

H. C. Littlejohn, of Leesburg, has been reappointed as a member of the Board of Pharmacy for a term of five years from March 1, 1929. Mr. Littlejohn has served one full term and part of another term on the Board, and has been its vice-president for the past seven years.

West Virginia.—The following were registered by reciprocity recently: Columbus Talbott, of New Mexico; James T. Fuqua and Charles H. Adams, both of Virginia.

Wyoming.—Governor Emerson recently appointed C. C. Earl, of Lander as a member of the Board of Pharmacy to succeed C. C. Tomsik, of Sheridan, whose term recently expired.

The law was amended at the recent legislature to permit the Board to retain fees collected for examination, reciprocity, renewals, etc., paying its expenses out of these funds. Heretofore the Board has had an appropriation usually about \$2500 for a two-year period and this has not been sufficient. Examination fee was also increased to \$15.00, reciprocity fee to \$25.00 and annual renewal to \$4.00. Also, the provision of the law was deleted which relates to returning the fee in case of failure of the applicant. Under this section about three-quarters of all fees were returned, in spite of the fact that the Board had done the work.

Reciprocal registration was extended to Karl F. Moedl, of Utah, during May.

THE TEACHING OF BOTANICAL SUBJECTS AT THE NEW YORK COLLEGE OF PHARMACY.*

BY C. W. BALLARD.¹

The numerous articles and discussions dealing with the teaching of botany and pharmacognosy indicate a lack of unanimity as to scope and methods of presentation. While not quite agreeing that such unanimity is an indication of perfection, the fact remains that the teaching of these branches in the different pharmacy schools shows great variation as compared with pharmacy and chemistry. There even occasionally crops up the question as to why they should be taught. A certain amount of standardization is greatly to be desired, especially by those schools which receive students from other institutions, but this should be a standardization as regards scope. This is very aptly put in an article by Professor Youngken² in which he states his belief that there should be a minimum list of topics included in the botanical course, but that the teacher should be given the broadest latitude in the matter of presentation. If, as he states, we have such a minimum list of topics in the Pharmaceutical Syllabus and the Commonwealth Study and if those teaching these subjects are willing to include these topics in their courses, we at once have an agreement as to scope. But the very fact that each school is at liberty to omit a certain amount of this material at once partially nullifies efforts toward uniformity of scope. It appears desirable if we are to secure uniformity, to either make the Syllabus list obligatory or establish a list of obligatory topics with a proviso that they must be included in the work of each school.

Perhaps the first step toward a crystallization of ideas as to scope and uniformity or conformity with both Syllabus and Commonwealth Study, should be definite statements from those teaching these studies in the various schools. Such a statement should not only include the apportionment of hours, but also general data as to arrangement of work, mechanism of the laboratory, sequence of topics, examinations or tests and computation of standings. The recent article by Pro-

* Section on Education and Legislation, A. Ph. A., Portland meeting, 1928.

¹ Associate Professor of Materia Medica, Columbia University, College of Pharmacy.

² Heber W. Youngken, "Teaching of Botany to Pharmaceutical Students," *JOUR. A. Ph. A.*, 11 (1928), 190.

fessor Wirth¹ may well serve as an example. While most of those who have expressed opinions are in favor of greater uniformity as regards scope, it is especially pleasing that they are unanimous in the matter of latitude in the manner of presentation. The real differences of opinion arise in regard to the sequence of topics in a given subject. These differences even exist between schools in close proximity and the conferences on laboratory teaching in New York State held under the auspices of the State Education Department go a long way toward agreement in the matter of scope and sequence in the five schools of this state. These conferences are so arranged that each third year those in charge of laboratory courses in the division of *Materia Medica* can meet, compare notes and come to that degree of agreement necessitated by the licensing examinations. The divisions of Pharmacy and Chemistry are afforded like opportunities and their conferences are held, one in each of the two intervening years.

The following brief descriptions of the laboratory procedures in botany and pharmacognosy at this school are presented in the hope that others may see fit to give similar statements. While these procedures have shown satisfactory results over a period of years, each term sees minor changes or experiments looking toward improvement. Therefore no claims of perfection are made and they are to be regarded as our contribution to what might be made a real symposium on the teaching of botany and pharmacognosy with all of the schools in the country taking part. If it were possible for each teacher to have before him a brief outline of the work at the other schools we would have something more tangible and more readily assimilable than the discussions at conferences, helpful as the latter may be.

APPORTIONMENT OF HOURS.

Ph.G. Course—First Year	
<i>Lectures</i> , Morphology	= 32 hours—1 hour for 32 weeks
Histology	= 24 hours—1 hour for 24 weeks
<i>Recitations</i>	= 40 hours—1 hour for 24 weeks 2 hours for 8 weeks
<i>Laboratory</i> Morphology	= 64 hours—2 hours for 32 weeks
Histology	= 64 hours—2 hours for 32 weeks
Second Year	
<i>Laboratory</i> Pharmacognosy	
Macroscopic	= 48 hours—1 ¹ / ₂ hours for 32 weeks
Microscopic	= 48 hours—1 ¹ / ₂ hours for 32 weeks
Ph.Ch. Course—First Year	
<i>Lectures</i> , Morphology	= 32 hours—1 hour for 32 weeks
Histology	= 28 hours—1 hour for 28 weeks
<i>Recitations</i>	= 40 hours—1 hour for 24 weeks 2 hours for 8 weeks
<i>Laboratory</i> Morphology	= 48 hours—2 hours for 24 weeks
Histology	= 96 hours—3 hours for 32 weeks
Second Year	
<i>Laboratory</i> Macroscopic	
Pharmacognosy	= 64 hours—2 hours for 32 weeks
Third Year—	
<i>Laboratory</i> Microscopic	
Pharmacognosy	= 64 hours—2 hours for 32 weeks

¹ E. H. Wirth, "The Teaching of Pharmacognosy," *JOUR. A. PH. A.*, 17 (1928), 691.

BOTANY LABORATORY.

The work of the first year consists of lectures and recitations in morphology and histology together with laboratory work illustrative of these lectures. The laboratory work is divided between gross botany or morphology and histology so that each is given a two-hour period, histology in the morning and immediately following a lecture in the subject, and morphology in the afternoon of the same day. This arrangement is found to be more satisfactory than a continuous four-hour period. In morphology the work is divided into general and special topics, the latter series particularly related to descriptive terms used in reference to crude drugs. The sequence of general topics is the phyton, floral branch, perigone, androecium, gynaeceum, torus, ovules, seeds and fruits. The special topics include the morphological examination of roots, rhizomes, stems, barks, leaves, fruits and seeds. Each of these topics extends over one or more two-hour periods. In regard to general topics the work parallels the general histology of plant tissues. Histology starts with the preparation of specimens and cell structure, works through the different types of tissues and closes with a consideration of the structural characters of each of the plant organs. Thus plant tissues are dealt with both as isolated elements and as integral parts of a given plant organ. In the latter part of this work the histology and morphology parallel each other. Thus while barks are being dealt with from the standpoint of the histology at a given morning period, their morphological characters and the terms used in their description are being covered in the afternoon period. In this way we secure coördination between the two lines of work; but as a greater amount of time is necessary for the histological study of a given specimen, the number so considered must be restricted. In morphology the student deals with commercial samples of drugs, and several drugs can be studied at each period.

Each student prepares a set of specimens, including powdered and sectioned materials, at the beginning of the year. The majority of the sections are cut by our staff and mounted by the student in glycerin jelly. In addition to the set so prepared, he is also required to prepare a few specimens from both fresh and dried materials by sectioning, teasing or powdering, according to the nature of the specimen. Giving students prepared material may be open to objection, but often the time necessary for the student to prepare all of his specimens might better be given to an actual study of them.

For the past few years we have been using a laboratory manual devised by Prof. Hart and myself, and furnished the students in loose-leaf mimeographed form with a strong spring back binder. These manuals consist of a certain number of text pages summarizing the chief points relating to a given part of the work, together with a number of drawing or report pages. Readings are assigned weekly in advance and the pages for drawings are given to the students at the beginning of each laboratory period, so as to discourage the practice of submitting excellent drawings copied from some textbook. Minute directions for work are a part of the drawing pages and there is an almost endless repetition of the word *focus* so as to drive home the importance of proper manipulation of the microscope. We insist that the working directions be read perhaps several times over, and enforce this rule by not giving assistance if we see that the trouble is due to disregard of this request. We have found that if the student follows directions he will have a

fairly clear idea of procedure and will be able to do the work with but little trouble. The drawings or reports of each session are enclosed in a temporary binder and given in for rating and criticism at the end of the period. The matter of grading drawings is somewhat simplified by having but two grades—accept or reject for those drawings counting less than three points. The values assigned to accepted drawings or reports range from one point for those of a simple nature to eight points for detailed section drawings. The total number of credits for this part of the work is 125 in histology and 125 in morphology.

Four practical tests are held through the year for the first-year class. These consist of a certain number of prepared slides for microscopic examination and a like number of gross specimens for description or observation. In these tests the student is asked specific questions which can only be answered by an examination of the specimens assigned him. He is solely concerned with the identification of cellular elements, cell contents and morphological description.

Our main laboratory has a capacity of 135 students with work tables so arranged that north light is used for work. Each place is also provided with a sub-stage lamp for use when daylight is not available. In addition to charts of our own preparation we use lantern slides, opaque and micro-projection in illustrating the work. Every student is furnished with a Bausch & Lomb Model FFS or Leitz Model III, compound microscope. Our equipment includes 172 instruments of these types beside 60 older models which are rented to students at a nominal fee. The two types of microscopes mentioned above are nearly uniform, so that each student has the same type both as regards mechanical details and optical equipment. For gross work we use a Barnes type dissecting stand of special design made to our order and with a reflecting mirror. The student furnishes slides, coverslips, slide box and dissecting instruments. The microscopes, both compound and dissecting, are drawn at the beginning of the period from two stockrooms upon presentation of a card bearing the number of the instrument assigned the student.

While our laboratory sections are very large, this difficulty is overcome by dividing each section into small groups, each in charge of and for which an individual instructor is responsible. There are always one or more members of the staff in general charge and their duty is to explain details or difficulties reported by the instructors in charge of the smaller groups. The instructors circulate among the students of their respective groups, giving assistance and commenting upon the work. As the laboratory staff includes three officers of professorial rank and six instructors, both classes being full-time appointees, we can so divide our laboratory sections that each instructor has between twenty and twenty-five students in his charge. Two laboratory helpers and one clerk are also included in the staff.

PHARMACOGNOSY LABORATORY.

The pharmacognosy of the second year includes both macroscopic and microscopic work. In the macroscopic division we arrange the official drugs according to the plant parts which they represent. The sequence is roots, roots and rhizomes, rhizomes, barks, woods, leaves, flowers, herbs, fruits, seeds, and a miscellaneous group containing articles not otherwise placed. Each student receives weekly a specimen box containing about ten crude specimens and during the term covers the

entire list of official drugs. He makes brief descriptions and sketches of each drug on a manual page which is divided and captioned for the purpose. He retains the specimens for his personal collection and turns in his descriptions for criticism. In this work the instructor is relieved of the routine presentation of titles, definitions and specifications for each drug as this material is printed upon the page of the laboratory book. He therefore has more time available for comment upon and explanations of this data. He indicates the specific points to be stressed in description but takes care not to carry this so far as to relieve the student of the necessity for personal observation. Four practical tests, each consisting in the identification of twenty drugs, are held during the year, and two theoretical tests are given. No direct grades are given for the descriptions and drawings in macroscopic pharmacognosy, but failure to present a satisfactory laboratory book both as to amount and scope is penalized by a deduction of twenty points from the rating of the next practical examination.

The microscopic pharmacognosy consists in the study and drawing of about fifty official powdered drugs. This work is so arranged that one or more of the drugs furnished as a specimen in macroscopic pharmacognosy of a given period is used for microscopic study. The student prepares a teased or powdered specimen from the crude drug, studies it and records his observations by sketch. Before each practical examination he is given an opportunity of obtaining standard powders from our stock for permanent preparations. The drawings of each session must be returned at the end of that period and grading is either "accept or reject." Four practical and two theoretical examinations are given during the course. The practical examinations consist of the identification of unknowns and the examination of known materials for conformity with official specifications. Students are required to use both the U. S. Pharmacopœia and National Formulary in these practical examinations.

PHARMACEUTICAL CHEMIST COURSE.

The general foundation work of this class is similar to that of the Ph.G. course in the first year, with the exception that twelve weeks are devoted to a brief but systematic study of the lower plant forms. This latter work replaces the morphological and histological study of plant organs given in the Ph.G. course. The general topics in both histology and morphology are the same for both classes. The study of lower forms begins with the *Cyanophyceæ* and works through *Algae*, *Fungi*, *Bryophytes* and *Pteridophytes*, concluding with a study of the general structure of the dicotyledonous plant. This is a broader treatment of botany than the more specialized Ph.G. course and is more in line with a general laboratory course in the subject.

Macroscopic pharmacognosy is placed in the second year of this course, and at this point the student receives instruction in the special morphology of parts of the plant constituting official drugs. This morphology is so worked into the program that one or more periods are given to the general consideration and description of a given plant part immediately preceding detailed studies of the drugs derived from this particular plant part. The method of presentation is similar to that of the Ph.G. course, but in addition to the official drugs, several nonofficial items of commercial importance are included.

The microscopic division of pharmacognosy is given during the third year and consists in a study of the histological structure of the several plant organs, followed by work on powdered drug materials. Students prepare their own specimens, both sections and powders, but are also given duplicate specimens from our stock after they have made a study of the materials prepared by themselves. Each student has a small reagent set and performs the simpler microchemical tests. They are also required to prepare two specimens by the paraffin infiltration method, carrying through all steps from fixation to staining and mounting.

RATINGS AND COMPUTATION OF STANDING.

Ratings are computed in accordance with the following schedules, copies of which are placed in the hands of the students. We believe in the utmost publicity both as regards evaluation and marking. All test papers are returned to the student plainly marked, and he has the privilege of appeal to the director of the laboratory. We take no little pride in the fact that a student who fails the course rarely questions his low grade. He can keep his own tally and knows where he stands throughout the term. He can also see from these schedules that a final spurt will not counterbalance delinquency through the year.

First-Year Ph.G. Class

Accepted drawings in histology	125 points
Accepted assignments in morphology	125 points
Written recitations	150 points
Practical examinations	400 points
Theoretical examinations	200 points
Pass rating = 750 points	
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	1000 points

First-Year Ph.Ch. Class

Accepted drawings in histology	90 points
Accepted assignments in morphology	120 points
Accepted drawings and assignments in developmental botany	140 points
Written recitations	150 points
Practical examinations	300 points
Theoretical examinations	200 points
Pass rating = 750 points	
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	1000 points

Second-Year Ph.G. Class

Accepted drawings and assignments in pharmacognosy	160 points
Practical examinations in pharmacognosy	800 points
Theoretical examinations in pharmacognosy	
Pass rating = 1020 points	400 points
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	1360 points

Second-Year Ph.Ch. Class

Accepted assignments in morphology	100 points
Practical examinations in macro-pharmacognosy	400 points
Theoretical examinations in macro-pharmacognosy	
Pass rating = 525 points	200 points
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	700 points

Third-Year Ph.Ch. Class

Accepted drawings in micro-pharmacognosy	250 points
Accepted reports and technic	150 points
Practical examinations in micro-pharmacognosy	400 points
Theoretical examinations in micro-pharmacognosy	
Pass rating = 750 points	200 points
	1000 points

The above data represent strictly botanical or pharmacognostical laboratory work. The subjects of posology, physiology, bacteriology, materia medica and toxicology are taught separately, although these studies, as well as botany and pharmacognosy, are all for purposes of departmental organization, included in the division of *Materia Medica*.

COLLEGE OF PHARMACY,
COLUMBIA UNIVERSITY.



DR. CHARLES H. MAYO.
ROCHESTER, MINN.

Dr. Charles H. Mayo will be a speaker at the Rapid City meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION. He needs no introduction to pharmacists; his work during the World War is known to everyone and also the Mayo Clinic in Rochester, and his contributions to medical education. The members of the A. Ph. A. highly appreciate his coming to the meeting to address them; his subject is "The Chemistry of Nature."

PLANT SCIENCE SEMINAR.

To the Deans of Colleges of Pharmacy, Pharmacognosists, Botanists and Plant Chemists:

This informal greeting is addressed to you with the hope that you will make an effort to have your school represented at the seventh annual meeting of the Plant Science Seminar which will be held in Custer State Park of the Black Hills, Rapid City, South Dakota, August 19th-23rd. This meeting will be followed by the National Conference on Pharmaceutical Research on the 24th and by the annual meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION the following week.

It is not the intention of the Seminar to duplicate in any way the work of the AMERICAN PHARMACEUTICAL ASSOCIATION, but rather to augment its activities.

The meeting this year will be somewhat of an innovation as it is planned to make it a real week's outing in one of Nature's most wonderful playgrounds of the West. Papers and discussions on topics of pharmaceutical botany and pharmacognosy as well as plant chemistry will be continued but the dominant features of this session will be the exchange of herbarium specimens, field trips and the collection of new specimens.

A wealth of natural scenery and an abundance of flora will lend a continuous greeting to those in attendance at the meeting. Experts upon the botany and geology of the locality will accompany the group upon their collection excursions, sight-seeing and fishing trips.

Those interested are urged to come and to send in their contributions to the Secretary.

You and your representatives are most cordially welcomed.

CHARLES E. F. MOLLETT,
Dean School of Pharmacy, University of
Montana.