ments, and the commercial instruments presently available. These chapters are well written and informative. In them, and also in the remainder of the book, the author is at pains to introduce numerical examples, presumably to be worked through by undergraduate students. Undue emphasis does, however, seem to be placed on certain aspects; for example there is a fairly detailed discussion of the ion optics of Aston's original mass spectroscope, a system of little current interest. Comparatively little is said, however, about such important geometries as the Mattauch-Herzog or the Nier-Johnson geometries.

In any book of this kind the author's particular interests are bound to show through clearly, and one is able to see Kiser's great interest in the fundamentals of the ionization process. This is apparent in chapter 6 which discusses the various types of ions in mass spectra, in chapter 8 which is entirely concerned with the energetics of electron-impact processes, in parts of chapter 10, and in the inclusion of two appendices that list atomic and molecular ionization potentials. I believe that it would have been better for the author to concentrate on particular parts of the subject and to treat them fully rather than to attempt complete coverage of a field that is now so highly diversified in its applications. Inevitably, when the latter course is adopted, certain subjects must be dealt with in an extremely brief manner. As an example, only half a page is devoted to rearrangement ions, surely among the most valuable of all ions in mass spectra for elucidating fragmentation mechanisms.

The chapter on analytical applications, too, has a great deal to say about the quantative analysis of mixtures, going deeply into the matrices involved, but has practically nothing to say on the much more widely practised use of the mass spectrometer for the qualitative identification of unknown compounds; the current field of data handling exemplified by the work of Biemann and others in "element mapping" is ignored. The book is not particularly up-to-date in its treatment of various subjects. To take one example, the section on ionization gives no details of the great advances made by Beckey in the last few years, neither does it discuss the great importance of this method as a means of producing ions without excess vibrational energy. It is hard to see the book competing with Djerassi's book in the field of organic chemistry and, on the physical side, small books such as Duckworth's would seem to be more concise and valuable summaries, while Field and Franklin's classic will still stand supreme in the detailed discussion of ionization phenomena.

J. H. BEYNON
Physics Section,
Imperial Chemical Industries,
Manchester, England

Chiroptera

The Bats of West Africa. D. R. Rosevear. British Museum (Natural History), London, 1965. xviii + 418 pp. Illus. £7 15s.

The Bats of West Africa is the first book to bring together available information on the 9 families, 31 genera, and 97 species of bats of this interesting area. The peculiar geographical region, which is from 20°N (approximately the southern edge of the Sahara) south to a line that runs east across Cameroon and the Central African Republic to the extreme western Sudan, is designed to encompass the four former British tropical West African colonies (Gambia, Sierra Leone, Ghana, and Nigeria); owing to its semipopular approach, the book seems written primarily for naturalists in this area. A general introduction precedes separate accounts (including keys and including much original taxonomic work) of the various families, genera, and species of the region. These are followed by an eight-page bibliography, a list of journals (with abbreviations), a glossary, notes on the preservation of specimens and on vegetation zones in west Africa, an extremely useful gazetteer, an index, and a fold-out map that shows both localities and vegetation zones. Readers should be warned that many statements in the general introduction do not apply to bats outside of Africa and that certain methods suggested for the preparation of specimens are somewhat at variance with current American practices. The book is illustrated with two colored plates and 103 line cuts, chiefly illustrating details of morphology of different kinds of bats. These figures are mostly of excellent quality, and they should be extremely useful to the novice and the professional.

My criticisms are relatively minor. The distributions of species are given mostly in very general terms, with few actual collecting localities listed. These would have been useful documentation of the distributions. Possibly because of the book's semipopular appeal, what seems to be an inordinate amount of space is devoted to color in spite of what Rosevear admits is its great individual variation and resultant low taxonomic utility. Local native common names for species are not given because of their limited utility, yet an almost completely artificial set of English "common" names for all taxonomic levels, including subspecies, has been constructed. The book is nevertheless highly recommended for all students of African bats. Its price, however, seems rather high.

KARL F. KOOPMAN
American Museum of Natural History, New York

Physical Chemistry

Chemical Physics of Semiconductors. J. P. Suchet. Enlarged and revised translation of the French edition (Paris, 1962) by E. Heasell. Van Nostrand, Princeton, N.J., 1965. xii + 197 pp. Illus. $8.50.

The author points our clearly that the phenomena of semiconduction are not restricted to a few materials but are possessed by several hundred compounds. Moreover, the materials need not be crystalline to exhibit the required properties.

A surprising fact of the state-of-the-art of semiconductor electronics is that most of the economic importance centers on two elements, silicon and germanium. An exciting possibility is that other materials can be found with outstanding parameters which would be of value in the performance of electronic functions. The III-V compounds, especially GaAs, show promise.

The most outstanding chapter in the book is chapter 7 "The crystallochemical model." The reason is twofold. This chapter contains more of the author's original work than the others, and in it he tries to answer the question of how one tries to predict the electrical properties of semiconductors on the basis of structure and bonding. A good discussion of his concept of the "Ionocovalent bond" is given, and an "ionicity" parameter is defined. Some remarkable correla-

tions are shown between the band gaps of many compounds and this parameter. The electron mobility also shows an interesting relationship to "ionicity," within a definite set of compounds, that is, III-V, II-VI, I-VII, and IV-VI.

The book is mainly a review of the field of semiconductor materials as they may be described by chemical bonds and crystallography. Since this is a vast subject and the book only 175 pages, it is obvious that a lot of background is required of the reader. Quantum mechanics relating to the build-up of the periodic system and the bonding orbitals among atoms is helpful. A good knowledge of crystallography is also necessary.

I would not recommend it as a text for students but rather as specialized reading material and for professionals who wish orientation in this subject. The excellent bibliography appended to the text should be adequate for most purposes.

STEPHEN J. ANGELLO
Department of Electrical Engineering, University of California, Santa Barbara

New Books

Mathematics, Physical Sciences, and Engineering

Calculus of Variations and Partial Differential Equations of the First Order. vol. 1, *Partial Differential Equations of the First Order*. C. Caratheodory. Translated from the German edition (Berlin, 1935) by Robert B. Dean and Julius J. Brandstatter. Holden-Day, San Francisco, Calif., 1965. 187 pp. Illus. $8.50. Holden-Day Series in Mathematical Physics, edited by Julius J. Brandstatter.

Calculus on Manifolds. A modern approach to classical theorems of advanced calculus. Michael Spivak. Benjamin, New York, 1965. 158 pp. Illus. Paper, $2.95; cloth, $7. Mathematics Monograph Series, edited by Robert Gunning and Hugo Rossi.

Les Carbones. vols. 1 and 2. P. Jacquinot and others. Masson, Paris, 1965. vol. 1, 777 pp. F. 138; vol. 2, 975 pp. F. 168. Illus. Collection de Chimie Physique, edited by A. Pacault; 26 papers.

The Chemistry of Diamond-Like Semiconductors. N. A. Goryunova. Translated from the Russian edition (1963) by Scripta Technica. J. C. Anderson, Ed. M.I.T. Press, Cambridge, Mass., 1965. 254 pp. Illus. $10.

Crystal Structures of Minerals. Sir Lawrence Bragg and G. F. Claringbull, with a chapter by W. H. Taylor. Cornell Univ. Press, Ithaca, N.Y., 1965. 419 pp. Illus. $11.50. The Crystalline State, vol. 4, edited by Sir Lawrence Bragg.

Deformation of Metals During Rolling. I. Ya. Tarnovskii, A. A. Pozdeyev, and V. B. Lyashkov. Translated from the Russian edition by M. de O. Tollemache. A. Shutt, Translation Ed. Pergamon, New York, 1965. 340 pp. Illus. $15.

The Design of Structures of Least Weight. H. L. Cox. Pergamon, New York, 1965. 142 pp. Illus. $6.50. International Series of Monographs in Aeronautics and Astronautics, vol. 8.

Diels-Alder Reactions: Organic Background and Physico-Chemical Aspects. A. Wassermann. Elsevier, New York, 1965. 122 pp. Illus. $5.50.

Dynamical Theory of Groups and Fields. Bryce S. DeWitt. Gordon and Breach, New York, 1965. 264 pp. Illus. Paper, $2.95; cloth, $5.95. Documents on Modern Physics, edited by Elliott W. Montroll, George H. Vineyard, and Maurice Lévy.

The Earth's Shape and Gravity. G. D. Garland. Pergamon, New York, 1965. 191 pp. Illus. Paper, $2.95. The Commonwealth and International Library.

Elements of Geochemistry. Yasuo Miyake. Maruzen, Tokyo, 1965. 475 pp. Illus. $12.

Electron Optics. P. Grivet, M. Y. Bernard, F. Bertein, R. Castaing, M. Gauzit, and A. Septier. Translated from the second French edition by P. W. Hawkes. Pergamon, New York, 1965. 791 pp. Illus. $30.

Formulas for Stress and Strain. Raymond J. Roark. McGraw-Hill, New York, ed. 4, 1965. 446 pp. Illus. $12.50.

Gas Chromatography of Metal Chelates. Ross W. Moshier and Robert E. Sievers. Pergamon, New York, 1965. 171 pp. Illus. $5.50. International Series of Monographs in Analytical Chemistry, vol. 23.

Introduction to Calculus. C. C. T. Baker. Arco, New York, 1965. 254 pp. Illus. Paper, $1.65; cloth, $3.50.

Introduction to Quantitative Ultramicroanalysis. I. M. Korenman. Translated from the Russian edition (Moscow, 1963) by Scripta Technica. Ronald Belcher, Translation Ed. Academic Press, New York, 1965. 244 pp. Illus. $9.50.

Lehrbuch der Theoretischen Physik. vol. 3, *Quantenmechanik* (652 pp., DM. 39); vol. 7, *Elastizitätstheorie* (191 pp., DM. 16). L. D. Landau and E. M. Lifschitz. Akademic Verlag, Berlin, 1965. Illus.

Linear Operators in Hilbert Space. Werner Schmeidler. Translated from the German edition (Stuttgart, 1954) by Jay Strum. A. Shenitzer and D. Solitar, Translation Eds. Academic Press, New York, 1965. 132 pp. Illus. Paper, $2.95; cloth, $6. Academic Paperback in Mathematics.

Lunar Designations and Positions, Quadrant III. Compiled by D. W. G. Arthur and A. P. Agnieray. Univ. of Arizona Press, Tucson, 1965. Map. $1.

Macromolecules in Solution. Herbert Morawetz Interscience (Wiley), New York, 1965. 511 pp. Illus. $16.50. High Polymers Series, vol. 21.

The Method of Averaging Functional Corrections: Theory and Applications. Anton Yur'yevich Luchka. Translated from the Russian edition (Kiev, 1963) by Scripta Technica. Academic Press, New York, 1965. 154 pp. Illus. Paper, $3.45; cloth, $6.50.

Modern Computing Methods. C. W. Clenshaw, E. T. Goodwin, D. W. Martin, G. F. Miller, F. W. J. Olver, and J. H. Wilkinson. Philosophical Library, New York, ed 2, 1965. 176 pp. Illus. $6.

Modern Dimension Theory. Jun-Iti Nagata. Interscience (Wiley), New York, 1965. 267 pp. Illus. $11.

Modern Radar: Analysis, Evaluation, and System Design. Raymond S. Berkowitz, Ed. Wiley, New York, 1965. 676 pp. Illus. $19.50. Twenty-five papers based on a course given at the Special Summer Session of the Moore School of Electrical Engineering, University of Pennsylvania, during the summers of 1960 and 1961.

The Molecules of Nature. A survey of the biosynthesis and chemistry of natural products. James B. Hendrickson. Benjamin, New York, 1965. 205 pp. Illus. Paper, $3.95; cloth, $7. The Organic Chemistry Monograph Series, edited by Ronald Breslow.

Nuclear Magnetic Resonance and Electron Spin Resonance Spectra: Index for 1958–1963. Herbert M. Hershenson. Academic Press, New York, 1965. 117 pp. $10.50.

The Oxidation of Hydrocarbons in the Liquid Phase. N. M. Emanuel', Ed. Translated from the Russian edition by K. R. Dobson and B. J. Hazzard. J. Hopton, Translation Ed. Pergamon, New York, 1965. 423 pp. Illus. $20. Thirty-five papers.

Photographic Atlas of the Moon. Zdeněk Kopal, Josef Klepešta, and Thomas W. Rackham. Academic Press, New York, 1965. 277 pp. Illus. $16.

Physical Metallurgy. R. W. Cahn, Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1965. 1124 pp. Illus. $34. Twenty-two papers.

Physics of the Lower Ionosphere. R. C. Whitten and I. G. Poppoff. Prentice-Hall, Englewood Cliffs, N.J., 1965. 240 pp. Illus. $7.50.

Plasma Diagnostic Techniques. Richard H. Huddlestone and Stanley L. Leonard, Eds. Academic Press, New York, 1965. 639 pp. Illus. $19.50. Pure and Applied Physics Series, vol. 21. Eleven papers: "Basic macroscopic measurements" by Stanley L. Leonard; "Magnetic probes" by R. H. Lovberg; "Electric probes" by Francis F. Chen; "Spectral intensities" by R. W. P. McWhirter; "Line broadening" by W. L. Wiese; "Optical and ultraviolet techniques" by Eugene B. Turner; "X-ray spectroscopy" by T. F. Stratton; "Far-infrared techniques" by M. F. Kimmitt, A. C. Prior, and V. Roberts; Optical interferometry" by Ralph A. Alpher and Donald R. White; "Microwave techniques" by Charles B. Wharton; and "Particle measurements" by J. E. Osher.

Principles of Vector Analysis. Jerry B. Marion. Academic Press, New York, 1965. 149 pp. Illus. Paper, $2.45; cloth, $5.50. Academic Paperback in Physics, edited by Henry Booker, D. Allan Bromley, Nicholas DeClaris, W. Magnus, Alvin Nason, and A. Shenitzer.

Problems of Mathematical Physics. N. N. Lebedev, I. P. Skalskaya, and Y. S. Uflyand. Translated from the Russian by Richard A. Silverman. Prentice-Hall, Englewood Cliffs, N.J., revised and enlarged English edition, 1965. 443 pp. Illus. $16. Supplement by Edward L. Reiss. Selected Russian Publications in the Mathematical Sciences, edited by Richard A. Silverman.