electrons. Any firmly based, major physical insights to be gained from this point of view are not yet well developed.

I found this volume well worth reading.

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Genetics

Elementary Genetics. W. Ralph Singleton. Van Nostrand, Princeton, N.J., 1962. xiv + 482 pp. Illus. $8.25.

This pleasant, easily read textbook for beginners in genetics is aimed at about the sophomore college student; somewhat less than usual emphasis is placed on the mathematical aspects of the subject. Examples are drawn from most of the major experimental organisms, with maize perhaps replacing *Drosophila* as the favorite organism.

The first 16 chapters give a standard account of basic genetic theory; this is followed by a chapter on radiation genetics, two chapters each on biochemical genetics and population genetics, and a concluding chapter in which the author discusses current investigations on the chemistry of the gene. The book is profusely illustrated, and the illustrations and tables are well coordinated with the text. The bibliographies at the end of each chapter could be used to direct students to further reading, but the "problems," which are also given at the end of each chapter, do not appear to challenge students in a satisfactory manner. Each set of problems begins with the same tasks: (i) define certain terms, and (ii) identify certain scientists. The definitions requested are usually identical with those provided in the glossary at the back of the book; this spoils the teaching value of the problem. The lists of scientists to be identified have been drawn up by including everyone mentioned in the chapter, an unsatisfactory way of getting students to recognize the "major contributions" of many of these persons.

The most striking characteristic of this book is its personal nature. The author's interests and his work history have shaped its contents to a remarkable extent. Local newspaper items, various neighbors, the family pediatrician, and the pedigree of what appears to be the family horse occupy the reader's time. A whole chapter on mammalian coat color and an extensive appendix on linkage groups in maize are related to papers published by the author. These items and a number of others form a set of unimportant digressions which an instructor with a different background will find wasteful of time. The intensive selection of examples from the work of the author and his colleagues probably results in a less than desirable representation of the important experiments in genetics.

While annoying errors and ambiguous statements occur every few pages, these are not intolerably frequent. However, the errors are such that, in courses which emphasize *Drosophila* or statistics, the use of this text would result in an extra burden on the students; the relative lack of material on the genetics of microorganisms would also limit the use of the text for some instructors.

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Solitary and Social Wasps

Wasp Farm. Howard Ensign Evans. Natural History Press, Garden City, N.Y., 1963 (available from Doubleday). x + 178 pp. Illus. $3.95.

Almost everyone, except a few students of wasp biology or animal behavior, looks upon wasps as nasty creatures that should be combatted "tooth and nail," or at least with an aerosol bomb, a fly swatter, or some other means of destruction.

In this small book, published for the American Museum of Natural History, Howard Evans gives vignettes of a few of our predaceous solitary and social wasps. Many of the observations were made at "wasp farm," the country home which Evans formerly owned near Ithaca, New York. These were supplemented by studies made in other parts of the country by Evans and by a few other observers. The 15 brief chapters thus present engaging accounts of several dozen species, ranging from the most primitive kinds of solitary wasps through the increasingly complex behavioral patterns exhibited by solitary wasps that nest variously in the ground or in wood, or construct mud cells, and they culminate in an account of a few social species. Evans' stories of the evolution of the wasps' prey-carrying mechanisms and of the comparative behavior of species of *Bembix*, fields in which he has made invaluable basic contributions, are especially interesting. For instance, how many entomologists know that predatory wasps have developed 13 different ways of transporting their paralyzed insect or spider prey to the nest? Among the illustrations are a number of high quality, close-up photographs taken by the author to illustrate various facets of wasp biology. Several unfortunate minor errors have occurred here: Figure 18 is upside down (the cells of the pipe-organ wasp actually open downward) and, in the caption for figure 21, *Leptochilus* is certainly a slip of the pen for *Symmorphus*, a close relative.

These accurate, popular accounts of the wonderful array of behavior patterns and differing life histories, particularly those of the inoffensive solitary wasps, should do much to dispel the general dislike of these insects; perhaps the accounts will induce some to indulge in observational work of their own. Were I not already so convinced, this book would certainly persuade me that wasp-watching should supplant bird-watching! The book should also be required reading for those scientists who think there are no additional frontiers to explore in natural history.

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Textbook of Limnology

Fundamentals of Limnology. Franz Ruttner. Translated from the German by D. G. Frey and F. E. J. Fry. University of Toronto Press, Toronto, Canada, ed. 3, 1963, xvi + 295 pp. Illus. $6.50.

Frey and Fry have again done American and other English-speaking limnologists a fine service by translating the third edition of the late Franz Ruttner's *Grundriss der Limnologie*. In its topical organization, this edition does not differ markedly from its predecessor; about 40 percent of the volume is devoted to sections on water

as an environment (chiefly physical and chemical factors) and 60 percent to biotic communities. The total length, however, has been increased by 22 percent. Although many or most of the paragraphs are essentially unchanged, areas of recent research emphasis in limnology are brought up-to-date nicely. The chapter entitled "The problem of production," for example, is now 18 instead of 10 pages, "Communities in running waters" is doubled in length, and there are new short sections on saline waters, plankton bacteria, and elemental nitrogen and methane. The previous edition was criticized for its "too selected" list of selected references, but this situation has been remedied by a much longer and more useful literature list.

The translators have preserved Ruttner's easy and unstilted style, which often approaches an essay-like quality. For use as a textbook in limnology courses at the levels of university seniors and beginning graduate students, this careful revision will undoubtedly attain much wider use than its predecessor.

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Plant Physiology

Plant Metabolism. G. A. Strafford. Harvard University Press, Cambridge, Mass., 1963. viii + 152 pp. Illus. $2.75.

This is a disappointing book. The reader is assured on the cover that it is an authoritative and up-to-date account of plant metabolism, with an extensive bibliography. It is none of these. The first of many factual errors is a large structural formula on the cover with a trivalent H atom. The extensive bibliography is a list of eight texts and monographs and articles which appeared in the *Annual Reviews of Plant Physiology* between 1950 and 1960.

The author (whose address is not given) strikes a more modest tone in the introduction where he states that the primary audience is advanced British high school students, and if the Harvard University Press is responsible for the cover, they are culpable. Nevertheless, regardless of the level of reader aimed at, there is no excuse for the inaccuracies that litter the text. These occur in each of the six chapters: "General biochemical principles," "Photosynthesis," "Nitrogen metabolism," "Mineral nutrition," "Translocation," and "Respiration." Little would be gained by giving even a partial list of the errors, but they range from misleading information on energy concepts and ATP and enzymes to errors of fact in listing major fatty acids and micronutrients in plants. The chapter on photosynthesis and the various tables are shot through with errors of fact and interpretation.

If this were not enough, it is also very doubtful that the book can achieve its aim of interesting biologists and chemists in the field of plant metabolism. Little is said about the whole range of problems that remain to be solved in plant metabolism, or of the location and control of biochemical reactions in the cell. The challenging problems of growth and differentiation are not mentioned. None of the excitement that comes from actually doing experiments in metabolism is transmitted, and the methods by which our present knowledge has been gained are not given adequate coverage.

Instead, there is a dry and often inaccurate recital of some of the biochemical facts. Surely the University Scholarship examiners alluded to in the introduction recognize that metabolism is more than this, and certainly the prospective biologist deserves more in the way of inspiration.

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New Books

Mathematics, Physical Sciences, and Engineering

Cosmic Rays. T. E. Cranshaw. Oxford Univ. Press, New York, 1963. 137 pp. Illus. Paper, $2.90.

Cobol. A self-instructional manual. James A. Saxon. Prentice-Hall, Englewood Cliffs, N.J., 1963. 202 pp. Illus. Paper, $6.

Engineering Design. A systematic approach. Robert Matousek. Translated from the 1957 German edition by A. H. Burton. D. C. Johnson, Ed. Interscience (Wiley), New York, 1963. 272 pp. Illus. $8.50.

Error Propagation for Difference Methods. Peter Henrici. Wiley, New York, 1963. 81 pp. Illus. $4.95.

Foundations of Thermodynamics. Peter Fong. Oxford Univ. Press, New York, 1963. 104 pp. Illus. $2.50.

Inorganic Chemistry. A guide to advanced study. R. B. Heslop and P. L. Robinson. Elsevier, New York, ed. 2, 1963. 599 pp. Illus. $9.

Inorganic Thermogravimetric Analysis. Clement Duval. Translated from the French by Ralph E. Oesper. Elsevier, New York, ed. 2, 1963. 738 pp. Illus. $22.

Progress in Materials Science. vol. 10, Nos. 3 and 4, No. 3, *Precipitation Hardening*, A. Kelly and R. B. Nicholson (251 pp., $7.50); No. 4, *Surface Diffusion*, J. M. Blakely (48 pp.). Pergamon, London; Macmillan, New York, 1963. Illus. Paper.

Quanta and Reality. A symposium. A. B Pippard *et al.* American Research Council, Larchmont, N.Y., 1963. 96 pp. Illus. $3.95.

The Quantum Theory of Fields. Proceedings of a conference (University of Brussels), October 1961. Stoops, Brussels; Interscience (Wiley), New York, 1963. 261 pp. Illus. $8.

Radioactive Tracers in Physical Metallurgy. C. Leymonie. Translated from the French edition (1960) by Vernon Griffiths. Wiley, New York, 1963. 222 pp. Illus. $8.50.

Rare Metal Extraction. By chemical engineering techniques. W. D. Jamrack. Pergamon, London; Macmillan, New York, 1963. 372 pp. Illus. $10.

Rarefied Gas Dynamics. vols. 1 and 2. Proceedings of a symposium (Paris), 1962. J. A. Laurmann, Ed. Academic Press, New York, 1963. (vol. 1, 557 pp.; vol. 2, 545 pp.). Illus. $16 each.

Recent Developments in Network Theory. Proceedings of a symposium (Cranfield, England), 1961. S. R. Deards, Ed. Pergamon, London; Macmillan, New York, 1963. 262 pp. Illus. $12.50.

Recent Research on Beta-Disintegration. A. I. Alikhanov. Translated from the Russian edition (1960) by William E. Jones. Pergamon, London; Macmillan, New York, 1963. 156 pp. Illus. $3.

Recovery and Recrystallization of Metals. Proceedings of a symposium (New York), February 1962. L. Himmel, Ed. Interscience (Wiley), New York, 1963. 399 pp. Illus. $20.

The Scientific Papers of Sir Goeffrey Ingram Taylor. vol. 3, *Aerodynamics and the Mechanics of Projectiles and Explosions*. G. K. Batchelor, Ed. Cambridge Univ. Press, New York, 1963. 571 pp. Illus. $17.50.

Selected Principles of Chemistry. Jay A. Young. Prentice-Hall. Englewood Cliffs, N.J., 1963. 175 pp. Illus. Paper, $2.95.

A Study of Splashes. A. M. Worthington. With an introduction and notes by Keith Gordon Irwin. Macmillan, New York, 1963. 191 pp. Illus. $4.95. A facsimile reprint of Worthington's lecture before the Royal Institution (London, 1894) and the original volume *A Study of Splashes* published in 1908. The 1908 volume was reviewed in *Science* [**39,** 464 (1909)] by R. W. Wood.

Technique of Inorganic Chemistry. vol. 2, *Nuclear Chemistry*. Noah R. Johnson, Eugene Eichler, and G. Davis O'Kelley. Interscience (Wiley), New York, 1963. 216 pp. Illus. $8.

Zone Melting of Organic Compounds. E. F. G. Herington. Wiley, New York, 1963. 170 pp. Illus. $5.95.