

tors and can not direct such students. On the other hand, it is fortunate for the college teacher that very few of the students in our classes are ready to attempt special problems.

Even after many years of experience, the writer does not think that he should attempt to direct more than two or three of his students in special investigation at one time. These he tries to select early in the courses in botany and to suggest something to them which may be carried along for a time with their regular work and take more of their time as they advance, the investigation sometimes being finished under his direction after they have graduated. Every advanced student of botany might well be expected to do seminar work, but few teachers can find time to direct all advanced students properly even in this. The writer has a senior college student who has been working on a special problem for two years and who spent the whole of last summer in laboratory investigation and library work, in matter related to this problem and others similar to it, without credit on his course. This student has gone through about 40,000 titles in search of literature pertaining to this work and is aiding his teacher in perfecting his lectures on the subject, and in putting them together in systematic fashion. The student is by no means narrow in his botanical training, nor is he regarded narrow as a college student.

Independence and originality should be encouraged, and why should we discourage the exceptional student when he reaches the point where he wants to attempt some independent work? The effort may or may not result in something worth publishing, and if published, it should not be tabooed because done by an undergraduate student. Some of the best research is done by those who have had no college or university work. So far as they go, the results obtained by undergraduates are sometimes equal to those of graduate students who undertake more difficult problems. Like the teacher's research, the student's investigation should center about some problem related to his undergraduate courses and his proposed life work. There are many

problems of this kind. Some of them are work on some portion of a local or a state flora, investigation of some plant disease, the study of the woodlots of a small area adjacent to the college, the working out of keys for the identification of certain fungi or other plants of the region, the investigation of botanical instruction in high schools or colleges, studies in laboratory administration, etc. These and many other problems may well be attempted by the exceptional undergraduate, provided his teacher has sufficient insight and enthusiasm to aid him when he needs help.

Lest the drift of the argument above may have obscured the writer's views somewhat, it needs to be repeated in closing that the investigation of the undergraduate should never exclude thorough and broad botanical training, nor should it replace a knowledge of the elements of many subjects in the college curriculum. Hence it must be confined to the rare student, who is especially fitted and has time for this work and the more important general work which will give him a broad mental training.

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*THE "KAISER-WILHELM INSTITUT FÜR  
PHYSIKALISCHE CHEMIE UND  
ELEKTROCHEMIE"*

ON October 1 Professor F. Haber will begin his work as director of the new Kaiser-Wilhelm Institut für physikalische Chemie und Elektrochemie at Dahlem near Berlin. The buildings of the Institut, work upon which was begun during the present summer, are being erected by the Prussian government working in conjunction with the "Koppel-Stiftung" for the purpose of improving the intellectual relations of Germany with other lands."

The "Koppel-Stiftung" which was founded in Berlin some years ago by Geheimer Kommerzienrat Leopold Koppel, and which until now has maintained the German School of Medicine in Shanghai and the American Institute in Berlin, will provide the funds for

the erection of the new institute and will also give thirty-five thousand Marks annually for its maintenance during a period of ten years. The Prussian government has provided the site which is situated at the terminus of the new underground railway from the center of Berlin to Dahlem, and has endowed the institute with the sum of fifty thousand Marks annually.

The institute will be controlled by a board consisting of two representatives of the German government, two representatives of the Koppel-Stiftung and the director of the institute. The director has an absolutely free hand in the choice of his work, his fellow workers and his assistants. For the admission of investigators who wish to follow their own lines of investigation in the institute with their own means, the director must have the assent of the board of control.

The institute will consist of scientific and technical departments in separate buildings. The building of the scientific department is 600 square meters in ground area, and has a basement entirely underground, containing constant temperature rooms. On the ground floor are the professor's laboratory and consulting room, the offices, the calibrating room in which are to be kept the necessary laboratory standards, the mechanic's workshop and a lecture theater to seat twenty-five persons. Further lecture rooms are not provided in the building as *teaching in the ordinary sense is not contemplated in the institute*. The first floor will be devoted to the library, chief assistant's room, glass blowing room and a laboratory for eight research men. On the second floor are the living rooms for the mechanic and his family, since the mechanic also acts as caretaker. This floor also contains rooms for photo-chemistry, for scientific collections and work places for several more research workers.

The building is connected by a corridor with the technical department, whose most important feature is the machinery hall with a floor space of two hundred square meters. This hall is surrounded by smaller rooms for chemical preparations, high voltage and heavy current work and a blacksmith shop. The ground

floor of the technical building contains a consultation room and the laboratory of the assistant in charge of that department. On the first floor are the living accommodations for two assistants and an engine-man and also a room for the serving of refreshments.

The director's house will be erected in the grounds of the institute.

Although there exists no stipulation on the point, *it may be taken as a rule that, on account of the fact that no teaching as such is to be undertaken, only such students will be admitted by the director as have already finished their normal university course and desire a wider experience in scientific research*. This will mean that students who come directly from American universities should have the degree of doctor of philosophy in chemistry, or physics, or an equivalent training. There are no restrictions whatever as to the nationality of the men admitted by the director.

The director of the institute, Professor Haber, was born in Breslau in 1868, and obtained his Ph.D. in Berlin in 1891. After obtaining his degree he spent several years, partly in technical work and partly in securing further scientific training. In 1894 he went to Karlsruhe and was appointed privat-dozent in chemical technology in 1896 and ausser-ordentlicher professor in 1898. In 1902 he was sent to America by the Bunsen Society of Applied Physical Chemistry to study the system of chemical instruction and the condition of electrochemical industries in the United States. In 1906 he was appointed to the post of ordentlicher professor in physical and electrochemistry in Karlsruhe, where he built up the best equipped research laboratory of physical chemistry in the world. Students from all parts of the world were attracted to this laboratory to such an extent that its accommodations were insufficient to allow all of them to enter, even although Professor Haber admitted as many as forty men at one time as research workers. What was most remarkable was that he personally directed the work of all of these men, and often aided them in their experimental work. In 1907 he was called to

take the place of Lunge in Zurich as professor of chemical technology and in 1909 he was asked to undertake the control of one of the largest chemical works in Germany, but he declined both of these appointments.

Professor Haber introduced into Germany the rational method of instruction in elementary chemistry as embodied in the laboratory outline written by Alexander Smith. This book was translated into German by Professor Haber and Fritz Hiller. The two books: 1898, "Lehrbuch der technischen Elektrochemie auf wissenschaftlicher Grundlage" (now out of print); 1905, "Thermodynamik technischer Gasreaktionen" (English edition, 1908), together with numerous contributions to the *Zeitschrift für Elektrochemie*, *Wiedemann's Annalen* and the *Zeitschrift für physikalische Chemie*, constitute his literary activities.

One of Professor Haber's most important researches was that upon the ammonia gas equilibrium at high temperatures. This work resulted in the development of a commercial method for the manufacture of pure ammonia directly from the elements by the use of osmium or uranium as a catalyzer. Another important series of researches was that upon the properties of flames, including the gas equilibria involved, the ionization and conductivity of the gases and the action of the ions as catalyzers. He has spent much time during the last few years upon the study of the escape of electrons from the reacting surfaces of metals and the effects of electrons upon gas equilibria and upon the velocity of chemical reactions. His other recent researches have been mostly upon the following subjects: the electromotive force of the oxy-hydrogen cell at high temperatures; the oxidation of nitrogen in the high potential arc; a gas refractometer for the optical analysis of gases, according to Rayleigh's principle; electrical forces at phase boundaries; the corrosion of iron by stray currents from street railways; the reduction of hydroxylamine; the use of solid materials such as glass and porcelain as electrolytes; the equilibrium between magnesium chloride and oxygen; electrode

potentials and electrolytic reduction; the laboratory preparation of aluminium; the preparation of hydrogen peroxide by electrolysis; experiments on the decompositions and combustion of the hydrocarbons, and autoxidation.

The writer wishes to thank Dr. Fritz Hiller, of Berlin, for the greater part of the information contained in this article. The statements in regard to the purposes and government of the institute are official.

WILLIAM D. HARKINS

UNIVERSITY OF MONTANA,

September 30, 1911

#### THE GENERAL EDUCATION BOARD

CONDITIONAL appropriations aggregating \$635,000 have been granted to six colleges and universities by the board of trustees of the General Education Board. Applications from twenty-four institutions were presented. From this list the board selected six among which is distributed conditionally the available funds as follows:

To Bucknell University, Lewisburg, Pa., \$35,000 towards \$160,000; to Earlham College, Richmond, Ind., \$75,000 towards \$400,000; to Furman University, Greenville, S. C., \$25,000 towards \$100,000; to Grinnell College, Grinnell, Ia., \$100,000 towards \$500,000; to Smith College, \$200,000 towards \$1,000,000; to Southern Methodist University, Dallas, Tex., \$200,000 towards \$1,000,000.

During the meeting attention was called to the fact that since Mr. Rockefeller made his first contribution to the board for the promotion of higher education, contributions have been made to ninety-one institutions in an aggregate amount of \$7,625,000 towards a total of \$35,909,512. Fifty-one institutions to which the board has made conditional contributions have completed the subscriptions for the supplemental sums required and to these institutions the board has already paid \$3,500,000 in cash. It was pointed out that as a result of the campaigns made by these fifty-one institutions their assets have been increased by over \$19,000,000. Their student bodies have increased by 2,047, 183 new professors have