

Afterward we must have him do it under our supervision and under conditions which admit of our following and sharply criticising every detail of his manipulations. The old days when a sleepy attendance upon a course of lectures, however learned their source, could be considered a course of instruction, have gone, it is hoped, never to return. The ideal is attained only when every detail taught in the lecture room is followed by ample laboratory practice. Better, if anything is curtailed, that it be the didactic lecture rather than the laboratory course.

Coming now particularly to my own department, I note that the ultimate object of the study of Pharmacognosy is to enable the student to identify and determine the quality of drugs by their physical examination. Perfection is reached when he is competent to do this in the case of every known drug. But such perfection is far beyond the bounds of possibility in the college course. Only a portion of the *materia medica* can be thus learned, and he must depend in his dealings with the others, upon applying the description to which he will refer when necessary. He must, moreover, be prepared to intelligently interpret the descriptions of subsequent new comers and very likely to construct and present such descriptions of his own. Appreciating this necessity, we note that only half our task is performed when we have familiarized our students with such drugs as we can find time to study with him. We must supplement this teaching by making him perfectly familiar with the use of the term used in scientific description.

We may therefore consider the following three tests, as fairly indicating our success in securing practical results (the only kind that we have a right especially to consider) from our teaching.

(a) The ability of our student to form a correct idea of a drug that he has never seen, from considering a description of it.

(b) His ability to describe a drug fully and accurately in scientific language.

(c) His ability to recognize, and determine the value of, a reasonable number of drugs from their physical examination.

If we keep these three practical results clearly in sight we are in the way to know exactly what kind of instruction to impart, and we shall have a perfect guide to proportioning it.

To familiarize our students with the use of descriptive scientific terms and to thus meet the first and second of our tests the course in botany and junior pharmacognosy is instituted. While the laboratory hour is known as junior pharmacognosy, it is really but the practical application of the teaching of the botany lectures. It is practical structural botany. Its superiority to the ordinary practical summer course in botany lies in the fact that we are not dependent upon the specimens that the season and locality afford, but we select from every locality, and preserve at leisure during the summer our material, and arrange it to suit our course of instruction, instead of being obliged to

adapt our instruction to our available material. In addition there is the important fact that we work with dried materials, the same that the pharmacist must be capable of handling in his business operations. Thus, acquiring at the outset the more difficult art; the student later can pass with facility to that which is easier. The laboratory course should cover every point of structure presented in the lectures. But an hour's lecture will treat of more points than can be covered by an hour's work in the laboratory. I therefore have recourse to auxiliary illustration in the lecture room. We must all have experienced the difference between becoming familiar with an object itself and seeing it illustrated by even the best possible pictures of the text book and the chart. By the system of card mounted specimens here shown you, perhaps half of the technical terms of descriptive botany can be vividly illustrated in the lecture room. Each student holds in his hands one or more cards of specimens illustrating the lecture of the hour, and the didactic lecture becomes merely an explanation of the objects there seen, and the application to them of the proper descriptive terms. (Illustrate with card showing outlines of leaves, &c.)

The objection that will naturally be urged against this method is the enormous labor that it involves, and this objectionable consideration can be neither disguised nor mitigated. To carry out the method with reasonable thoroughness for a class of 200 students requires 50,000 mounted articles, besides all the material used in dissection in the laboratory. But ladies and gentlemen, it pays the students and the man who has assumed the responsibility of training a large college class cannot justly decline any labor that will be of such great advantage to them. As conscientious teachers we must consider that we are bound to our students by moral obligations far transcending the business obligations that bind us to the institutions by which we are employed. We must confront ourselves with the test that we accepted at the beginning. We succeed when we secure graduates in whom the accurate idea is excited upon the instant that a descriptive term is named. It is a cardinal principle in teaching that no term should ever be used until after the idea that it represents has thus become the property of the student. If, as I read the botanical description of a certain species of plant which he has never seen, a picture is gradually built up in the imagination of my listening student, perfect in detail in proportion as the description is thus perfect, then I count that my teaching of this student has been successful in this particular direction. But just so far as we fall short of this result, just so far we have failed in our efforts. This statement would not apply to the students in all classes of schools. The minister, the journalist, and the author, like the unprofessional man of culture, could undoubtedly profit much by a series of didactic

lectures unaccompanied by any practical instruction. His financial success does not depend upon the extent and accuracy with which he can apply such instruction in the examination of natural objects; but this is by no means true of the pharmacist. Culture and discipline are not the objects sought, and we have no right to content ourselves with a course of instruction which ends with them. So far as our work is concerned, it is true that any course of lectures on botany or pharmacognosy or any portion of such a course that is not followed up by securing for the student a practical familiarity with its subject matter, may just as well be omitted as introduced, except for the mere name of its presence. The student who has listened, although again and again to such teaching without having been shown the things of which it treats, is no better off as a pharmacist than he would have been without it. He still encounters in scientific description a language that is essentially foreign to him, and is a stranger and an alien among the richest collections of literature and the most entertaining of scientific society.

If this portion of our work has been faithfully and successfully performed, then the student is ready to examine intelligently the objects which he is to study in his second year and thus to prepare himself for meeting the third of our tests.

The drugs with which he is to become familiar under our instruction he must see, and the word "see" here means a great deal. We must show him and teach him how to find for himself all the marks, both gross and microscopical, upon which the desired determination depends. To meet the requirements of this case I devote one hour in the laboratory for each hour devoted to didactic lecturing upon *materia medica*. While the lecture is called *materia medica* the laboratory course is called pharmacognosy, we must appreciate that the latter is merely the practice of the former in certain directions. Therefore, to say that I elaborate this kind of instruction so far as possible is to present one direct answer to the question, "How shall we make our teaching more practical?" For this purpose the articles are arranged in the order of their similarity in appearance, the order practically which is given in Maiseh's text book. The gross characters are first considered, the dozen or so specimens for the day being compared as to points of similarity and difference, and afterward several of the most interesting are examined with the compound microscope. To each student is furnished an ample specimen of each article and in case of most of them he is allowed to retain them permanently and is encouraged to study them further at home.

Although the time thus allowed is short yet it is sufficient to get a fairly good knowledge of all the organic drugs of the Pharmacopœia, and the point which is of greater importance is that he is fitted for properly pursuing his studies in the future without assistance, and this is of much more value to him than any information which he may gain while at college.