

XV.—THE PLACE OF BACTERIOLOGY IN THE ORDINARY  
MEDICAL CURRICULUM.

By PROFESSOR RITCHIE.

I HAVE to deal with the subject of the place of bacteriology in the ordinary medical curriculum. I shall do so as shortly as possible.

The function of the teacher of bacteriology in relation to the medical student is, I take it, to furnish him with the minimum amount of bacteriology which will enable him to understand the clinical cases he will come in contact with when he goes into practice. There are three main lines along which this instruction must go. First of all the student must have a knowledge of the part which bacteria play in the initiation of disease processes and in the phases of the successive phenomena which emerge during the progress of a clinical case. Secondly, the practitioner in modern times must be possessed of such bacteriological knowledge as will enable him to undertake those methods of treatment which have a bacteriological basis, methods which involve the application of sera, vaccines, and so on, to the treatment of disease. And thirdly, the practitioner must have a knowledge of how, during the life of the patient, he can get information as to the cause of the disease by the bacteriological examination of various exudates and of other material derived from a case; if, when he goes into practice, he does not undertake these examinations himself—which usually, of course, he does not—he must know what precautions ought to be taken in order that the material may be sent to a clinical laboratory in proper condition, and he must further be able to interpret the reports which he receives from such a clinical laboratory. These are the three objects which the bacteriological teacher must have in view in dealing with the medical student. The dominating factor of the situation is this, that bacteriology must be treated as a branch of pathology. In modern times pathology has gained a new insight into the processes of disease by the knowledge which has been acquired by the bacteriologist. The phenomena of inflammation become more and more intelligible when considered from the bacteriological standpoint, and a new interpretation is given to the conception of the reaction of the body to disease which plays such a great part in pathological processes. In fact, it may be said that it is bacteriology which has placed this conception of reaction upon a scientific basis, for although reaction is in essence a physiological process, it only finds proper elucidation when examples are taken from what occurs when bacteria get entrance into the body and call out phenomena which represent the fighting power of the organism. From its own standpoint, bacteriology gains much from association with pathology; if in connection with medicine it is not associated with pathology it becomes a

very inferior and incomplete branch of botany. Therefore it is essential, I think, that in trying to work out, as we are doing here, the place which bacteriology is to hold in the medical school, we should make the teaching a part of the pathology course. As Professor Lorrain Smith has indicated, that is what is being done in this school now. I cannot do better than follow his example, and give an outline of how at present this is actually worked out.

First of all there are the systematic weekly lectures, twenty in all, during the two terms of the systematic course. We have already had a considerable expression of opinion here as to the place which systematic lectures are to occupy, and I would like to say that as matters are at present constituted, it seems to me that the systematic lecture occupies a very integral part of the course. It is all very well to say that a student can get up his information from text-books. In bacteriology, to ask a student to get up a text-book is simple cruelty, because there is no text-book that does not give a great deal more than is necessary for the ordinary medical student to know. And further, unless there is regular tutorial supervision of the reading of the student—such as exists in the older English Universities—he will not read what he ought to read at the proper time: without such supervision he can have no guidance as to what he ought to read and what he ought to leave out. The systematic lecture does to a certain extent supply this guidance. In the lectures given in the pathological department here the main points regarding, not uncommon diseases, but the common bacteriological diseases of man are taken up and emphasised, and thus the student gets to know what is important and what he may pass by. As far as possible the lectures in bacteriology are correlated with the other systematic lectures in pathology. For instance, Professor Lorrain Smith commences his course with a consideration of inflammation. At the same time I take up a simple bacteriological inflammation, such as pneumonia, and follow that up with the more complicated case where suppuration is interposed as a stage in inflammation. Then one goes on to deal with an example of a chronic reaction to a long-standing irritant such as one finds in tuberculosis. I may say here that not only are the lectures on bacteriology correlated with the lectures on pathology, but they are also correlated, when opportunity arises, with the practical work which is being done in the morbid anatomy class. For instance, this year the students were doing a case of tuberculosis, and I took up tuberculosis and treated of the points which were raised in the actual case the students were working at in the pathological department of the Infirmary. In the twenty lectures one can deal thoroughly with the ordinary infections, inflammation, suppuration, tuberculosis, a pure intoxication like diphtheria, and the more complicated pathological picture found in infections with the typhoid organism, and meningitis, gonorrhœa, syphilis, and other infections

are also dealt with. Then we go on to more general bacteriological pathology, taking up the lesions which bacteria are capable of originating. Then we have to tackle the difficult task of giving the student such knowledge as he requires regarding modern methods of treatment which have a bacteriological basis. This leads us into the realms of immunity, which I never approach without trepidation! Here I try as far as possible to give as many of such facts as there are, and not to allow my imagination to soar into those regions of fancy to which Professor Dean has alluded. When all is said and done, the fundamental facts of immunity are few; they are, however, not simple, and it is the most difficult task of the bacteriologist to get the ordinary medical student to comprehend them.

With regard to the practical work, this consists of ten meetings. In the October term the men who have had out practical pathology the previous summer have their bacteriological course, and after Christmas the men who began their pathology in October have theirs. In that way one can reduce the size of the classes to reasonable limits; we aim at having not more than fifty in a practical class. Further, we aim at having a student demonstrator for about every eight students in the practical classes. I consider this supervision by student demonstrators absolutely necessary, and I do not think that one demonstrator can attend to more than ten students at most at a time. In this practical course no attempt is made to give the students an intimate knowledge of bacteriological methods. They do not make culture media; they have the methods of making them demonstrated to them. But they themselves put up a series of preparations of ordinary organisms and of morbid tissues containing these organisms, and thus they practise all the ordinary elementary staining and cultural methods. They also have to do certainly one experiment in agglutination, but beyond that the serological methods (for example, the Wassermann reaction) are left to demonstration.

There is a third series of classes which we have developed within the last two years, and which, I think, will prove the most valuable part of the ordinary bacteriological course. In this third section, which comes after they have had the elementary practical class, the students are divided up into small groups, the size of which depends upon the size of the class—say about ten to eighteen students in each group, and they work at *clinical bacteriology*. Each student goes through a course of eight meetings of two hours each devoted to this subject. We take any material which may have come in to the three laboratories at our disposal—sputa, pus, urine, fæces, cerebro-spinal fluid, etc. We give the material to the students without telling them what they are to do with it. They must discuss what ought to be done, and, of course, we give them direction in deciding this, and then they proceed to do whatever is necessary for

the preparation of a report. In this way they get to know what can be done by clinical bacteriology and its limitations, and I think this work will help them to interpret reports which they will receive from clinical laboratories when they go into practice. At the end of this short course they have to send up their slides and the notes they have taken. In these notes they must state the problems they have studied, the methods employed, and the report which they would issue. These notes are gone over and criticised in order to show them where they have succeeded and where they have failed.

This, then, is briefly the instruction given at the present time to the students of pathology in the branch of bacteriology. More and more we are trying to bring bacteriology into correlation with clinical medicine, just as in the other branches of pathology, and I hope that in the future there will be still further development along the lines of encouraging the men, who are working in the wards, personally to take material from the cases they are interested in and to work it up, and such observations will, I trust, come to be a feature in the reports which they submit to their clinical teachers in the ordinary course of their ward work.

#### DISCUSSION.

DR. JAMES MILLER.—There are many ways of preparing a student for examination, but there are far fewer ways of teaching him a basic understanding of the subject. Probably the oldest way was for a man with a message—the professor—to gather round him a group of disciples, and by a system of question and answer and an interchange of ideas to work out the subject. That, I take it, is still the best way. Somewhere in the Middle Ages the system of lecturing from a chair was introduced. It has its advantages, and in the hands of a proper teacher who can impress his personality upon the student may be very valuable, but it cannot be compared with the other method adopted by Professor Lorrain Smith in the teaching of morbid anatomy. It interests the student, and it brings him into touch with the patient.

Dr. Edwards has drawn attention to the fact that the pathologist tends to degenerate unless he carries on research; but there is another thing that he *must* do—he must keep in touch with the clinical aspect of affairs, and this method of teaching pathology forces him to do so. I must cite some disadvantages, but they are not inherent in the method. One is, that it necessitates a large staff; a single individual cannot carry out this method of teaching. The men must be gathered in groups, and by the system of asking and answering questions the requisite knowledge must be instilled into their minds. Secondly, this method imposes a great amount of work on the teacher in annotating and criticising the notes of the students, without which justice would not be done to the individual. The method also tends rather to widen the gap between the bad and the good student. It increases the number of good students undoubtedly, but the others, I think, tend to fall behind, and require “coaching” to get through their examination.

No student ought to leave the university without having done at least