Physicists will find this volume useful in making range-energy measurements, evaluating particle momentum by multiple scattering techniques, and making charge identification by grain and delta-ray counting. The theory and systematics of alpha decay processes are considered in great detail, together with quantitative theory on the formation of alpha stars in emulsion. The evaluation of neutron energy spectra is particularly thorough. About one-third of this scholarly work is devoted to applications of the nuclear emulsions in high-energy physics, both with collimated beams of particles from accelerators and in the study of the cosmic radiation. By comparison, coverage of other types of applications, such as that in the fields of geology and histoautoradiography, while adequate in view of general principles developed in earlier sections, may appear scanty, occupying only 13 pages of fine-printed text.

In an age where individual scientists take pride in being expert on some small facet of nature, it is exhilarating to find a comprehensive work covering a broad vista of science skillfully integrated by a single mind. Demers is to be congratulated for his arduous efforts in providing a greatly needed, authoritative work on the use of photographic emulsions in nuclear physics.

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Effect of Radiation on Human Heredity. Report of a study group convened by the World Health Organization, together with papers presented by various members of the group. World Health Organization, Geneva, 1957 (order from Columbia University Press, New York). 168 pp. Illus. $4.

The purpose of the study group whose report is presented in this volume was, according to the preface, twofold: (i) to obtain the opinions of authorities on genetics from countries other than Great Britain and the United States, whose national committees on radiation hazards reported in 1956; and (ii) to probe certain untouched aspects of the problem of genetic hazards, especially "the lines of research which should be followed, in the light of our present knowledge, to increase our understanding of the genetic effects of ionizing radiations on man." At the meeting of the first International Congress of Human Genetics in Copenhagen during August 1956, a group of 20 highly expert investigators in various aspects of human genetics was assembled. The report actually comprises only ten pages of the volume, and while it will undoubtedly stimulate some research to bring about the solution of critical problems and to supply key information, and while it may serve to increase financial support of research in human and other branches of genetics, this section is hardly the most valuable or interesting part of the book. It is hard not to mimic those generals who are forever fighting the last war.

The volume contains a collection of a dozen papers, however, every one of which is worth reading and rereading. The happy juxtaposition of the first two papers (by H. J. Muller and T. C. Carter, respectively) spotlights one of the most controversial matters in genetics today—one that is related to the whole problem of estimating genetic damage and hazard. This is the problem of the frequency of deleterious mutant genes that are always, or almost always, harmful no matter what the conditions, in comparison with the frequency of mutant genes that are seriously detrimental only when present in a person in double dose (homozygous) and which, when present in single dose (heterozygous), may, at least under certain conditions, be selectively advantageous. If the first situation predominates, then most mutant genes are held in the population in simple equilibrium between input (mutation) and outflow (elimination through failure to be passed on because of death or infertility). But if the second situation obtains, the interplay of forces is far more complex and consequently less predictable. Muller adopts the former view; Carter, and after him Wallace, the latter.

R. M. Sievert, of Sweden, gives a masterly summary of known human exposures to ionizing radiation. One may note the fact that he had no premonition of the recently discovered zone of extremely heavy radiation at high altitudes, for the curves drawn in 1956 all flatten out at about 50,000 feet. The Swedish data in general are in good agreement with the conclusions of the British and American committees. J. Lejeune discusses the kinds of data needed and the practicability of detecting induced mutations in the offspring of radiated parents. There is wide misapprehension on this subject. Lejeune is properly cautious. Court Brown describes methods being developed for more accurately determining the genetically all-important gonad dose delivered by various types of exposure.

Measurement of the spontaneous mutation rate in man by direct and indirect methods, the effects of induced mutations, the differential sensitivity of human loci to radiation, and the load of abnormal genes per person in the population are topics discussed by L. S. Penrose. There follows the first report of the radiation readings in inhabited areas with particularly high background radiation, such as the region of monazite sands in Travancore. Gopal-Ayengar reports readings that are high, but hardly as high as rumor had previously made them. He estimates a total gamma dose of about 10 to 30 roentgens over the reproductive span of 30 years in that locality. The world will be understandably interested in the prompt investigation of the populations living on such soils. Is their genetic burden detectably higher than that of similar populations not so exposed to radiation?

Stevenson and Neel probe the difficulties and possibilities of error in estimating spontaneous mutation rates in human populations. Freire-Maia considers the effect of inbreeding in bringing more mutant recessive genes to the surface and exposing them more rapidly to selection. The frequency of genetic defect *manifested* in a population is *not* a simple function of the frequency of the genetically defective genes. Howard Newcombe, of Canada, completes the series of papers by describing the sort of vast genetic health registration of the population that is really needed if many of these problems are to be solved.

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Electronic Instrumentation for the Behavioral Sciences. Clinton C. Brown and Rayford T. Saucer. Thomas, Springfield, Ill., 1958. xiv + 160 pp. Illus. $5.50.

In 160 pages this book provides "a simplified presentation of basic electronic theory required for instrumentation problems." The volume is specifically oriented toward fields of experimental psychiatry, psychophysiology, and physiology where electronic instrumentation is required for stimulation or measurement.

The first chapter offers a brief, lucid discussion of the physical theory underlying electronic phenomena, followed by an elementary review of methods of electrical measurement. Tube types and basic circuitry are next considered. This section is followed by chapters on power supplies, amplifiers, oscillators, timing devices, and switching circuits. Valuable suggestions are made regarding input and output transducers, including devices for tracing and displaying physiological changes. There is commendable emphasis on various methods for the protection of human subjects of experimentation. A chapter is devoted to test instruments, with suggestions regarding kits available for their economical construction. Recommendations are made regarding specific instruments that are

commercially available. Unfortunately, such limited citations, which occur throughout the book, do not survey the field of acceptable available equipment. A notable omission concerns the highly successful employment of vibrator (chopper) type amplifiers for high-sensitivity, drift-free recording of small direct current potentials.

A virtue of this book is its conciseness, and it would be unfair to enumerate all the things that might have been included. Under the heading of recording devices, for example, one might wish for mention of the enormously important role to be played in the near future by frequency-modulated tape-recording of physiological variables. Tape-recording provides the present possibility of instrumental reproduction and review, rerecording, and reanalysis and the eventual possibility even of automatic measurement and tabulation.

Preceding the final chapter on the laboratory workshop is one which is especially valuable at the present stage of electronic development—on transistor theory, transistor types, and comparison of transistor with vacuum tube circuitry. Recommendations are made regarding useful, currently available transistor types.

The book is what it purports to be and can be recommended as a useful, simplified, brief presentation of basic electronic theory and its application to psychophysiological problems.

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A Handbook of Lattice Spacings and Structures of Metals and Alloys. W. B. Pearson. Pergamon Press, New York and London, 1958. x + 1044 pp. Illus. $38.

In 1912 von Laue discovered the diffraction of x-rays by crystals. This was immediately applied by the Braggs to the elucidation of the atomic arrangements in solid matter. However, it was not until the early 1920's that the new technique was sufficiently developed for large-scale application to the study of metals. For this development thanks are largely due to the pioneer work of Arne Westgren and of A. J. Bradley. As a result of their work the x-ray diffraction technique now takes its place alongside the classical thermal and microscopic methods as an essential tool in metallurgical research, an important aspect of which is the determination of thermal equilibrium diagrams.

The book under review is largely concerned with the enormous developments in alloy structure determinations and phase diagram studies which have taken place since those early days. It is truly encyclopedic in character. Its coverage of the vast literature which has grown up since those early days—much of it scattered and buried in obscure papers—is astonishingly complete, and the condensation of this literature into usable form in the space of a single volume is a truly remarkable achievement. The book will prove an indispensable vade mecum for the metallurgist and will be of invaluable service to the solid-state physicist.

Among the most useful features of the book is the long table of intermediate phases, which includes some 4000 compositions. Comprehensive as it is, I noted at least 30 omissions; among these may be mentioned Fe_3Mo_2, $MoBe_{13}$, MnZn, Mn_3Sn_2, InMg, Fe_3Ti, and $MgZn_5$. I feel that the lattice spacings should have been uniformly given in absolute angstrom units. The table provided on page 257 for the conversion of kX to angstrom units is not very helpful and could have been omitted.

The discussion of lattice parameter determinations would have been greatly clarified if a diagram illustrating the various film arrangements for the powder diagrams had been given. A discussion of modern powder diffractometry, with its special advantages, would have been appropriate here.

The real meat of the book is given in chapters 11 and 12. Here we have 640 pages of detailed, well-coordinated, accurate, and excellently illustrated data on the lattice parameters of alloys, metal carbides, borides, and nitrides, along with details concerning their purity, preparation, heat treatment, and equilibrium structures. These two chapters represent a real tour de force and will save the reader countless hours of literature searching. The text, comprehensive as it is, needs to be supplemented with phase diagrams. Could room be made for them in the next edition?

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Plant Design and Economics for Chemical Engineers. Max S. Peters. McGraw-Hill, New York, 1958. xi + 511 pp. Illus. $11.

This book by Max Peters is the latest addition to the literature directed towards the economics of chemical engineering. The objective of this volume is to present economic and design principles as applied to chemical engineering processes and operations. The early chapters develop the principles of applied economics, covering such topics as interest, investment costs, depreciation, taxes, and cost accounting. For the most part, the remainder of the book discusses equipment design and costs in considerable detail.

The attempt to treat so broad a subject in one volume has resulted in scanty coverage of such topics as waste disposals, patents, and equipment fabrication. Numerous problems are included at the end of most chapters, and there are some major design problems.

The book is intended for the advanced student as well as the practicing engineer; it should prove to be of greater value to the student.

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Einführung in die Messtechnik der Kernstrahlung und die Anwendung der Radioisotope. Heinrich Fassbender. Thieme, Stuttgart, 1958. 223 pp. $8.85.

This book presents in five chapters a clear and compendious introduction to radioisotope techniques. Emphasis is on the German development (about 65 of the 75 references deal with German publications). Thus, the book provides an interesting reflection on the present status of German science in this important field and, at the same time, is useful to the student.

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New Books

The Absorption of Infrared Radiation. Robert P. Bauman. McGraw-Hill, New York, 1958. 551 pp. $8.90.

The Academic Marketplace. Theodore Caplow and Reece J. McGee. Basic Books, New York, 1958. 272 pp. $4.95.

The Background of Astronomy. Henry C. King. Braziller, New York, 1958. 254 pp. $5.

Principles and Applications of Random Noise Theory. Julius S. Bendat. Wiley, New York, 1958. 452 pp. $11.

Reticular Formation of the Brain. A symposium sponsored by the Henry Ford Hospital, Detroit, Michigan, and held at the hospital 14–16 March 1957. Herbert H. Jasper, Lorne D. Proctor, Robert S. Knighton, William C. Noshay, Russell T. Costello, Eds. Little, Brown, Boston, 1958. 780 pp. $16.

Vistas in Astronautics. First annual Air Force Office of Scientific Research Astronautics Symposium. Morton Alperin and Marvin Stern, Eds. Pergamon, New York and London, 1958. 351 pp. $15.

The Waking Brain. H. W. Magoun. Thomas, Springfield, Ill., 1958. 146 pp. $4.75.