

Section on Education and Legislation

Papers Presented at the Sixty-Second Annual Convention

PHARMACEUTICAL EDUCATION.

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Pharmaceutical Education is a very comprehensive title, and it will, perhaps, be well at the outset to state that the present discussion refers only to the training in the United States for certain branches of pharmaceutical work.

The consideration of pharmaceutical education is usually limited to the educational requirements of retail pharmacy, but it must be remembered that the requirements of modern pharmaceutical manufacturing and drug inspection are quite different. Students frequently seek advice in regard to the course of study which should be pursued to fit them for positions as drug chemists; and directors of schools of pharmacy, chemistry, and chemical engineering occasionally ask the same question. The answer is usually unsatisfactory, for this branch of pharmaceutical education has received very little attention. Teachers have frequently had experience as retail pharmacists, but rarely as manufacturers or drug inspectors, therefore, they cannot know the requirements for such positions from personal experience, and it remains for official and industrial drug chemists to indicate the character of training required. The writer believes that this should be essentially the same for chemists who engage in drug inspection and manufacturing, and it is hoped that this discussion will lead to the consideration of this field by those engaged in educational work.

The first thing to establish, is the demand for such specially-trained men, but this seems evident since the federal government and all the states require drug chemists, and every pharmaceutical manufacturer requires from one to fifteen or twenty such chemists. The conditions which exist in different manufacturing establishments vary widely; in the small factory all of the scientific work may devolve upon one man and in such cases he must have a broad and varied pharmaceutical training if he is to succeed, however such positions offer the greatest opportunities for general experience. In the large establishments where many scientific workers are employed, a high degree of specialization exists, some have no knowledge of pharmacy, others a knowledge of only one branch of the industry; nor is a pharmaceutical training necessary to all, for a botanist in the employ of such an establishment should be essentially a botanist with particular knowledge of the vegetable drugs and not a pharmacist with some additional training in botany. The chemist or pharmacist, however, should have general pharmaceutical training and it is to the education of this class that the present discussion refers.

The demand being established it may be asked if there is not a sufficient supply of such chemists. The existing condition is that practically no students have received or are receiving the kind of training desirable in such positions and graduate chemists with no pharmaceutical knowledge are usually employed, the alternative being to employ men who have obtained such knowledge at the expense of their general chemical training. A man with good chemical training can by years of experience obtain the necessary pharmaceutical knowledge, but it is much more difficult for the graduate pharmacist to acquire a sufficient knowledge of chemistry in this way. In a small establishment, however, where only one chemist is employed, he must have at the beginning, the pharmaceutical as well as chemical training. In the larger establishment the young chemist will probably be started on analytical work which does not require pharmaceutical training, although familiarity with the pharmacopœia and with medicinal products would be of great advantage.

Teachers of engineering and of industrial chemistry, wish to keep their students out of the drafting room or analytical laboratory, unless these may be expected to act as stepping-stones to executive positions or to actual engineering practice. In the factory where medicinal products are manufactured a certain amount of research work is necessary and many chemical engineering problems are solved; this work should be done by men promoted from the analytical laboratory, provided they have the essential pharmaceutical knowledge acquired either by training or experience, otherwise such positions must be filled by bringing in specially-qualified men if they can be found. Unless he has had a preliminary pharmaceutical training only the exceptionally energetic and studious chemist engaged upon some particular line of analytical work, can fit himself for such positions.

If it be granted that there is an active demand for drug chemists which is not supplied by the existing system of pharmaceutical education, the next step will be to determine the length and character of a course calculated to train men for such positions. This is a difficult subject and one which must receive the attention of many men engaged in educational and industrial work before satisfactory courses can be outlined. The writer will therefore only treat the matter in a general way and touch upon some details which are matters of personal observation.

All of the other branches of pharmaceutical work depend upon retail pharmacy for their existence, therefore it is highly desirable, if not absolutely necessary, for one who expects to advance very far in any line of pharmaceutical work, to have some information in regard to the retail drug business upon which to build his general knowledge of pharmaceutical matters. Actual experience in a drug store, is the best way to acquire such information, although if this is impossible, judicious reading and observation will go far toward supplying it.

There are many excellent chemistry courses in which the time given to the study of language, mathematics, physics, and general, theoretical and analytical chemistry, is properly proportioned, and the prospective drug chemist should receive just such training; in addition a thorough drill in assaying drugs should never be overlooked. The subjects provided for in the Pharmaceutical Syllabus should be included except where these are covered by the regular chemistry course. Some engineering knowledge is also essential to the manufacturing pharmacist, although it may not be necessary in drug inspection. It may be objected that the

proposed course of study would require six or seven years, but time could be saved in working out the details of such a course and it could undoubtedly be handled in a very satisfactory manner in five years. Would it pay students to take such a course? This can be answered in the affirmative, as most of the men now entering this field have had four years of college work and the additional year would enable them to command a higher salary from the beginning and would enhance their prospects of promotion to positions of greater responsibility.

At the present time graduate-chemists, available for positions in drug laboratories, are frequently deficient not only in pharmaceutical training, but also in their knowledge of physical and physiological chemistry, and it is exceptional to find men who have been trained to make proper use of the chemical literature. There is usually a lack of knowledge concerning the use and care of electrical and optical instruments, balances and weights, and other laboratory equipment, which results in inaccurate work and often in ruined instruments. There has been no engineering or mechanical training and, therefore, a simple mechanical drawing cannot be executed and neither special laboratory apparatus nor factory equipment can be designed. All of these things should be especially emphasized in a course in pharmaceutical chemistry and as the time devoted to such a course will be so fully occupied, extraneous subjects must be omitted. There will be no time for food analysis, mineralogy, metallurgy and other subjects not related to the chemistry of medicinal products, and their places should be taken by drug analysis and by the chemistry of industrial processes more closely related to pharmacy.

Mention must be made of the courses which have already been established for the purpose of training drug chemists. All of these courses must be classed as failures in some degree on account of a lack of coöperation between the industrial and official drug chemists and those engaged in educational work. Four-year pharmacy courses are, as a rule, only a little better than the shorter courses, in fitting men for practical drug work; instead of giving more thorough training in chemistry, the extra time is usually occupied with cultural and miscellaneous scientific subjects in a way which makes it appear that it is somewhat difficult to fill two additional years, when, as a matter of fact, a period of four years is too short a time even if every non-essential, though probably desirable, subject is omitted. A still more illogical course is the three-year course, where the regular two-year pharmacy course is supplemented by a third year of food and drug analysis. To attempt to combine food and drug work in a three-year course is absurd and can only lead to the encouragement and perpetuation of certain abuses which now exist. It would be much better if schools of pharmacy would use their influence to separate food and drug work, rather than to associate them more closely. Since it is unfortunately true that foods and drugs are linked together in the laws, it is particularly desirable that administrative officers should be able to secure the services of chemists who are thoroughly trained in pharmaceutical chemistry to carry on the work of the drug laboratory. The "cramming" of a lot of analytical methods, can result only in their empirical use, and this is one of the conditions which are now handicapping drug manufacturing and inspection. Let the chemical training be so broad and thorough that the principles upon which methods are based can be clearly understood; the limitations of the methods will then be recognized and

they will be used with judgment and modified when necessary to suit varying conditions.

It may be objected that very few men at present connected with drug work, have had the training which has been advocated, yet many succeeded, but it must be recognized that their success would have been earlier and ultimately greater if they had started with the thorough training which has been suggested. We have worked as well as we could with the material at hand, but if thoroughly trained pharmaceutical chemists had been available during the past eight or ten years, this branch of chemistry would be much further advanced and would be recognized by chemists in other lines of work; nor would it be possible for a well-informed chemical engineer to say to the writer, as was done a short time since, "Pharmaceutical work at present is entirely empirical, is it not?"

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PHARMACEUTICAL EDUCATION, OR THE EDUCATION OF THE PHARMACIST; WHICH SHALL IT BE?

JACOB DINER.

The question of education is justly occupying the minds of many men, educators and laity, and not the least interested in this question are those men who are chiefly concerned with professional education. The medical press for the last ten years has devoted a great deal of time and considerable space to the subject of medical education and the pioneer of American medical journals, the *Journal of the A. M. A.*, regularly brings a column or more on medical education and legislation.

In one of his usual masterly addresses, Henry P. Hynson some time ago sounded the key-note when he spoke of the pharmacist and his need of general education.

Therefore, in taking up the subject of Education as related to Pharmacy and the Pharmacist, we must closely differentiate between the education of the pharmacist and pharmaceutical education.

Modern pharmacy (or, should I say the modern pharmacist?) consists essentially of two integral parts. On one side we must have the professionally or rather specifically-trained man, on the other side we must prepare the same man to be commercially able to avail himself of every honest and legitimate means for the financial advancement of his business. How far shall we educate the embryo pharmacist for one and prepare him for the other,—does modern pharmacy really demand a professionally-trained pharmacist? Is the commercial training compatible with scientific education? To all of which I reply:—Most emphatically yes. The times have passed when the first essential to scientific attainments was utter lack of practical knowledge and disregard of the so-called worldly petty details such as dress, manners, sociability, etc.