

# THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

## *The Publication Board*

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THE VISION OF any professional group must be an ever-expanding one if that profession hopes to hold a place in the world of service. Well does the writer remember when the field of pharmacy was looked upon as a one department field and a college of pharmacy as a one department college comparable to a "College of Chemistry." When the writer of this introduction first insisted that physiology was a basic pharmaceutical science he was dubbed as visionary and bordering on *dementia præcox*. It took a Commonwealth study to justify the position of physiology in the pharmaceutical group. Bacteriology was a later addition to the basic science group. It has had to feel its way in, in the form of one- or two- or three-hour lecture courses. The time has come when a druggist without a laboratory knowledge of bacteriology can easily be a menace to a community, for without that knowledge he can neither conduct a sanitary drug store nor appreciate the care that is necessary to preserve the potency of a multitude of instruments of precision that are necessary in the scientific treatment of disease. In the paper which follows, Dr. George Reddish has stated in a most convincing way the value of bacteriological knowledge to both the student and practitioner of pharmacy.—*The Editor*.

### THE TEACHING OF BACTERIOLOGY TO PHARMACY STUDENTS.

BY GEORGE F. REDDISH.\*

Bacteriology, as an independent subject, is a newcomer to the curriculum of many pharmacy schools. In some schools materia medica courses have in the past included some instruction in bacteriology and immunology, while in others short separate courses covering these subjects have been offered. In still others full courses in bacteriology have been given for a long time. With the general acceptance of the four-year course in pharmacy, more schools have recently added separate departments devoted to the teaching of bacteriology entirely. This recognition of the importance of this subject to pharmacy students and to pharmacists is another indication of the progress made by schools of pharmacy within recent years.

Whether bacteriology is as important to the pharmacist as chemistry, pharmacognosy, pharmacology and the various courses included under the general heading of pharmacy, is perhaps beside the point, but it is, nevertheless, a valuable addition to the pharmacy school curriculum. Students do obtain additional training in this course which enables them to become even better pharmacists than they would be without it. Many practicing pharmacists to-day recognize the need of more fundamental knowledge of this subject, and have encouraged the establishment of separate bacteriology departments in our pharmacy schools.

It will be of interest to discuss the teaching of bacteriology to pharmacy students in the light of its subsequent value to them as practicing pharmacists. It is not my intention to outline a course in bacteriology for pharmacy students, nor to attempt to state exactly how such a course should be taught. I shall confine myself to pointing out the value of bacteriology to the pharmacist with the suggestion

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that such courses be designed to meet his needs. Teachers of bacteriology have their own methods of teaching this subject, but all of us should direct our efforts to the same end—to present the course in such a way that the pharmacist will reap the most possible benefit from the instruction given. In other words, instead of giving a general course in bacteriology, we should, as far as possible, give a course in pharmaceutical bacteriology. Instead of attempting to designate exactly how this should be done, I would prefer to point out the value of such instruction to the pharmacist with the suggestion that courses in bacteriology be planned accordingly.

In what different ways will instruction in bacteriology be valuable to the pharmacist in the practice of his profession? Having had a course in bacteriology, how is the pharmacy student better fitted to become a competent pharmacist—in what respects is he better equipped to establish himself as a member of this ancient and time-honored profession? In the first place, a course in bacteriology better equips the pharmacist to cooperate with the physician, the dentist and the veterinarian to a fuller extent than he could without such training. He is able to intelligently discuss bacteriological matters with members of these professions and often be of assistance to them. Because of the close relationship between these professions and pharmacists a certain interdependence has grown up between them which becomes stronger and closer as each understands the problems and difficulties of the other, with the result that they expect cooperation from each other. The members of these professions also have more respect for the pharmacists who display a fundamental knowledge of bacteriology and immunology and as a result of this added respect greater confidence in them naturally follows. This mutual respect between physician and pharmacist is of vital importance to both.

The course in bacteriology provides the pharmacist also with a broad knowledge of a subject which is becoming more and more important to him. This fundamental training first covers methods of growing and studying bacteria, their isolation in pure culture, identification and classification of representative non-pathogens, and pathogens, thorough study of the more important disease-producing bacteria and careful training in the special technique necessary in these studies. The use of various staining methods for identifying bacteria, demonstrating special and characteristic features, etc., are employed throughout the course. In addition, experience is obtained in the various sterilization procedures, in methods of making and sterilizing pharmaceutical solutions, etc. This fundamental training leads up to the special features of the course which are of most importance to practicing pharmacists.

Since the pharmacist by the very nature of his profession is concerned with the prevention and cure of disease—since he compounds prescriptions used for these purposes—he naturally is much interested in the actual cause of these diseases. Studying the cause of infectious diseases and their laboratory diagnosis constitutes one of the most important phases of the course in bacteriology. The laboratory diagnosis of many of these diseases is emphasized to such a degree that the student is competent, by the time he has finished the course, to make an accurate laboratory diagnosis of many of the more common infectious diseases. It is not expected that he will become an expert in these diagnostic procedures, but in an emergency or when a diagnostic laboratory is not available he can actually make these tests and obtain reliable results. While ordinarily the pharmacist is not asked to make these

diagnostic tests, and he should not be if a competent bacteriologist is available, there are times when he may be of assistance to the physician in this way. The fact that he is prepared to do so is important. The physician respects a pharmacist more because of this additional information and training in a subject allied to pharmacy. The pharmacist is for that reason more valuable, at least potentially, to the physicians whom he serves, as well as to his community.

While studying the fundamental characteristics of the bacteria which cause infectious diseases, full consideration is given to the factors concerned in the spread of disease. Methods of preventing disease—preventive medicine as it affects the public health as well as in its relation to the individual—are thoroughly studied. More important to the pharmacist, however, are the methods of preventing and treating diseases as applied to the individual. In this connection, a full understanding of vaccines and anti-sera is of prime importance. The fundamental nature of the various biological agents used for this purpose must be thoroughly understood. To do this requires first of all a comprehensive study of the methods used for making the various vaccines and biological sera. Along with a thorough understanding of the nature of these vaccines and sera together with the processes employed in making them, the student also obtains a clear conception of the manner in which they exert their activity, and how they are used. He learns the precautions which are necessary in the handling of these products, and why such care is so important. He also obtains a thorough understanding of standardization and dosage of these biologicals, as well as a better conception of the necessity for proper care on the part of the pharmacist in storing and handling these preparations. In addition the federal and state requirements as to labeling, dating, storage, etc., are thoroughly considered. As the result of careful training in this phase of bacteriology, the pharmacist is prepared to handle biologicals more intelligently and with more understanding.

In this connection full consideration is given the subject of immunity and resistance to disease—the natural defenses of the body against disease and how these can be maintained, and more particularly to methods for building up immunity. The general principles concerned with immunity, both natural and acquired, are studied in considerable detail. Those factors which are concerned with health and disease, with infection and resistance, with immunity, with diagnosis and treatment, with immunological agents in general, are all emphasized in their proper relationships. The value to the pharmacist of this part of the bacteriology course cannot be over-emphasized.

The use of germicides in preventing infection and the spread of disease is of much interest to the pharmacist. Since he handles a variety of such preparations—antiseptics and disinfectants—he should know the advantages and the disadvantages of the different compounds available for this purpose. In the treatment of this subject in the bacteriology course, due consideration must be given to laboratory methods of testing these preparations. It is important that this instruction be thorough and accurate. Because of misinformation relative to this subject in professional and lay literature, and even in some textbooks, it is all the more necessary that the teacher of pharmaceutical bacteriology keep up-to-date in this field. This is particularly so, because of the rapid changes taking place in this field due to the active research constantly being pursued, especially relative to antiseptics. In

addition to instruction as to the usefulness of the various classes of antiseptics and disinfectants, the pharmacy student must become acquainted with federal and state laws and regulations used in controlling these products. He must be taught to evaluate the label claims of such products and interpret the directions for use for the benefit of purchasers. Considering the importance of antiseptics and disinfectants in preventing infection and the spread of disease, the pharmacy student may expect to learn much of value regarding this subject in the bacteriology course.

Methods of controlling the sanitary quality of milk, water and food are studied from the standpoint of federal, state and municipal laws and regulations. While the pharmacist may not have occasion to actually make these laboratory tests, he should have an intelligent understanding of how they are performed, how they must be interpreted, and in general the value and significance of the various standards relating to these commodities. This part of the bacteriology course should be given the pharmacy student as though he were a potential health officer, because the pharmacist is in a position to exert an influence for good in the matter of assisting local as well as state and federal health officers in the sanitary control of these necessities, as well as encouraging the application of other sanitary measures for preserving the public health.

It is apparent from this brief survey that the pharmacist benefits in many ways from instruction in bacteriology. He not only is equipped to lend assistance to the physician, the dentist and the veterinarian in a number of ways, but because of his close contact with the public, he is in a position to disseminate good advice of a general nature which will be helpful to a clearer understanding on the part of the public of the constant menace of infection and disease through unsanitary practices, as well as to assist the public to an understanding of accepted methods of preventing infection and disease. He is also an influence for good in supporting the physician, the health officer, the local, state and federal authorities, in the promulgation and enforcement of laws and regulations for the promotion and protection of the public health.

It may not be amiss to mention another way in which the course in bacteriology is valuable to pharmacy students, and to potential pharmacists—training in the proper pronunciation and spelling of bacteriological terms. While this may seem of incidental importance, in my opinion it is of considerable consequence. I consider this so important that I devote the opening lecture each year to a discussion of this phase of the course. At that time I give a serious warning that throughout the course this feature will be emphasized, even to the extent of penalizing the student for incorrect usage and spelling in class quizzes, tests and examinations—at least during the first half of the course. It has been my experience that the student soon becomes so accustomed to the proper use and spelling of these technical terms that they become a part of his normal vocabulary.

The technical training obtained in courses in bacteriology is not only useful to pharmacists in the practice of their profession, but the general information derived from such courses has a cultural value which must not be overlooked. Pharmacy students and the pharmacists, while benefiting in large measure from the general information obtained from instruction in bacteriology, will profit most, of course, from the technical information and training which is presented.

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