curs in connection with a hydroelectric power system is studied by the method of slowly varying amplitude and phase.

Diffraction and scattering problems. H. Levine, "Acoustic radiation pressure on a circular disk." W. Magnus, "Infinite matrices associated with a diffraction problem" (abstract only). A. E. Heins and H. Feshbach, "On the coupling of two half-planes." The authors are concerned with the effect of a plane wave incident upon two infinite half-planes of different acoustical materials joined along a straight line. G. F. Carrier and W. H. Munk, "On the diffusion of tides into permeable rock." The problem of water-level fluctuations in the irrigation wells is formulated mathematically by assuming the observed groundwater fluctuations to represent a diffusive transmission of the tidal disturbances through the porous volcanic structure. J. J. Stoker, "Some remarks on radiation conditions." The difficulty on the uniqueness of steady-state solution in unbounded domains may be avoided by formulating the problem as an appropriate initial value problem and then finding the solution of the steady state by limiting process in allowing time to tend to infinity. E. W. Montroll and J. M. Greenberg, "On the theory of scattering of plane waves by soft obstacles." An obstacle is considered to be soft if the wavelength of the wave inside the scatter does not differ much from that of the incident wave in the absence of the scatterer. Progress on this problem is reported.

Vibration theory. E. H. Lee, "Wave propagation in helical compression springs." A. Weinstein, "On the wave equation and the equation of Euler-Poisson." A general discussion of results on a class of hyperbolic partial differential equations which includes the classical wave equation as a special case is given. S. Lefschetz, "On the Lienard differential equation." R. J. Duffin and A. Schild, "The effect of small constraints on natural vibrations."

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Fatigue of Metals. ed. 3 of *La Fatigue des Metaux.* R. Cazaud. Trans. by A. J. Fenner. Philosophical Library, New York, 1953. 334 pp. Illus. + plates. $12.50.

This book is essentially an English translation of the author's 1948 edition of *La Fatigue des Metaux.* It discusses the characteristics of fatigue failures, theories of the mechanisms of fatigue in metals, fatigue testing machines, influence of various factors such as size, speed of test, overstress, understress, residual stress, notches, sharp shoulders, surface conditions, and corrosion. It includes a chapter on fatigue strength of structural joints and another on improving the fatigue strength of machine components.

The description of fatigue-testing machines is predominantly concerned with European practice, as would be expected. The few references to American testing machines are not representative of recent practice and do not reflect the fine work done in this field. The discussions of the effects of various factors are an interesting review and should serve as a valuable summary for engineers in general. The chapters on fatigue strength of structural joints and on improvement of fatigue strength of machine components should be of great value to designers in pointing up the practical application of the accumulated knowledge of fatigue of metals.

The book is well written and authoritative. However, it is not as modern as the date of publication (1953) would indicate. Practically all the data discussed were developed prior to 1948. Nevertheless, it is a valuable book for the practicing engineer to have on his bookshelf, for it will serve well as a ready reference on the subject.

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Statistical Analysis in Chemistry and the Chemical Industry. Carl A. Bennett and Norman L. Franklin. Wiley, New York; Chapman & Hall, London, 1954. xvi + 724 pp. Illus. $8.

Owing to the rapidly accelerating interest that has developed since 1947 in the use of modern statistical methods in the field of chemistry, the Committee on Applied Mathematical Statistics of the National Research Council and the Mathematics Branch of the Office of Naval Research have sponsored the preparation of this comprehensive book on applied mathematical statistics, with illustrative material from chemistry and the chemical industry. The authors were carefully chosen; one is a mathematical statistician with experience in chemistry, and the other is a chemist with knowledge of mathematical statistics. The sponsors and authors had the advice and cooperation of a host of statisticians and chemists of outstanding professional ability.

This remarkable planning and fine cooperation have resulted in a work of broad scope, as is indicated by its 11 chapter headings: "Introduction," "Descriptive statistics," "Probability and samples," "Mathematical machinery," "Statistical inference," "Relationship between variables," "Analysis of variance," "Design of experiments," "Analysis of counted data," "Control charts," and "Some tests of randomness."

The mathematics used is not beyond the ability of an engineering or chemistry graduate, thus placing the level between that of the standard textbooks of mathematical statistics and that of books dealing mainly with applications of statistical methods. The more theoretical topics are relegated to appendixes at the ends of several chapters. Many statistical techniques are presented and abundantly illustrated with appropriate examples from chemistry. Numerous tables make possible the numerical calculations involved in application of these techniques. However, there are no unsolved examples on which the student can test his knowledge.

Statistical Analysis can be studied with profit by physical scientists and engineers with some knowledge of statistics and by students of mathematical statistics interested in applications. However, it is doubtful whether the on-the-job chemist without formal

training in mathematical statistics can work his way through this treatise without outside assistance. For this reason it would have been helpful if the authors had indicated a selection of topics suitable for a first reading.

I heartily recommend this book to those with serious interest in the applications of statistics. However, there are several features open to criticism: (i) The authors' substitution of the symbol "ave (x)" for the universally accepted symbol "$E(x)$" is annoying to the mathematical statistician and is likely to be confused with the common use of the word *average*. (ii) Seventeen useful tables are distributed throughout Chapters 5, 6, 9, and 11 without being properly referenced, and consequently are lost to the occasional user of the book. (iii) The authors repeatedly use significance levels of the F and χ^2 distributions that are not included in their tables and fail to inform the reader of their sources. (iv) The list of references should be alphabetized. (v) The most serious criticism is the occurrence of numerous typographical errors in formulas and in numerical calculations, which tend to destroy the reader's confidence in the authors.

I feel that the afore-mentioned criticisms are sufficient justification for a revision of the book at the earliest possible date. With proper editing *Statistical Analysis* could be one of the most useful reference books on applied statistics.

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Physical Geology. L. Don Leet and Sheldon Judson. Prentice–Hall, New York, 1954. ix + 466 pp. Illus. $6.75.

A generation ago geology, as presented in textbooks, was largely a descriptive science, comparatively independent of other subjects. As knowledge has increased, so has dependence on related disciplines, and precise quantitative measurements have supplemented descriptive analyses. Elementary textbooks, however, have been slow to incorporate the advances in research and industry, although recently some have shown increasing awareness of the interrelationships of geology and other sciences. *Physical Geology* reveals in an outstanding manner the contributions to geology of recent research and of disciplines such as mathematics, chemistry, physics, and astronomy, without assuming background knowledge in these fields.

This book begins with a brief description of the scope of physical geology; moves on to a short discussion of atomic chemistry and physics, explaining such topics as mass, energy, atomic particles, isotopes, ionic radii, and ionic bonds; covers carefully and thoroughly in succeeding chapters the usual topics of an elementary textbook; and ends with a chapter on the earth's age and another on mineral deposits and fossil fuels.

Written in a concise narrative style, with more than 350 pictures and drawings, this should serve as a splendid beginning textbook. All chapters merit praise, but the one on earthquakes is perhaps most outstanding, reflecting the special interests of the senior author. Up-to-date geologic information abounds, and where conclusions are controversial, the different viewpoints are presented. *Physical Geology* is an introductory textbook that retains the best from older works and moves boldly to integrate into geology that which is useful and relevant from other sciences. May the trend continue!

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Beyond the Germ Theory. The roles of deprivation and stress in health and disease. Iago Galdston, Ed. Health Education Council, New York, 1954. viii + 182 pp. Illus. $4.

This book contains 11 chapters by nine authors and a foreword by Howard Craig, director of the New York Academy of Medicine. Iago Galdston contributed the first chapter, which gives the book its name. All the papers discuss a general theme, the influence of factors other than germs in causing disease. These factors are deprivation, stress, nutrition, and the emotions.

Part I deals with "The dynamics of deprivation and stress"; part II with "Nutritional deprivation and stress"; part III with "Psychological deprivation and stress"; and part IV with "Social stress and deprivation."

In view of the increasing emphasis on psychosomatic medicine, this book is timely and may be read with benefit by most medical men, dietitians, and social workers. Unfortunately, the chapters vary considerably in interest and readability, and many contain a great deal of excess verbiage. A notable exception is the one by Lawrence Hinkle, Jr., on "Normal stress in normal experience." Its clarity and excellent organization make it delightful reading. Most of the other chapters could have been considerably improved by careful editing.

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The World of Learning 1954. Europa Publ., London, 1954. xii + 1030 pp. $17.50.

This 1954 edition of a well-known reference book that lists the principal international scientific and cultural organizations and, in alphabetical order according to countries, detailed information about such institutions as research institutes, learned societies, colleges and technical institutes, museums and art galleries, academies, and libraries and archives. Included are the names of key personnel in each institution listed, the foundation year of the various institutions, and the titles of publications issued by them. For easy reference, there is an index of institutions.—D. R.