THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

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METHODS OF PRESENTING PHARMACEUTICAL CHEMISTRY.

BY E. D. DAVY.*

After reviewing the comprehensive report of the Committee on Curriculum and Teaching Methods, one is brought to a realization that the term, Pharmaceutical Chemistry, has been much abused, and after offering ample evidence of this fact from a review of the catalogs from all member Colleges of the Association a definition was formulated which follows, "It designates that specific branch of science dealing with the chemistry of substances used in medicine, the production of such materials and the tests applied for their detection, qualitatively and quantitatively."

It is very difficult indeed to keep from encroaching upon the field of Scope and Prerequisites in discussing the presentation of this special branch of chemistry. However, it is necessarily assumed that the student has had the usual prerequisites to the courses of Pharmaceutical Chemistry, so that the method of presentation assumes a place of first importance.

To quote from Norman Campbell's "What Is Science," "Whenever we undertake any practical action, we have two decisions to make. We have to decide what is the end of our action, what result we wish to obtain, and we have to decide what is the right means to that end, what action will produce the desired result. Conflicts between the ends and means arise and it is a necessary step to disentangle the conflicting elements."

In our teaching methods we should aim to present such material and present it in such a way as will enable the student when in the active practice of his profession to understand and to be able to converse intelligently on the subject matter in his main guides, the Pharmacopœia and National Formulary; also to apply it in a practical way if called upon, or to make proper use of it if he should continue in advanced work, keeping in mind the purpose in presenting a principle that may be generally rather than specifically applied.

We are sometimes reminded of our shortcomings in teaching methods, but in the writer's opinion the success or failure attending such efforts must be judged by the response of the student, whether his interest is spontaneous or whether it is necessary to resort to pressure.

Many times the teacher in his preparation for the presentation of a given course remembers the methods of the professors under whom he has studied; he has evaluated their results and attempts at emulation. He may find that certain methods successfully used by them are not suitable for his needs. Upon reflection and study a modified method may be developed showing individuality and a marked degree of success.

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In the above the writer does not wish to suggest the trial-and-error method of teaching, neither does he believe it advisable to hamper progress by too rigid methods, rather, flexibility should be provided.

Some methods of presentation often provide for effectiveness only to meet the exigency of mass production, emphasizing group rather than individual effort. This certainly is not conducive to good results.

The teaching of Pharmaceutical Chemistry lends itself admirably to the application of new procedures, assuming, of course, that the inorganic, qualitative, quantitative and general organic chemistry have been completed.

The most difficult problem in the presentation of this special chemistry, is the human equation. If all teachers had like training, like interests and the ability through experience to point out the application for the particular material being presented, coupled with the proper spirit, this question would scarcely be a pertinent one here. However, in view of the fact that such is not the case, the following is offered in the order indicated.

TEXTBOOK METHOD.

It should be emphasized that the textbook method of presentation must be supplemented by the instructor and should serve only as a guide. The students during their first three years have been taught mainly from textbooks, which is only logical, but after this basic training they have been, in the writer's experience, eager to go to the library with reference assignments as a guide and study the subject which is under discussion.

Certain unavoidable differences of opinion as to arrangement in textbooks can be corrected only by the instructor, likewise no textbook can give a full and adequate treatment of all important topics. That which one might consider important and stress in a text may not fulfil the needs of another. Any enlargement necessary must be the field of the instructor, which precludes an acquaintance with the current literature and standard texts, coupled with the instructors' practical experience.

This brings us to the application of all the modern texts and journals to which the student should be assigned pertinent topics so that a free discussion may be involved and individual judgment applied. Since these subjects invariably involve a laboratory operation they should be studied together.

THE LECTURE METHOD.

The lecture method of presentation without recourse to any guide except the United States Pharmacopœia and National Formulary, other than that which the instructor shall present.

This method lends itself admirably in those cases in which the instructor has had considerable teaching as well as practical experience, and constantly keeps in touch with the newer developments.

Such a procedure of necessity requires that assignments be made to the literature upon the topics to be subsequently presented to the class. In this way the student acquires the habit of reference work and little trouble is experienced in a continuance of the practice. In this way also the student's objection that he is

being held responsible in examinations for material not in his textbook is entirely eliminated.

TOPIC ASSIGNMENT METHOD.

This method is somewhat in keeping with that followed in advanced work, namely, the assignment of different topics to each student, with scarcely any direction, leaving the student to develop the ingenuity necessary to the final solution of the problem. With exceptional students there is little doubt but that they will make a creditable showing, while the average or below average student has accomplished little or nothing as a result of his efforts. A basis for such procedure should first be established by well-outlined work.

The following discussion applies to any separate one of the three methods previously outlined.

If the colorimeter, polariscope, refractometer or other special equipment are to be presented, they should by all means be accompanied by sufficient work in the laboratory in order to demonstrate their practical application. Demonstration of this equipment to a class or to groups of students is far removed from teaching.

From an analytical point of view the presentation should not involve a great number of laboratory assignments for the sake of method, but rather one of accuracy and a thorough understanding of the application of data when at hand. In other words, the student should be taught, when quantitative results become qualitative, as for example, refractive indices, iodine values, optical rotation, specific gravity, etc., represent very definite values but may be used as a means of identity as well as purity standards.

Supervision of the laboratory work should not necessarily be as extensive as that of the early chemistry training, but it has been found quite helpful for the student to have an exact subject outline of the laboratory work to be done. Detailed laboratory note books should be kept by the student and they should be periodically inspected and graded.

Organic Pharmaceutical Chemistry as has been outlined tentatively for the Syllabus may well be limited to those substances in the United States Pharmacopœia and National Formulary, except perhaps to digress in the selection of topics from new synthetics or recently isolated natural products from plant and animal sources, in order to keep the student alive to current progress. This subject lends itself perhaps less than any other to the textbook mode of presentation.

In conclusion it may be said that one's success or failure in presenting any phase of Pharmaceutical Chemistry depends largely upon ability, personality and interest in the particular work which is allotted for his presentation.

THE SCOPE OF PHARMACEUTICAL CHEMISTRY.

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An incomplete study of the course descriptions under pharmaceutical chemistry as set forth in the collective pharmacy school catalogs reveals a great diversity

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