathological histology has taken such a leading part in the study of disease.

If all the morbific agents produced essentially different reactions in the cells, cellular pathology would give infallible indications by means of which diseases could be accurately separated from each other. Unfortunately this is not always the case; but even after this admission I feel quite justified in asserting the primary importance of morbid histology.

Pathological chemistry, though growing rapidly in importance, is still too speculative to be placed on the same level as morbid histology from an educational point of view, and as nearly all the chemical methods used in the investigation of disease are similar to those taught in courses of physiological chemistry, it seems to me that, at the present time, the laboratory of pathological chemistry should be reserved for advanced workers prosecuting investigations rather than for the purpose of systematic teaching. This question, however, has to be determined in each school by the provisions which have been made for the teaching of physiological chemistry.

[11] I use the word cause in a very limited sense; as, for instance, applying to a pathogenic bacterium, a poison, etc.

5. We now come to the most difficult part of pathology. So far we have had to deal only with the objective parts of the subject, with facts which necessitated chiefly powers of accurate observation, and which could all be easily demonstrated. When we come to deal with causes of disease and with the way in which lesions are produced we must necessarily introduce into our work induction, deduction, and experimentation. When a number of facts seem to indicate that two or more phenomena are correlated and due to the action of a certain cause, we feel generally, when dealing with biological problems, that we may have overlooked many factors, and therefore we have to test our views by experimentation. Experimentation is not, however, always guided by direct observation, for it often happens that the causation of certain lesions is inferred from what we know of the causation of other more or less analogous lesions.

The nature, the duration, and the difficulty of many of the experiments which have been made for the purpose of testing theories touching the causation of disease and the production of lesions make it difficult to teach the whole of this part of pathology by means of demonstrations and practical classes, and it is in this case that systematic lectures or textbooks are the most justifiable and, in fact, necessary.

Etiology and pathogenesis cannot be put aside, for much of the advances which have been made in the art of prognosis, in the treatment, and in the prevention of disease are based on our improved knowledge of these subjects.

Bacteriology, however, lends itself specially well to practical work, and I believe it would be beneficial to most medical men to have a more practical knowledge of this subject than they are generally made to acquire in the course of their studies.

The conclusion which I draw from all these considerations is that students would obtain a more useful knowledge of medicine if they had fewer lectures and more practical courses. They should be made to attend thorough practical courses on (1) pathological anatomy, histology, and chemistry; (2) bacteriology as applied to the study of infectious diseases; (3) general clinical medicine and surgery, with special courses in special branches of clinical work such as diseases of women and obstetrics, diseases of children, infectious diseases, mental diseases, diseases of the eye, of the ear, of the throat, etc.

Systematic lectures should be confined to courses on (1) etiology of disease and pathogenesis; (2) general considerations regarding the practice of medicine and of surgery. These courses should be as short as is compatible with a clear exposition of those principles which but very few students would be able to formulate for themselves from the study of facts.

Finally, I wish to say that if, in expressing my views, I have wounded the feelings of any who have opinions differing from mine I will ask him to apply to me the words of Harvey: "I would not charge with wilful falsehood anyone who was sincerely anxious for truth, nor lay to anyone's door as a crime that he had fallen into error."[12]

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[12] Harvey, *An Anatomical Dissertation upon the Movement of the Heart and Blood in Animals.* Dedication 1628. Rendered into English for G. Moreton. Canterbury. 1894.