

THE PURPOSE OF SCIENCE TEACHING AT A UNIVERSITY

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A little more than a century ago shortly after the close of the Napoleonic wars, a young German, not out of his teens, went to Paris and secured admission to the private laboratory of Gay-Lussac. Liebig was a born chemist if ever there was one, but even he needed the inspiration of contact with one of the master minds in his science. After about a year he returned to Giessen, Germany, and founded there a laboratory which was new of its kind in the world. Liebig's conception of a chemical laboratory was not that of a place where the science as already known is taught, so much, as that of a work shop where student and teacher work together to find something new from the great book of nature. A. W. Hofmann, one of the students of that laboratory, was called by Prince Albert to London in 1845 as a Professor in the Royal College of Science. Ten years later W. H. Perkin was employed by Professor Hofmann to work as an honorary assistant. Perkin was not yet twenty, but he was so intensely interested in his subject that he was not content to work during the day with Hofmann, but fitted up a private laboratory in his father's house where he could work at night. There, in the course of some experiments which were begun in an attempt to synthesize quinine, he discovered a new coloring matter now known as mauve. He conceived the idea that this compound could be made commercially and used for dyeing silk and other goods. His father had enough faith in the young man to furnish him the necessary capital and thus was begun the manufacture of the coal tar dyes. It would have been thought that with all the initial advantage in England this manufacture would have remained in that country, but within a comparatively few years Germany became pre-eminent in the manufacture of dyes and at the beginning of the present war she was furnishing three-fourths of all of the artificial dyes used in the world. This was almost entirely because the laboratories founded after the model which Liebig had set furnished young men trained in methods of research, and such young men proved to be the ones who were best able to carry the manufacture on to success.

It will be seen from the above that the wonderful achievements of Germany in this field rest directly on the laboratory founded by Liebig in Giessen. We can go much further than this now and it is entirely clear that the tremendous efficiency of Germany the last thirty months rests on the same basis. It would be difficult to find a better demonstration of the important place that research work fills in our national life. Some persons may be disposed to say that all this is well enough for Germany, but it does not apply to American conditions. Two or three illustrations of similar results achieved here may not be out of place. I take these illustrations from our experience at the University of Illinois, but parallel cases might be cited from many large universities in the country.

C. L. Wagner, who graduated from our course in chemical engineering in 1910, was employed shortly after by a Cement Company in the State of Washington. Something had gone wrong with their process and the company at that time had thousands of barrels of cement thrown back on their hands because it did not meet the requirements set for such material. Mr. Wagner, trained during his senior year in methods of research, was able to put his finger on the difficulty and soon he corrected it and the company has continued in successful manufacture of their material ever since.

In 1907 a graduate of Worcester Polytechnic Institute, who had spent one year in research work at the Massachusetts Institute of Technology, came here as a research assistant. Three years later he secured his doctor's degree with us, and was continued as an instructor and still later was raised to the rank of assistant professor in charge of the division of organic chemistry. Last year one of the largest manufacturers of coal tar dyes in America looked the country over to find a man who could organize a research laboratory for their work. They selected Dr. Derick, not because of his experience in manufacturing, but because he had shown unusual ability in the study of research problems in pure organic chemistry, and especially in the application of physical chemistry to the study of such problems.

Another man who came to the University as an associate ten years ago, was called last summer to organize a research laboratory for the study of applications of rare metals to in-

dustrial uses. In this case again it was not because of experience in manufacturing, but because he had become a recognized authority in the study of rare earths, a phase of research which is about as far removed from practical results as can well be imagined.

A man who graduated from our course in chemistry in 1906 and afterwards took his doctor's degree at the University of Wisconsin, is now State Chemist of the Illinois Food Commission in Chicago. Every man, woman and child in the State is dependent directly, or indirectly upon Dr. Klein for the maintenance of proper standards of purity in the food which we eat. Many other illustrations might be given of the way in which the universities of the country have contributed to the development of manufacturing and other interests. It is more than a question if the benefits which are derived from this kind of work are not very much greater than the benefit which accrues to the students who study chemistry in a routine manner at the university. Some of the men mentioned above were among the best teachers whom we have ever had at Illinois, and there was a very direct connection between their ability in research and their success as teachers.