

### 35. Standardization of Cod Liver Oil.

On arrival in this country the higher grades of oil are again assayed and standardized on the basis of natural vitamin content. The potency with respect to vitamins A and D is accurately determined by biological standardization using albino rats and checked by chemical methods.

### 36. Filling Bottles.

Washed bottles are brought to the filling machines by conveyors. As they are filled carbon dioxide gas is forced into them to displace the air and protect the product. The filled bottles are inspected through magnifying glasses as they pass along the conveyor belt to the capping machines.

### 37. Finishing Bottles.

A moving belt carries the sealed bottles to the labeling machines where a label is put on each bottle, after which the bottles are cartoned in single packages and larger lots. The packages are put into shipping containers and conveyed directly to the warehouse to await shipment.

### 38. Distribution.

The completed product is shipped to branch warehouses conveniently located at central points in the various sections of the country. From these, wholesalers in the principal cities and retailers in every corner of the country may be served promptly with supplies to fill their needs.

This splendid collection of dioramas was contributed to the Museum by The Upjohn Company, Kalamazoo, Michigan. The subjects to be illustrated were chosen by Dr. E. Gifford Upjohn and those who worked with him. Most of the dioramas are actual scenes of the Upjohn offices and laboratories. The Diorama Corporation of America, Chicago, Illinois, made the dioramas.

Much credit is due The Upjohn Company for its public spiritedness in presenting in such an impressive manner some of the professional and scientific aspects of medicine making—the art of the pharmacist.

This collection of dioramas has been on exhibition since November 1934, and has elicited much favorable comment. It is hoped that members of the association will take the time to inspect this exhibit when they visit the city of Washington.

---

## UNDERGRADUATE RESEARCH.\*

BY LAWRENCE H. BALDINGER.<sup>1</sup>

Undergraduate research, as referred to in this paper, includes that work of an investigative nature, curricular or extra-curricular, assigned to students working for a bachelor's degree. This topic is undoubtedly of more interest to those engaged in the teaching of pharmacy than to those engaged in commercial pursuits. Individuals in the latter group, however, can do much by assisting in this work and by realizing the possibilities of the intelligent application of undergraduate research in developing the scientific and professional attitude of our student pharmacists. Ira Remsen once wrote (1): "There is nothing mysterious about research. Every human being, in fact every animal, is by nature engaged in research, that is to say, trying to find out something about its environment." Research, fundamental or industrial, undergraduate or graduate, is one of the best means of acquiring new information, of developing in the student the qualities of originality, accuracy, reliability, a regard for professional ethics and a respect for hard work and properly directed imagination.

---

\* Section on Education and Legislation, Portland meeting, 1935.

<sup>1</sup> Department of Pharmacy, University of Notre Dame, Notre Dame, Indiana.

If, by means of well-planned and directed problems in undergraduate research, we can develop to a small degree in our students these qualities so necessary for a professional point of view, the profession of pharmacy will be benefited in so far as these are put to practice.

A hasty survey of the catalogs from sixty-three pharmacy schools reveals the following facts: Seven schools state specifically that a thesis in pharmacy or in a related field must be submitted before graduation, and two of these seven give credit to the student for this work; fifteen schools offer research as an elective course in the senior year, the credit given being based upon the amount of work done; two schools offer research but give no credit for the work. In a number of schools instructors assign small problems as part of the regular class work. No mention is made of this work in the catalogs, hence it is difficult to approximate the prevalence of this practice. In many cases, however, the same result is achieved as if the student was assigned a thesis problem which would require the major part of a school year for completion. Research work toward higher degrees is mentioned in catalogs from some of the remaining schools in the list. This data, however, was disregarded because we were concerned only with research offered to or required of undergraduates.

A number of objections have been voiced by pharmaceutical educators toward undergraduate research. While some are unquestionably well founded and worthy of consideration, others can hardly be considered in keeping with good pedagogy and high academic standards. Some say that the curriculum for the four-year course will not permit sufficient time to complete a thesis. Others say that the time spent in writing a thesis could be better utilized by taking extra course work. Cost is considered by some as an obstacle while others confess a lack of subjects for assignment to students. The most frequently voiced objection states that the undergraduate is incapable of doing acceptable research and that the time would be wasted.

The choice of a thesis depends upon the student's likes and dislikes, and upon his qualifications for the work. The latter, obviously, should be considered carefully by the instructor in charge of the research. An important factor, too often overlooked, is the assignment of a problem within the scope of the student's training, a problem which will not be too comprehensive so as to discourage the young researcher. The beginner should be impressed that every new fact, however small or circumscribed, is worth while and that, in the beginning of his career, he should be satisfied with problems dealing with some definite, specific and concrete point, even if it is a small one, and that it is far better to complete a small bit of research than to overtax his limitations on a problem too comprehensive.

Three types of theses may be offered to undergraduate students. The first type is known commonly as a library thesis. In this work the student may trace the history of a law, a preparation or a method of treatment. Obviously, extensive library facilities are necessary for this type of research as well as for the bibliographical thesis in which the student collects bibliographical references for one particular problem without writing a summary of the work which he has done.

For those students who prefer laboratory work and in those cases where library facilities are limited, a simple problem involving laboratory work as well as

some literature research is most desirable. Here again the director of research must exercise good judgment in selecting and assigning a problem which he knows will culminate with a fair degree of success, a problem which, no matter how small, will give the student a sense of satisfaction in a task well done.

In the two types of theses mentioned thus far a knowledge of scientific literature is not only desirable but imperative. Too many students are being graduated from universities with a hazy idea of what constitutes a good scientific journal, and a still hazier idea of how to go about using a library, either scientific or general. If, in completing a simple thesis, the student does nothing more than to learn how to use *Chemical Abstracts*, the proper method of listing and abbreviating journal references, and to acquire a speaking knowledge of standard reference texts and methods, his work has been well worth while and he has profited by the experience.

The third type of thesis is suggested for those students whose interests are mainly commercial and who expect to enter the business world. A laboratory or library thesis will not appeal to this type of student and it is far better to assign a problem involving survey work in a drug store or one having a commercial interest. In this type of thesis the enthusiastic help and coöperation of the pharmacists in the vicinity of the school are paramount, hence the request, early in this paper, that this group be cognizant of the possibilities of this work. If properly handled, it may result in a closer affiliation between the pharmacists and the school.

As has been stated, the qualifications of the student determine to a great extent the type of thesis assigned, the amount of time to be allotted, and the complexity of the problem. While some juniors are sufficiently mature to begin the work, it seems to be common experience that the first three-quarters of the senior year are best adapted to the work. A student soon learns to budget his time in order to do the maximum amount of work in the shortest time.

To instil into the student the true research spirit, the director must set the example. One can hardly expect the student to show enthusiasm over a problem which is assigned with a glad-that-is-over attitude on the part of the instructor. To familiarize the student with the proper use of the library, the instructor should be thoroughly acquainted with the library facilities in his own institution, neighboring institutions and cities. In this connection it might be well for the reader to review the paper, "The Use of the Library in Undergraduate Instruction" by Lee (2). John C. Merriam (3) has stated four reasons why a university or college includes constructive work as a necessary part of its regular program. Two of the four reasons are as follows:

"(a) Investigation is an indispensable means of keeping the faculty in a position to present the most fundamental and most advanced knowledge through its teaching.

"(b) Training in creative or constructive work is one of the most important phases of teaching and can be carried out successfully only through actual experience of the student."

It is obvious that research on the part of the instructor is necessary not only for personal intellectual growth but also for assuming the leadership of those under him.

In attempting a brief summary, only a few of the advantages of undergraduate research can be listed. It teaches the student how to use scientific literature and

how to organize material which he has collected from laboratory experiments and from library research; it develops a sense of responsibility, serves as an apprenticeship for those who plan to enter graduate work and, most important of all, it engenders a scientific attitude so necessary in the development of a professional point of view.

#### REFERENCES.

- (1) Reid, E. E., "Introduction to Organic Research," D. Van Nostrand Company, New York (1924).
- (2) Lee, C. O., "Use of the Library in Undergraduate Instruction," Proceedings of the 34th Annual Meeting of the American Association of Colleges of Pharmacy, page 80 (1933).
- (3) Merriam, John C., "The Function of Educational Institutions in Development of Research," *The University of California Chronicle*, page 133 (April 1920).

---

#### DENTAL PROFESSION MEETS IN NEW YORK.

BY GEORGE C. SCHICKS.\*

Dentistry holds, yearly, at least three conventions of national importance, that of the American Dental Association and the meetings held annually in New York and Chicago.

The Greater New York December Meeting of the First and Second District Dental Societies was held in the Hotel Pennsylvania the first week in December. It was the eleventh annual session and was very well attended by dentists and those in allied professions from all parts of the United States, from Canada and South America.

The program for the New York Meeting is always interesting; it was especially so this year.

Dentists have a characteristic way of offering what might be called specialized graduate courses of instruction to their members in the form of clinics. Each clinic is scheduled for three days and two hours each day is devoted to them. The duration of each class is one hour, though some have two-hour sessions, therefore six different classes may be met by each lecturer during the three days. Clinicians usually give one lecture to the general assembly during the week in addition to meeting the regular classes. Members of the dental profession may attend the clinics on payment of five dollars. It is surprising and pleasing to note the number of dentists who, each year, eagerly await the opportunity to register for such instruction.

The dentists had a wide choice of subjects to choose from in the 23 clinics available. Many of them were of particular interest to the pharmacist as well as to the dentist. Those having more or less specific application to the profession of pharmacy were:

1. Root Surgery Fundamentals Essential to Success, Clinician U. G. Rickert, Professor of Therapeutics and Materia Medica, University of Michigan, and also a member of the Council on Dental Therapeutics.
2. Surgical Treatment of Pyorrhea, Clinician Theodore O. Peterson, Past-President, Second District Dental Society.
3. Pre-Operative and Post-Operative Treatment, Clinician C. Raymond Wells, Chief of Dental Service, Queens General Hospitals, New York.
4. Root Amputation for the General Practitioner, Clinician E. Blumenthal, Director Dental Department, Greenpoint Hospital, Chief of Dental Department, Beth Moses Hospital, Brooklyn, New York.
5. Medication, How and What to Prescribe, Clinician George C. Schicks, Assistant Dean and Professor of Materia Medica, Rutgers University, College of Pharmacy.

One morning was given to the combined Medical and Dental discussion of the Report of the Sub-Committee on the Study of Curricula of Medical and Dental Schools in the United States and Canada. The Report was presented by M. O. Magid, M.D., and discussed alternately

---

\* Assistant Dean, Rutgers University, College of Pharmacy.