Strecker, of the University of Pennsylvania, presiding. The incoming president, Dr. Karl M. Bowman, of the Medical School at San Francisco of the University of California, will be inducted into office on Thursday.

THE celebration of the sixtieth anniversary of Memorial Hospital for the Treatment of Cancer and Allied Diseases, New York, N. Y., opened on May 6. There were no formal anniversary exercises. May has been designated as anniversary month with special emphasis on cancer education for the public, and a series of lectures on "The Challenge of Cancer" will be given on successive Saturdays at 11 A.M. in the hospital auditorium.

A NEW laboratory specially equipped with high-frequency heating apparatus has been established by the department of chemical engineering of Columbia University. It will have the cooperation of technical experts of the Induction Heating Corporation of New York, which provided the high-frequency equipment for the laboratory. The department of chemical engineering will have full authority in guiding the program and in publishing the results of research. The laboratory is under the direction of Professor Arthur W. Hixson, head of the department, and Professor Philip W. Schutz. Everette K. McMahon, a graduate of the Georgia Institute of Technology, specialist in the applications of high-frequency heating, is in charge of the laboratory.

DISCUSSION

BASIC BIOLOGY AND GENERAL EDUCATION

IT is unfortunate that the multiplicity of objectives of college and university students has not been brought to the fore in the recent discussion of the teaching of general biology, which is part of a very important and far-reaching problem in college and university teaching.[1, 2] It is likely that few scientists would disagree with one of the writers cited[2] that for the education of professional biologists, detailed and systematic introductory courses in each of several important branches of biology are indispensable. However, it is not for such students that courses of more comprehensive scope and less complete detail should, in the opinion of the present author, be designed or offered.

It is unfortunately a fact that very large fractions of college and university students now leave such institutions without appreciable contact with modern science. Our choice as educators in science is not between presenting the broad range of knowledge about nature to students in many systematic courses covering individual areas of specialization, and its presentation in a more comprehensive manner. The limitations of time in four college years make it impossible to include a detailed treatment of even the major subdivisions of the sciences along with the other desirable content of the modern college curriculum. The practical alternative which is actually open to us seems to be the choice between the more comprehensive and less detailed course and nothing.

The peculiar virtue of the American educational system is its extensiveness. The American system has many weaknesses, but it has apparently been good enough to allow the people to operate a reasonably satisfactory democratic system. Our colleges and universities may be inferior to some others, for example, the old German, in intensiveness of training offered to the majority of their students. It does not follow, however, that they perform a less useful service. To provide a modicum of college training to about ten times the proportionate number of young people in the population is an achievement of American education to be borne in mind when the virtue of one or another educational policy is to be decided. Such education has apparently performed a great service in the past by creating a broad base of fairly well-informed citizens in the democracy. But our training of students in science is becoming poorer by the year because of the greater emphasis on vocational and professional training. The teaching of science has reached a low ebb, as far as non-science students are concerned. Something constructive will have to be done to turn the tide. Our old offerings have been rejected. The present problem is to find new ways to accomplish old ends.

We are living in an age of greatly expanding knowledge in science. If our people are to have some useful appreciation of this increase in scientific information is it not reasonable that the colleges and universities should offer their students courses with broad enough scope so that an introduction to the whole range of science is possible within the limitations of time of a college curriculum? This question can not be answered by evasion because it is on the public mind as well as our own. If we do not give a satisfactory answer, the public or college administrators may give it for us in the form of a directive, perhaps less congenial to us and less useful to society than our own solution could be.

The problem of specialized versus general courses is not one of either-or. There is no bar to maintaining every essential introductory course in a field of specialization, designed for smaller numbers of serious stu-

[1] Gordon Alexander, SCIENCE, Vol. 99, January 28, 1944.
[2] C. A. Shull, SCIENCE, Vol. 99, March 10, 1944.

dents in related fields, and at the same time offering to the large mass of students without such professional objectives an opportunity to get at least a bird's-eye view of the field under competent tutelage. In many instances existing courses for non-technical students can be altered, combined or rearranged to meet the existing need. If some such solution is not found we shall have no right to complain when the American people derive their notions about evolution from William Jennings Bryan, about animal experimentation from Irene Castle or William Randolph Hearst and about medicine from B. J. Palmer or Mary Baker Eddy.

A university must and does serve many functions. It seems that it is not too much to ask that it carry out its job of giving its graduates as least a speaking acquaintance with the scope of science. The vexatious problem of the vested interests of specialty groups, anxious to avoid loss of prestige and financial support through a decrease in numbers of students in existing courses, should not be allowed to stand in the way of achievement of a goal, larger by far for both science and society than the disarrangements it will require for its achievement.

As a specialist in a branch of biology directly involved in the program under discussion, I am anxious to see the most important facts and principles of that branch be known and appreciated by as large a fraction of the public of which we are a dependent part, as is reasonably possible. I am convinced, first, that there will be no loss in prestige or economic support for that science as a consequence, and second, that such education will improve and enrich the lives of the generation acquiring it. It seems very likely that the whole realm of basic sciences would receive the greatest impetus possible if the people at large had even the barest sort of conception of how applied science rests upon progress in pure science. Many scientists to-day complain bitterly about the partiality of the public in the support of applied as opposed to pure science. There is little to be wondered at in such discrimination, since any one who can read knows something about the achievements of applied science. If we in the basic sciences are unwilling to play our part in mass education in the essentials of the pure sciences we shall have no one to thank but ourselves for the discrepancy in support that will result.

A corollary of the argument I have made is that professional students of science need a great deal more acquaintance with the literary, artistic and social heritage of the human race than they now acquire. The general cultural education problem has many facets, and although I have stressed only one because it is in my province as a teacher, I can not refrain from inserting the suggestion that the general education of scientists, pure and applied, deserves a much greater emphasis upon cultural phenomena than it has received in the recent past, and that comparably comprehensive presentations in these areas will assist greatly in meeting this need.

A move in the direction of less fragmentation into small subdivisions in the teaching of science to students without professional objectives in the areas in question seems to offer the best hope we have for the restoration of opportunity to college students to acquire a liberal education in the best sense. It presents an opportunity to make many more citizens intelligently aware of the importance of basic science to applied science and human welfare. It need not detract an iota from the thoroughness of training of specialists in science, nor decrease the prestige or financial support of basic science departments. In fact, it seems that to extend support for work in the basic sciences, greater public appreciation of their important role in human welfare is much needed.

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GREGOR MENDEL'S EXPERIMENT ON THE NATURE OF FERTILIZATION

IN "The Evolution of Genetic Systems," C. D. Darlington reviews "the three vital experiments" on which modern genetic principles are founded: 1—the proof by Johannsen that the genotype is independent of the environment; 2—the proof by Gregor Mendel that the genotype is composed of indivisible parts; 3—the proof by the same Mendel that fertilization and normal plant development involve the union of one egg and one pollen-grain.

While Johannsen's beans and Mendel's peas have become classical, Mendel's second contribution has remained almost unknown. In a seminar course "based principally on outstanding contributions that have marked great advances in the theory and the application of genetics," we have retrieved this Mendel experiment, locating the account in the eighth of the ten letters from Mendel to the German botanist, Carl Nägeli.[1]

It is interesting that Mendel conducted his experiment in 1869, five years before Oscar Hertwig observed the fusion of egg and sperm nuclei of sea urchins and thus discovered the basic principle of fertilization.

How little understood this principle was only seventy-five years ago can best be appreciated by quoting that passage of Darwin's[2] which caused Mendel to undertake his experiment:

[1] "Gregor Mendel's Briefe an Carl Nägeli, 1866–1873," Herausgegeben von C. Correns. *Abhandlungen der Mathematisch-Physischen Klasse der Königlich Sächsichen Gesellschaft der Wissenschaften*, 29: 3, 235–236, 1905.