

with fair accuracy for each item of equipment what that period of years is going to be.

"As long as this replacement is inevitable, it seemed to me the only sensible thing to do would be to try to figure how it could be replaced at the least expense. You see the result. The fountain which some day will have to replace this one is going to cost me in actual cash layout only \$2808. If I waited until I had it in the store before I commenced to pay for it, it would cost me, according to my figures, \$3988.80, almost \$1200 more. In order to make this saving of nearly \$1200 all I have to do is to set aside \$19.50 a month of money that eventually I'd have to spend anyway. That certainly is little enough, don't you think, considering the saving it makes possible?"

GRADUATE EDUCATION IN PHARMACY.*

BY G. L. JENKINS.¹

Educational standards in pharmacy have advanced rapidly during the past five years when compared with previous periods, but this advancement has not been rapid if compared with the extension of such standards in other professions. The expansion of graduate pharmaceutical education, although marked, has especially failed to keep pace with that in other allied sciences. The reason for this condition is probably due in part to the assumption that the training of retail clerks and pharmacists is the primary and, frequently, the only function of our colleges. It is also caused in part by the fact that the majority of our schools, as well as the men who guide pharmaceutical education, have not been in a position to give more than the usual elementary stages of academic work designed to prepare retail pharmacists.

Until a century ago pharmacists were pioneers in research not only in their profession but oftentimes in that of the allied sciences. With the growth of other sciences—some of which were foster children of pharmacy, although they do not admit it to-day—pharmacy has receded into the background. Consequently, when we look for the achievements of pharmacists among the recent notable researches in the synthesis of new medicinal agents, in the development of biologicals, in the systematic analysis of drugs, in the study of vitamins, or in the knowledge of glandular products, we find that this work has mostly been accomplished by members of other professions that expanded into these fields which properly belong to pharmacy, and not by pharmacists. Much of this work has been done in pharmaceutical establishments but, usually, by others than pharmacists.

It is usually granted that much of the work requiring precise technical education and experience has disappeared from even the most professional of our modern dispensing pharmacies and has found its way into manufacturing plants. As a result, the technical educational requirement necessary for the retail pharmacist has decreased while that of the manufacturer has increased. Little cognizance has been given on the part of our schools to the need of preparing men to take their place in and make such plants truly pharmaceutical. Many manufacturers have few pharmacists on their scientific staff, while chemists, medical men and pharma-

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cologists are employed in considerable number. Obviously, a demand exists for men who have completed graduate education in pharmacy to do research in manufacturing pharmacies.

The recommendation of the Association of Colleges of Pharmacy that all schools encourage research indicates a hopeful trend. Definite steps in this direction may be expected in the near future. Further progress is indicated by the requirement of the Association that member colleges appoint only persons to positions above the rank of instructor who hold graduate degrees. With the steady increase of undergraduate educational standards this requirement is not too high. Our schools of pharmacy must give graduate work in order to prepare qualified teachers and research workers in considerable number, if we are to make the advance in general educational standards more than a gesture.

Graduate education in schools of pharmacy has grown slowly during the past few years and needs much further development. In 1927 nine schools offered a standard academic "master of science" degree and four the degree of "doctor of philosophy." Three schools offered the degree of "master of science in pharmacy" and three that of "doctor of pharmacy." In some cases the "doctor of pharmacy" degree is given for two years of graduate work. Thirteen different institutions or approximately twenty-five per cent of our recognized colleges offered graduate degrees. The fact that some of these schools have practically no graduate students indicates that the opportunities in pharmaceutical research and teaching have not been stressed. This is further emphasized by the exceedingly low ratio of graduate to undergraduate students in pharmacy as compared with other sciences. It is found that the majority of graduate students take their work in colleges offering the doctorate degree. It is also found that the greater number of grants from industrial plants are placed in such colleges.

The Association of Colleges of Pharmacy has provided that our schools may give the "master of science in pharmacy" and the "doctor of pharmacy" degrees for one and three years, respectively, of graduate academic work beyond the bachelor's degree. Since the majority of our colleges giving graduate work are granting standard "master of science" and "doctor of philosophy" degrees, it is desirable that such degrees be adopted. This would create needed uniformity in graduate pharmacy degrees and place them on a parity with degrees offered in other sciences by all universities.

Although progress has been and is being made, much remains to be accomplished. More schools should institute graduate work so that pharmacy will be represented by a group of scientists equipped to do pioneer research work. Qualified undergraduate students should be encouraged to continue beyond the bachelor's degree. The united support of pharmaceutical manufacturers through establishment of research fellowships should be secured, as in the chemical industries.

When graduate work of a high standard becomes established in a majority of our properly equipped colleges, pharmacy will no longer be discriminated against in governmental appointments; research grants from our industries which now are placed in other schools will be given to pharmacy. The prestige of pharmacy will be greatly increased through professional achievements. Most important, pharmacy will produce in its ranks a group of men capable of extending and consolidating its fields of activity.