and electron-phonon interactions precede a discussion of the formal theory of conduction. Detailed discussions of electrical conductivity, thermal conductivity, and thermoelectric and galvanomagnetic effects are presented, with specific substances used for illustration. This is a book of theory rather than materials.

Many recent advances and new techniques, previously available only in the literature, are incorporated—for example, variational methods for the solution of the Boltzmann equation are applied throughout; the Onsager relations receive constant attention; and the Bohm-Pines collective electron theory is included, probably for the first time in a textbook. Where full details could not be given, a clear statement of the essence is given, along with references for the interested reader. One unfortunate omission is the theory of hopping-type conductivity of localized electrons appropriate to certain oxide semiconductors. This book is limited to study based on band theory.

Although the text is written "from the ground up," it is my belief that it will be of greatest benefit to the reader with a working knowledge of quantum theory and some background in solid-state physics. For the theoretical and experimental research worker in the field, it will be a most valuable possession. No reviewer could fail to mention the quotations given just beneath the chapter headings. These gems and the author's vivid and sometimes humorous similitudes add to the enjoyable experience of reading this book.

A. H. KAHN
Solid State Physics Section,
National Bureau of Standards

Education and Manpower. Henry David, Ed. Columbia University Press, New York, 1960. xvi + 326 pp. $5.

The National Manpower Council, which was established at Columbia University in 1951 during the presidency of Dwight D. Eisenhower, is bringing its program of research to a close. The book that has just appeared, *Education and Manpower,* is a by-product of the work that has been in progress during the past nine years. Basically it consists of a series of staff papers prepared as the program progressed, but it also contains papers by Clarence Faust, "Our secondary schools and national manpower needs," and by Charles E. Odell, "Vocational guidance and the skills of the work force." In essence, the book is a summary of conclusions reached by the National Manpower Council in the course of its investigations.

Henry David, the Council's executive director, has written the introductory and concluding selections, and Eli Ginzberg, director of staff studies, has contributed a chapter on "Education and national efficiency." Substantial sections of the volume are devoted to secondary and higher education, with a somewhat shorter section on vocational guidance.

With the book's general thesis, the reader will find himself in complete accord. This thesis is stated in the opening sentence of Henry David's introduction: "Formal education is the foundation upon which the development of the nation's manpower resources is built." On the other hand, those who have been equally active in the fields of manpower and education may question the claim made on the jacket: "The selections which comprise *Education and Manpower* reflect a distinctive approach to some of the critical issues in education today." The value of this contribution to the subject is less in its distinctive approach than in its effective synthesis of the solid and constructive thinking that has been done on this vital subject.

It is unfortunate that the volume has not been brought more nearly up to date. Most of the selections appeared between the years 1954 and 1958, and more has happened since than can be covered in eight pages of supplementary notes. I do not wish, however, to detract from the soundness of the Council's thesis. Readers certainly will say "Amen!" to Henry David's warning that "the big danger . . . lies . . . in the possibility that the supply of highly trained men and women will not be adequate to the nation's future requirements. And this danger is enhanced if we fail . . . to increase the supply of young people of ability reaching the colleges; to strengthen the institutions of higher education; and, finally, to reduce the present degree of wastage of potential ability in the population. It certainly does not lie within the power of higher education alone to realize these objectives. Unless there is early identification of ability, a drastic improvement in the quality of secondary education, a more effective program of educational and vocational guidance . . . the stream of young people reaching college will remain too small."

HOWARD A. MEYERHOFF
Scientific Manpower Commission,
Washington, D.C.

The Physical Universe. Konrad Krauskopf and Arthur Beiser. McGraw-Hill, New York, 1960. 536 pp. Illus. $8.95.

The authors of this new elementary text covering the basic principles of physical science, but written for students who are not planning to specialize in science, undertook their task with a unique advantage: They set themselves the goal of condensing Krauskopf's *Fundamentals of Physical Science,* a text which has been employed on a large scale for well-nigh 20 years and which is still regarded by many as one of the best in the field. But simplification of an elementary text would, on the surface, seem to be either risky, impossible, or ruinous. Fortunately for the cause of education, the outcome proves successful beyond expectation, and the volume as it stands is a triumph of clarity, simplicity, and selectivity. It is the latter quality that often induces reviewers of textbooks to be petty and unfair because, do what you will from now until doomsday, the problem of choosing the items for inclusion in a text for a broad field must remain a personal one. All one can say in this instance is that the omissions made from the tested precursor are not fundamental. As for my own preference, I would have found it more useful had the authors left undisturbed the derivations of the equations for free fall and kinetic energy and omitted the page defining slugs and newtons, since the clarification of the distinction between mass and weight is well stated by them in prose anyway. It seems a little unfair to permit students to squeeze through a basic science course without sweating just a bit over the source, meaning, and practical value of an equation. But there is no reason why a conscientious teacher may not make an addition here and there, just as he often omits a section he finds expendable.

It would be redundant to go into details concerning the superior achievement of textbook authorship displayed

in this volume. Incidentally, the volume can boast of only an 18 percent reduction when compared with its parent text, but that figure tells only a small part of the story. In reading the smaller volume one feels that the authors were strongly aware of the need for brevity and strove hard to compensate with a gain in punch and lucidity. The illustrations are definitely far more meaningful than in the larger text, and significant bits of new material have been added here and there, out of respect to their timeliness. I am particularly pleased to see that many of the historical references in the older text, which showed the stamp of 19th century distortions, have been significantly mollified to bring them more in line with recent findings. The style is snappy and crisp. The placement of the questions and answers at the end of the book and the economical use of references will please both teachers and students. This book, more than any other in the field, may well be read with profit and pleasure by any literate man who wishes to know the alphabet and scope of modern physical science.

A few general comments may not be out of place here. It is hard to conceive that any college student (or high-school senior), even those who are neither particularly interested nor gifted in scientific-mathematical discipline, can fail to be deeply stirred intellectually by a course which employs a volume such as this one and which has a teacher that can give the text its real meaning. Such a student is bound to be better informed in science than is the average contemporary engineer in history, American literature, or modern painting. There is hardly a chapter in this book that does not pry the mind loose, challenge its latent powers to their limits, and enrich it with factual knowledge. Therefore, one cannot help being depressed by the post-Sputnik hysteria that erupted on several American campuses, one symptom of which was a blind rage against the general science courses and a demand for students, one and all, to return to the orthodox course of the 1920's. As a chemist on one campus put it: A year of real chemistry with holes in one's pants from nitric acid will teach a fellow more science and logic than 10 general science courses. And a friendly botanist beside him chimed in: And get his hands dirty.

How many people with holes in their pants and dirty hands, and feet too, learned little about science! No teacher using this volume would want to teach its contents without exhaustive demonstrations and some meaningful laboratory work. Moreover, on one campus it is a fact that, on senior college entry tests, nonscience students who had had the general science course (using the older Krauskopf text) did just as well as students who specialized in science, since, I presume, the tests dealt with general questions. Because the controversy is still dormant in many minds, it is a pleasure to see books such as the one under review, for their very existence speaks louder than words for the educational cause they serve.

MARK GRAUBARD
Natural Science, Interdisciplinary Studies, University of Minnesota

New Books

Mathematics, Physical Sciences, and Engineering

Activation Analysis Handbook. R. C. Koch. Academic Press, New York, 1960. 229 pp. $8.

Advances in Analytical Chemistry and Instrumentation. vol. 1. Charles N. Reilley, Ed. Interscience, New York, 1960. 462 pp. $12.

Adventures in Algebra. Norman A. Crowder and Grace C. Martin. Doubleday, Garden City, N.Y., 1960. 360 pp. $3.95.

Aeronautics and Astronautics. Proceedings of the Durand centennial conference. Nicholas John Hoff and Walter Guido Vincenti, Eds. Pergamon, New York, 1960. 470 pp. Illus. + plates. $12. Proceedings of the conference on aeronautics and astronautics held at Stanford University to celebrate the 100th anniversary of the birth of William Frederick Durand.

Analytical Quadrics. Barry Spain. Pergamon, New York, 1960. 144 pp. $5.50.

Annual Review in Automatic Programming. Richard Goodman, Ed. Pergamon, New York, 1960. 311 pp. Illus. $10. Papers read at the working conference on automatic programming of digital computers, held at Brighton 1–3 April 1959.

Arithmetic for the Modern Age. Aaron Bakst. Van Nostrand, Princeton, N.J., 1960. 348 pp. Illus. $4.95.

Background Material for the Development of Radiation Protection Standards. 13 May 1960. Staff Report No. 1. Federal Radiation Council, Washington, D.C., 1960 (order from Supt. of Documents, GPO, Washington 25). 39 pp. $0.30. The Council, established by executive order in 1959, advises the President with respect to radiation matters affecting health and offers guidance to federal agencies in the formulation of radiation standards. Its first staff report provides information on human exposure from radiation sources, the present state of our knowledge of the genetic and somatic effects of radiation, the problems of formulating radiation protection standards from available scientific data, and the basic and derived radiation protection guides. It also makes recommendations for further work by the Council and indicates areas where research is needed.

Bibliography and Index of Geology Exclusive of North America. vol. 23, 1958. Marie Siegrist *et al.* Geological Soc. of America, New York, 1960. 840 pp. $13.

Classical Electricity and Magnetism. E. S. Shire. Cambridge Univ. Press, New York, 1960. 412 pp. Illus. $7.50.

Continuous Geometry. John von Neumann. Princeton Univ. Press, Princeton, N.J., 1960. 310 pp. $7.50.

Determination of the Mechanical and Technological Properties of Metals. B. M. Gliner. E. Bishop, translation editor. Pergamon, New York, ed. 2, 1960 (translated from the Russian ed. 2). 169 pp. $8.50.

Digital Applications of Magnetic Devices. Albert J. Meyerhoff, Ed. Wiley, New York, 1960. 623 pp. Illus. $14.

Elements of Flight Propulsion. J. V. Foa. Wiley, New York, 1960. 456 pp. Illus. $12.50.

Elements of Maser Theory. Arthur A. Vuylsteke. Van Nostrand, Princeton, N.J., 1960. 375 pp. $9.50.

The Encyclopedia of Spectroscopy. George L. Clark, Ed. Reinhold, New York; Chapman and Hall, London, 1961. 803 pp. Illus. $25. More than 100 contributors have provided original articles for the volume, which are grouped under the following sections: "Absorption spectroscopy (spectrophotometry)—visible and ultraviolet"; "Band spectroscopy" (one article, 6 pages); "Beta-ray spectroscopy"; "Differential thermal analysis" (one article, 3 pages); "Electron paramagnetic resonance spectrometry"; "Emission spectroscopy—light" (47 articles covering 231 pages); "Flame photometry"; "Fluorophotometry and phosphorimetry"; "Gamma-ray spectrometry"; "Infrared emission spectroscopy"; "Infrared spectrophotometry" (35 articles covering 197 pages); "Mass spectrometry"; "Microwave spectroscopy"; Monochromators"; "Neutron spectrometry"; "Nuclear magnetic resonance spectra"; "Raman spectroscopy"; "Solar spectroscopy" (one article, 9 pages); "Vacuum spectroscopy" (one article, 10 pages); "X-ray and gamma-ray absorption photometry (absorptiometry)"; "X-ray characteristic absorption spectrometry" (one article, 2 pages); "X-ray diffraction or crystal spectra" (one article, 3 pages); and "X-ray emission spectrometry."

Fluid Mechanics through Worked Examples. D. R. L. Smith. With chapters on the stream function, circulation, vorticity, and potential function by J. Houghton. Cleaver-Hume, London, 1960. 344 pp. Illus. 28s.

A Guide to Mathematical Tables. A. V. Lebedev and R. M. Fedorova. English edition prepared by D. G. Fry. Pergamon, New York, 1960. 632 pp. $15.

A Guide to Mathematical Tables. Supplement 1. N. M. Surunova. English edition prepared by D. G. Fry. Pergamon, New York, 1960. 228 pp. $9.