

THE NECESSITY FOR A SPECIFIC COURSE IN BACTERIOLOGY FOR PHARMACY STUDENTS.*

BY FANCHON HART.¹

With the exception of a few notable cases, two extremes appear to characterize most of the bacteriology curricula as presented in the different colleges of pharmacy. One type of curriculum follows much too closely the medical bacteriology, in that it includes the cultivation of the pathogenic organisms, the preparation of vaccines, the collection of body-fluids including the spinal-fluid and the blood.

The time allotted to a course in bacteriology in a pharmacy school and the educational background of the student, is rarely adequate for this type of work. The other form of instruction is largely that of a botanical nature with little consideration of the biologicals so important to pharmacy.

The course in bacteriology should be so planned as to objectives that the graduates from our schools could use it as a basis for further study in bacteriology or related fields, if they so desire.

It is the function of the pharmacist to keep in close touch with all the medications on the market, including the particular advantages of each, usually expressed in the advertisement. His comprehension of the biological literature nevertheless will be largely dependent upon his previous training at college.

It is my belief that physician and pharmacist might meet here on common ground. In no other part of his work does the pharmacist have as great an opportunity to cooperate with the physician and by so doing thus gain his confidence. This is still, I believe, the cherished dream of the pharmaceutical profession as a whole.

The training at college should be of such a nature that the student will understand readily the differences between the various types of biologicals, their composition, methods of manufacture, the standard tests for potency and sterility, the necessity for an expiration date and other related details. Fortified with a basic knowledge of the Official Biologicals, it is to the pharmacist's advantage to acquaint himself with the commercial variants as well as with the newer preparations as they appear on the market. The much "detailed" physician often seeks the unprejudiced advice of an intelligent and well-informed pharmacist. Emphasis should therefore be placed on a thorough knowledge of the biologicals.

Second in importance in a bacteriological curriculum for pharmacy students is an objective, the results of which will appeal to the ethically minded members of the profession. I have in mind the thorough training in bacteriological technique. But it must be impressed upon the student that under no conditions should an individual with training solely from a school of pharmacy attempt to give advice, diagnose the disease or in any manner interpret the results of his findings.

The technique involved in operations such as the chemical analysis of the blood and urine, total and differential blood counts, the microscopy of urine samples, the staining of throat, sputum and smears from purulent exudates could easily be

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handled by the pharmacist. However, the finished slides should be examined by the physician, unless the pharmacist has had an advanced course and license to examine specimens of this kind. The busy and anxious physician might welcome the service of a competently trained person.

The small group of laboratory technicians, who might suffer slightly from this procedure is as nothing compared to the immense number of patients who would gain by a more thorough investigation if the laboratory routine were to start with the first visit to the physician's office. The smear, culture tube or blood sample may be taken to the pharmacist with the prescription by the patient. In many cases this method would prove to be a valuable saving in time. There have been complaints of the methods of distribution and collection of material to and from Health Department stations in large cities, with just criticisms of possible faulty diagnoses because of unavoidable delays.

Finally the third objective is of the greatest importance from the viewpoint of the health of the community. Nowhere are we given so fine an opportunity in which to deal with personal and mass hygiene and sanitation. Lessons in cleanliness and the results of contamination may be interestingly demonstrated by tests for the sterility of eye lotions and intravenous solutions, including those in ampuls. The subject matter should include the knowledge that will assist the future pharmacist to meet and honestly discharge the duties that the public has a right to demand of him, duties not of a pharmaceutical nature but rather those of every intelligent citizen with the educational experience that must motivate the desire for the betterment of human welfare.

The course should include the mechanism of immunity and the control of the common communicable diseases, as well as the incubation periods and the diseases that are under quarantine regulations and therefore reportable to the local authorities. A knowledge of the manifestations of the common diseases causing skin eruptions is of great value, particularly in the more congested areas of the larger cities. The pharmacist should be acquainted with the local health regulations, including the regulations governing milk and water supplies. He should have a knowledge of the inspection, sterilization and dangers of infection from swimming-pools, community drinking cups, lavatories and improperly handled and stored food-stuffs. He should know how the city sewage is disposed of and what possible diseases might be conveyed through the improper or total lack of the disposal of waste.

Many interesting projects easily motivate the student toward active participation in gathering data on this subject.

Each objective may be built upon in such a manner as to give advanced instruction for specialized fields of service.

The first objective might well be an introduction to an advanced course for bacteriologists in the field of biological research. The subject matter is also particularly valuable as sales information for those wishing to engage in detail work for the manufacturer of bacteriological biologicals.

The second part of the course is a prerequisite for more detailed work required of the hospital clinician, private laboratory technician and medical or dental assistant.

The third objective of the curriculum opens up the possibility of civil service

employment. The basic knowledge mastered in this course may stimulate a desire to seek positions in Health Department work, particularly in the inspection of food, water and milk.

The course would not be complete without the necessary information concerning veterinary biologicals. They are becoming increasingly more important. The alert pharmacist may well find it an asset to feature these preparations as attractive displays with such information as would be both interesting and pertinent to the material on exhibit.

OUTLINE FOR A COURSE IN BACTERIOLOGY FOR PHARMACY STUDENTS.

INTRODUCTION

- Historical data
 - Contributors
 - Theories of disease
- Fundamental considerations
 - Subject matter
 - Sanitation and the Health Department Sanitary Code
 - Sterilization
 - Disinfection
 - Antisepsis
 - Fumigation
 - *Microorganisms
 - Bacteria
 - Viruses (of unknown origin)
 - Molds
 - Protozoa
 - Metazoa.

* Under each of the above group of organisms the following points are to be considered—staining technique, cultivation, morphology and classification. Only non-pathogenic material is to be handed out to the student. The student should be required to examine smears from his own throat. Demonstrations are to be set up for observation. The purpose being to familiarize the student with the appearance of the pathogenic organisms and the more important serological reactions.

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| Useful microorganisms | Biological products, types of |
| Of economic importance in | Biologicals official in the U. S. P. |
| Agriculture | Composition |
| Dairy industry | Methods of preparation |
| Bakers' supplies | U. S. P. H. S. control |
| Fermentation products | Standardization |
| Citric acid production | Tests for potency |
| Dye industry | Tests for sterility |
| Fabric manufacture | Labeling, regulations |
| Harmful microorganisms | Packaging |
| Soil contaminants | Biologicals, unofficial |
| Food contaminants | Differences between the commercial types |
| Water contaminants | Vaccines |
| Organisms causing spoilage of drugs and drug products | Bacterial antigens |
| Organisms causing wood rot | Sero-bacterins |
| Animal parasites | Immunogens |
| Flukes, tapeworms, hookworms | Phylocogens |
| Agents of infection and infestation | Opsonogens |
| | Aggressins |

Modified viruses	Protein extracts
Anti-bacterial sera	Diagnostic reagents
Antibody solutions	Mechanism of immunity
Antitoxins	Natural
Toxin-antitoxin	Induced
Toxoids	Complement fixation
Antivenin	Widal reaction and other specific serum reactions
Tuberculins	Regulations concerning the storage
Mallein	Date of expiration
Johnin	Keeping qualities
Pollen extracts	

The unit covering *Sanitation*, includes the disposal of waste and sewage: the treatment of water supplies, milk and food inspection and other regional regulations.

Under *sterilization*, the special treatment for Galenicals and other medicinal substances, including *prescriptions* is emphasized. The various sterilization and pasteurization methods should be freely illustrated by each student.

Since the most important objective of this course is to acquaint the student of pharmacy with the official biologicals and commercial products of a related nature, he should be as familiar with the composition, use and dosage of these preparations as with any topic in *Materia Medica*.

Because of the frequency with which our graduates find positions in the technical, clinical or commercial laboratory it has become increasingly more important to include simple bacteriological technique in our curriculum.

A COURSE IN LABORATORY GLASS BLOWING IN A COLLEGE OF PHARMACY CURRICULUM.*

BY HORACE M. CARTER.¹

Comparatively few schools and colleges in the United States, at the present time, offer courses in laboratory glass blowing. The foreign universities, on the other hand, have apparently long recognized the practical value of adequate training in glass manipulation, a most necessary adjunct to the person properly qualified to enter the field of chemical research.

There are, no doubt, a certain number of our American universities which provide a training in glass manipulation, but I am aware at the moment of only one of our leading technical institutes which *requires* a course in laboratory glass blowing of its undergraduates in chemistry. The majority of the universities prefer to maintain a department under the supervision of an expert glass blower for the repair and construction of glass apparatus. The chemist who ultimately enters the research field without any practice in the technique of glass manipulation finds himself entirely helpless to make repairs or to construct the simplest type of apparatus.

Many laboratories which specialize in the preparation of synthetic organic chemicals, and many industrial firms which maintain a research department, re-

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