ing pleasure from continued studies of their physical environment, wherever they may be."

The wealth of illustrations deserves high commendation and contributes much to the value of the book, especially for the audience which Professor Worcester has in mind. Most, though not all of the photographs, are superb both from the point of view of photography and of reproduction. All are well chosen to illustrate the ideas ably presented in the text. The line drawings, including many block diagrams, are uniformly excellent and for the most part were originally prepared for this book by Julian W. Low. Many of the contour maps are reproduced in two colors, with the drainage features in blue. Both author and publisher are to be congratulated for producing so excellent a volume.

Geology and Engineering. By ROBERT F. LEGGET. xviii + 650 pp. 223 illustrations. New York: McGraw-Hill Book Company. 1939. $4.50.

DURING the last few years the application of the science of geology to the art of civil engineering has become a matter of prime importance. Whereas a generation ago the geologist was frequently called for a post-mortem examination of a leaking dam, collapsed bridge or faulty tunnel, he is to-day even more frequently requested to cooperate in the preliminary investigations of the materials on which or in which the engineer is to build his structure or do his work. The results in the saving of human lives and the reduction in the cost of engineering works are beyond estimate. Such cooperation has also contributed much valuable information to geological lore. Professor Legget's up-to-date treatise is a veritable milestone on the highway of human progress toward accurate synthesis of the diverse problems encountered in the arena of interplay between man and his environment.

As stated by Professor P. G. H. Boswell, of the Imperial College of Science and Technology, London, in his foreword, the several text-books of engineering geology previously available have been written by geologists. "Where engineering applications are discussed, in particular, they indicate what the geologist from his rather different viewpoint, imagines that the engineer should know." In contrast, "this book is the work of an engineer with the additional training of a geologist" and has a background that would scarcely be possessed even by a geologist of wide experience as a consultant on engineering problems. It therefore fills a long-felt want and will be widely used in engineering schools and as a valuable tool of the professional geologist and civil engineer. Many a college teacher of geology will use to good advantage in his classroom the accounts of the practical application of geological principles with which Professor Legget has pointed his precepts.

The first four chapters introduce the engineering student to those phases of geological science with which he is most likely to be later concerned. The remaining sixteen chapters deal lucidly and succinctly with the application of geology in civil engineering. Tunnels, open cuts, road construction, bridge foundation, dam sites, silting up of reservoirs, wells and boreholes, landslides and soil mechanics, these and many other topics are ably handled. Especially commendable is the wealth of illuminating experiences drawn from engineering practice the world over and including such current projects as those of the T.V.A. and Boulder Dam. There are four appendices, which include a glossary of geological terms, an annotated list of the geological surveys of the English-speaking world and a list of geological societies and periodicals.

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SOCIETIES AND MEETINGS

THE SEMI-CENTENNIAL CELEBRATION OF THE MEDICAL SCHOOL OF THE UNIVERSITY OF MINNESOTA

THE University of Minnesota celebrated from October 12 to 14 the fiftieth anniversary of the founding of its Medical School. The occasion was used as an opportunity to bring together a number of contributors to scientific medical progress in several fields, who presented accounts of recent advances with particular emphasis upon the unsolved problems which have been exposed and appear to be amenable to solution.

Progress in the application of physical chemistry to medicine was discussed by Professors Herbert M. Freundlich and Maurice B. Visscher, of the University of Minnesota, and John P. Peters, of Yale University. These investigators described living organisms as systems at steady states frequently, if not usually, at some distance from true equilibrium. The importance of the structure and properties of the colloidal systems in cells and of the metabolic energy-yielding reactions in maintaining these steady states was discussed.

Some recent investigations in metabolism were detailed by Professors Lee I. Smith and George O. Burr, of the University of Minnesota, who discussed organic chemical problems in relation to Vitamin E, and the metabolism of the fatty acids, respectively, by Professor George H. Whipple, of the University of Rochester, who treated the problem of production, utilization, and significance of the blood proteins, and

by Professor Charles H. Best, of the University of Toronto, who summarized the present state of knowledge concerning the chemistry and physiology of heparin and concerning the clinical physiology of thrombosis.

Chemical problems in immunity were discussed by Professor Michael Heidelberger, of Columbia University. Professor Robert G. Green, of the University of Minnesota, described experimental modification of pathogenic viruses in relation to the general problem of the nature of viruses. Professors Perrin H. Long, of Johns Hopkins University, and Henry F. Helmholz, of the Mayo Foundation of the University of Minnesota, discussed modern chemotherapy, the first with particular reference to the sulfanilamide group, and the latter with reference to the specific problem of urinary antisepsis.

Several approaches to the problems of the nervous control of the organism were discussed. Professor Irvine McQuarrie, of the University of Minnesota, described experiments showing important chemical factors in the production and control of convulsions in man and in animals. Professor Herbert S. Gasser, of the Rockefeller Institute for Medical Research, presented a general treatment of methods of analysis of nervous action which are being and can be extended in the investigation of the more intimate character of nervous conduction. Professor Detlev W. Bronk, of the University of Pennsylvania, described the results of observations upon nervous control of such visceral processes as circulation and respiration. He dealt with the problem of chemically sensitive receptors in reflex regulation of body activities, showing the interdependence of chemical and physical mechanisms in such control. Professor Walter B. Cannon considered the problem of chemical mediation of excitation at synapses. He marshalled the existing evidence for chemical mediation, particularly at cholinergic structures.

Public meetings were addressed by Dr. Thomas Parran, Jr., surgeon-general of the U. S. Public Health Service, on "Medical Education, Research and the Public Health"; by Professor Anton J. Carlson, of the University of Chicago, on "The Role of the Fundamental Sciences in Medical Progress"; by President Guy Stanton Ford, of the University of Minnesota, upon "The Place of Medicine in a University," and by Governor Harold E. Stassen, on "Medicine in the Commonwealth." These speakers emphasized the peculiar importance of public support for medical education and research on a high plane in the interests of the community itself, the necessity of research in the basic sciences for sound progress in the applied science of medicine, and the importance of broader and better cultural training for physicians themselves so that they may play a larger and more enlightened role in the social and political changes which are going on at a rapidly accelerating pace. The relatively more important part that American science must play on the world scene in view of the catastrophies of war and authoritarianism in Europe and Asia was stressed as an additional reason for intensification and improvement in our scientific and cultural institutions. The scientific and general lectures presented at the semi-centennial celebration will shortly be published in two separate volumes by the University of Minnesota Press.

Since the State of Minnesota undertook responsibility for the guidance and support of medical education and research fifty years ago, the aims and needs for such service have changed greatly. Initially, the undergraduate training of physicians was viewed as its main task. About twenty-five years ago the university undertook the problems of graduate training and research in a serious way. At the present time the graduate teaching program is a larger undertaking than the undergraduate teaching. In comparison with some four hundred undergraduates in medicine there are over six hundred graduate students working toward advanced degrees in the several fundamental and clinical medical fields in this university. The larger share of those working in the latter fields are doing their work at the Mayo Foundation of the university at Rochester. With the extension in medical knowledge and the rise of specialization this work has acquired increased importance.

Relative to the wealth of the state, Minnesota has given large support to higher education, including medicine. Smaller support, which in the aggregate amounts to five millions of dollars, has come to the university for medical work from private sources, mainly from individual donors, but in smaller part from the large foundations.

The State of Minnesota has in the past accepted the principle that each generation should pay its debt to society for the scientific and cultural heritage which it enjoys by adding to the stock of knowledge which is the real groundwork of human wealth. In celebrating the completion of a half century of service to the community in medical education and research, the dominant note was the necessity for sound planning of a program for the future. President Ford expressed the conviction of many when he said, "If ever this nation, this state, this university had a responsibility for supporting science and research in the name of the common welfare, that responsibility is a measure now full and running over by reason of the tragic days just behind and just before the nations who fling from dying hands the torch to us to-day."

M. B. VISSCHER

THE MEDICAL SCHOOL,
UNIVERSITY OF MINNESOTA