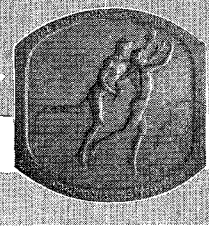
ENGINEERING AND SCIENCE
Monthly



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GEOLOGY AT THE INSTITUTE

By CHESTER STOCK

IN recent discussions conducted by national groups of the geological profession as to the adequateness of today's training of students of geology, much has been said about the importance of a more-than-passing acquaintance with the fundamental sciences. Only of late have the geological faculties of universities come to realize in full measure the significance of a thorough knowledge of physics, chemistry, and mathematics on the undergraduate level as a background for the beginning student in geology. That training in these disciplines is absolutely essential to the student planning to enter the fields of geophysics or seismology has of course been recognized for a long time.

The realization that the beginning student in geology must have a sound preparation in the fundamentals results from the fact that many of the long established subdivisions of geological knowledge have been thoroughly investigated and the techniques customarily used in them are now pretty well standardized. New salients of geology are being discovered and their exploration requires new kinds of instruments as well as a greater and a more exacting dependence upon the basic concepts of physics and chemistry as they apply to the earth.

The value of this background in undergraduate training was long ago appreciated at the California Institute. As a result, provision is made in the geological curriculum to insure thorough indoctrination of the student with physics, chemistry, and mathematics before he becomes too deeply engrossed in geology.

However, of even greater importance are the plans of the Division to enlarge its facilities for graduate students, especially for those who contemplate a completion of their advanced studies toward the doctorate and a future career in research and teaching rather than in applied geology. To accomplish these ends we should enhance the categories of research that call for high competence in physics, chemistry, and mathematics, as well as in geology. That exemplary research of this kind is now being done in geophysics and seismology, there can be no question. That highly important advances can be made in geochemistry, there likewise can be no doubt. A study of the genesis of ore deposits through the medium of geochemistry, of the geochemical changes that arise as a result of igneous emplacements and emanations, of the distribution of chemical elements in the crust of the earth, of X-ray diffractions obtained in particular mineral groups and crystal suites, investigated, however, by mineralogist rather than by chemist, and of the spectroscopic analysis of mineral powders—these represent but a few of the problems wherein geological research benefits from a mutual interest on the part of geology and the fundamental sciences.

Similarly, studies of the physical properties of sediments and of other types of rocks with the electron-microscope and spectroscope, the porosity and permeability of rocks, the investigation of the earth's radioactivity, the distribution of radioactive elements in the crust and its bearing on geologic time—these are representative of a large number of problems that call for a close bond between these sciences. This type of association of interests is in reality an extension of the contact already established at the Institute to enlist the aid of the physical sciences in a solution of problems arising in the several fields of physical geology. Accepting the full implication of these challenges will make the Division of the Geological Sciences a refreshingly unique kind of graduate school for geological research.