

# THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

## THE TEACHING OF PHYSIOLOGY AND PHARMACOLOGY IN SCHOOLS OF PHARMACY.\*

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The purpose of this short paper is to discuss when, where and how the two allied sciences—physiology and pharmacology—should be taught in the school of pharmacy.

It is a very simple thing to define physiology, but it is very evident, from a review of the definitions given in our standard textbooks, that the term pharmacology may be defined to suit the convenience of the teacher.

I have the honor of teaching both pharmacy and medical students. We who teach in institutions that have both schools are told that it would not be good pedagogy to teach medical and pharmacy students at the same time. The medical student is taught pharmacy, toxicology and pharmacodynamics by lecture, demonstration and laboratory work, while the pharmacy student is taught materia medica, toxicology and pharmacodynamics, principally by lectures and recitations.

It is just here that I would like to call your attention to what I believe is a weak point in our pharmacy curriculum—I refer to the teaching of physiology and pharmacology.

First of all, I do not believe the short course in physiology, taught as it is by lectures alone, is worth a great deal to the student. It has proved to be one of the most difficult studies in our school and we have had more "conditions" in this branch than any other. I do not concur in the belief of some that it is due to the poor preparation of our pharmacy students, but that it is due, principally, to the fact that they do not get laboratory work at all. Think of teaching pharmacy, chemistry or pharmacognosy by lectures alone! We should require one laboratory period for every lecture period. I am not prepared at this time to say just how many hours are necessary, but I am convinced that laboratory work in physiology should be required. I have never taught physiology, but this is my candid opinion. In order to get the viewpoint of the physiologist, I have asked our Professor to express his views and, with your permission, I will read them to you.

"Physiology belongs in Pharmacy because of its intrinsic value to any individual to understand the major workings of his body, because of its prerequisite value to other branches, and in order that the pharmacist may be at home in the atmosphere in which his profession naturally places him.

"There is a commercial value to the study of physiology, because it makes a better salesman of the pharmacist in dispensing the mechanical adjuncts of medicine, when he understands their physiological action and dangers. It also makes him a better purchaser to know the more valuable and useful products.

"None of these reasons require that he should be a finished Physiologist and the time for such a course would be unfairly taken from the more basic branches.

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"The length and character of the course should be about and a little better than a course of the grade of sophomore work for a Bachelor's degree. The time set by the council as sixty-four hours could not be shortened, and—by intensive use by the student, and logical use by the teacher—could be made satisfactory.

"The purpose of all laboratory work is discovery, illustration and facility. The laboratory is an addition to, and not a substitute for, study. The economical use of curriculum hours compels us to remember that the laboratory period is twice and in some cases three times the lecture period.

"Much of our knowledge is gained by comparison and anatomical structure and physiological action being basic must be seen to be comprehended. Hence, the necessity for laboratory work in the teaching of physiology.

"Not only time but material offers difficulties in the introduction of laboratory work in this course. Both of these can be successfully met. They must be, because the illustration and facility which come from the laboratory or similar work are needed in the teaching of physiology.

"In addition to the laboratory charts, models and dissections must be used.

"As to time, as much preparatory work as possible must be done prior to the teaching period. Laboratory set-ups must be ready when the class starts. Previous instructions given to prevent 'lost motion' in starting. There must be no such thing as dead time. The time of the men and of the work must be checked, and with that breadth of comprehension which would keep the exercise from being mechanical. Doubtful experiments must be eliminated. Repetition, when used, must be presented in a different form and to bring out additional facts. The experiments must be such as unfold knowledge to the student and for the acquisition of knowledge by him from observation. Observation, as a form of acquiring knowledge, must be cultivated.

"Mechanical principles must be shown by mechanical models which are followed by anatomical specimens showing physiological action so as to translate mechanical action into living motion."

(Human specimens must be previously prepared after cogitation as to the particular fact that is to be observed. It is facts, observations and conclusions we desire, not visual attention alone.)

"Since physiology in distinction from anatomy is in principles not form, and since anatomy is plan rather than detail, animal specimens are invaluable. Fresh organs may be secured and given to the students to handle; the plan of handling is previously arranged. These may be demonstrated and comprehensive exercises, economical in detail, are required of the student.

"The trachea, the lung, the basics, tissues, the eye, the coats of digestive tract, the oesophagus, the kidney, the heart, arteries, pancreas, spleen, liver, spinal cord, etc., of the animals lend themselves wonderfully to this work. Previous and definite arrangements should be made for obtaining these from the butcher or direct from the abattoir. Fresh specimens or those kept on ice are far superior to those kept in solution. In fact these latter are of doubtful value. The domestic animals and usual laboratory animals offer useful facilities. (With these, demonstrations in vivo can be given.)

"Demonstrations should not be by the teacher alone, but the majority should be by handling by the student; special exercises should be arranged for each organ.

"The student should be so guarded and warned that he does not get the idea that time *per se* spent in the laboratory is knowledge gained, or that the laboratory is a substitute for work or knowledge, but that it calls for special work. It is not to take the place of his regular study, but to make the knowledge gained thereby more comprehensible, more feasible and more permanent."

Pharmacology is quite as important as any of the other branches in our curriculum, and yet very few of our schools teach it as such. Some of the schools offer a short course in bio-assay. I believe that certain divisions of pharmacology should be stressed. There is, undoubtedly, too much over-lapping in the teaching of pharmacognosy and pharmacology. There is no need for the pharmacologist to repeat the botanical origin, family, etc., of the drugs. The pharmacologist should stress the preparations, doses, physical and chemical characteristics of

the drug. The physiologic, toxicologic and therapeutic action is equally important. However, of the sub-divisions of this important study, toxicology and bio-assay are the most important to the pharmacist.

Toxicology should be taught by lectures, demonstrations and laboratory work. Nothing you can say will impress and aid the student in remembering the treatment of a poison as will an experiment upon an animal.

A toxic dose of bichloride of mercury is administered to an animal by stomach tube or by placing a tablet on the back of the tongue and washing it down with water. Upon another animal follow the same procedure but administer the treatment. The student will never forget what he has seen demonstrated and will be ready when an emergency arises to render first aid and not lose valuable time looking up antidotes and trying to get a physician.

I know of a case that happened, just recently, in which the pharmacist sold carbolic acid to a customer, who drank it in the store. He called the ambulance. It was one hour before the patient received treatment and, of course, died.

Another case, where the pharmacist gave sweet oil to a young man who drank the carbolic acid he had just purchased. He died too. Two lives that perhaps could have been saved, if the proper treatment had been given. I am satisfied that toxicology should be stressed.

Bio-assay is another sub-division that should have more hours allotted to it. This study should also consist largely of laboratory work. You cannot teach bio-assay without frogs, guinea-pigs, cocks and dogs. The students should work in groups and every bio-assay method should be worked out in the laboratory.

Pharmacodynamics or the study of the physiologic action of drugs should also be taught by lecture, demonstration and laboratory work. As with physiology, I do not believe it necessary to allot as many hours as we do to the medical student, but certainly you cannot teach this subject by lectures alone.

Therapeutics or therapy-dynamics is a division of pharmacology the pharmacy student should be familiar with. It is not necessary, however, to stress this subject. I do not agree with those who are of the opinion that a knowledge of the uses of drugs in the treatment of disease will encourage the students in the idea that they are being prepared to counter-prescribe.

The pharmacologist should confine his teaching to useful drugs rather than used drugs. Teach the student the source, dose, official and common names of the drug and its preparations, then the physiologic action, therapeutics and toxicology. This should be followed by actual demonstrations in the lecture room and by exercises in the laboratory.

To summarize:

1. Physiology and pharmacology should be taught by lectures, demonstrations and laboratory work.
  2. Bio-assay should be stressed and consist principally of practical work.
  3. The course in physiology should be given during the first year.
  4. Pharmacology is a subject for the second year.
  5. Bio-assay should be taught in the third and last year.
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