the "type," but drastically different in the composition of their essential oils. This was an extremely important piece of research, for it showed clearly that differentiation of plants into taxonomic categories should not be judged by morphological characters alone but that they should also be judged by the chemical composition of their constituents. Occurrence of physiological forms was found to be widespread not only among eucalypts; it was also repeatedly detected by others in different plant families.

For those who are interested in eucalypts as providers of sugar and proteins for honey bees, there is a short chapter on this subject, which includes a list of "Eucalypts for honey and pollen."

Chapter 14 deals with miscellaneous uses and includes an important discussion of its uses for pulp and paper, "improved wood," veneer, and plywood and for extracting tanning materials and rutin. This last product has an interesting history. In 1887 it was found that leaves of *Eucalyptus macrorincha*, when boiled in water, yielded a yellow pigment. A couple of years later H. G. Smith analyzed the pigment, named it myrticolorine, and noted that "the presence of this dye material at once distinguishes *Eucalyptus laevopinea* from *E. macrorincha*. Later it was found that myrticolorine is identical with glucoside of quercitin, called rutin. In 1946, when rutin was elevated to the status of vitamin P (a regulator of permeability of small blood vessels), *Eucalyptus macrorincha* proved to be the best source of the product. Large quantities of rutin are exported now to the United States.

The last and longest chapter (142 pages) deals with descriptions of about 150 selected species of eucalypts. (The total number of species in the genus *Eucalyptus* is about 600.) This chapter will be consulted by all who work with eucalypts.

At the end of the book there are five distribution maps and 38 plates showing morphology of the eucalypts.

The other day one of my colleagues remarked that now is the time for monographs, cutting across accepted lines of botanical research. Penfold and Willis' book is precisely this kind of monograph.

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Man Discovers the Universe

Man's Conquest of the Stars. Pierre Rousseau. Translated from the French by Michael Bullock. Norton, New York, 1961. 356 pp. Illus. $5.

Splendor in the Sky. Gerald S. Hawkins. Harper, New York, 1961. xii + 292 pp. Illus. + plates. $5.95.

Among the sciences, astronomy has always had a special emotional and esthetic appeal to the educated public, and to this has now been added its "practical" interest as the background to space technology. These two books, written for laymen who can read thoughtfully, by professionals who can write clearly and vividly, should find a wide circle of readers. Neither book requires any mathematical preparation, but both presuppose an appreciation of simple logic and an interest in that form of ordered structure that is the essence of science. Though both are for the general reader, their aims differ.

Pierre Rousseau writes a closely integrated history of astronomy, from the Magdalenean cave man to Hoyle and Hubble. The aim is inspiration, as well as information. It is a celebration of the triumph of mind over space, and the style is appropriately flowing and lively, but always clear. A great amount of detail is presented, a canvas crowded with vividly characterized active figures; yet details nowhere obscure the general development of the principles under discussion. Minor advances are subordinated to major, great figures tower above small, and all is combined into a narrative of commanding sweep. It is a brilliant achievement. In fact, I feel that it is a little too brilliant. The true picture is not as clear-cut, as black and white, as this. Some of the dramatic simplifications are overdone, some of the thumbnail sketches misleading, and there are a number of minor misstatements of fact. But these are almost inevitable in a work of this range, written by one man; they are unimportant to the general reader, and the serious student will notice and discount them. The translation seems to convey well the spirit of the French original. One grotesque slip in this English edition is the statement, repeated on a number of pages, that the galactic system has the form of a *girdle*-cake! But I found no other. A full index is provided, but a bibliography of more critical and technical historical studies might well have been added.

Gerald Hawkins states that observatory "public nights" provided the basis for his book. Its content and form are well expressed by this statement. Each chapter is essentially self-contained, and they are grouped into six parts. Two parts are historical, the first carrying the chronicle of astronomy from the shepherds to Ptolemy, the second from Copernicus to Newton, and thence, more episodically, into the 19th century. The other four parts are topical, respectively setting forth our present knowledge of the planets, the stars (including the sun) and stellar systems within the galaxy, the meteors and comets and other nonplanetary material of the solar system, and the realm of the galaxies. The style is pleasing, clear, and direct. The book is excellently illustrated with 45 plates and 38 figures; it has an index and a good bibliography to guide the reader who wishes to extend his knowledge. I note one defect in the otherwise admirable presentation—inadequate emphasis on the imcompleteness of our data and the tentative, even controversial, nature of much that is given here as fact.

Both authors are to be congratulated, and both books are recommended.

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Clay Technology

Ceramics, Physical and Chemical Fundamentals. Hermann Salmang. Translated by Marcus Francis. Butterworth, Washington, D.C., 1961. 380 pp. Illus. $12.50.

There are few textbooks on ceramics available, and during the course of four German editions, Salmang's book (first published in 1933) has become a standard work, well known to ceramists. This English-language translation is essentially the same as the German fourth edition published in 1958.

The word ceramics has different definitions in different parts of the world, and its American meaning has changed over the last several years. As used by Salmang, *ceramics* is nearly equivalent to *clay technology*. In 380 pages all clay minerals and clay products are

discussed in detail; 9 pages are devoted to dielectrics and ferrites, 15 pages to basic refractories, and 16 to carbides, nitrides, and nonclay oxide refractories.

Following a brief introduction to crystal and glass structure, almost half the book is devoted to clay and silicate raw materials; the remainder is concerned with the manufacture and properties of products—brick, glazes, refractories, earthenware, stoneware, porcelain, and electrical insulators. The treatment is at an intermediate level; detailed elementary explanations of phenomena are not given, nor are quantitative analytical treatments presented. Extensive references to original literature, up to 1954 and 1955, are included. For the 13 pages on porcelains, 83 references are given; for the 120 pages on clays, 612 are cited.

One of the valuable features of prior editions was Salmang's tables of property data. These are extended and improved in the present book. Large foldout tables—"Properties of refractory materials," "Properties of high-duty refractory oxides," and "Properties of ceramic insulators"—updated and reorganized by G. Van Gijn, are the best available, and they will be considered the book's most valuable feature by many readers.

The quality of the book and of its half-tone reproductions is excellent.

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Circuit Design

Understanding Digital Computers. Paul Siegel. Wiley, New York, 1961. x + 403 pp. Illus. $8.50.

Siegel's book is for the reader who is interested in learning how a digital computer operates and how the logical circuitry of such a machine is designed. It is concerned with the internal operation of a computer. Except for a brief incidental description of an example of a program involving a loop, no attempt is made to describe methods of programing digital computers or the methods of solving scientific problems by means of such equipment. Thus, this book is not aimed at the person who wants to use digital computers in solving his computational problems. Rather, as stated by the author in the preface, it is written primarily for the technician who is thinking of entering the digital computer field. It can be read by anyone who has a basic understanding of electronics—a ham radio operator, for instance.

Emphasis is on principles, and the principles are illustrated by examples. The book is divided into three sections: Logic and arithmetic; Building blocks; and Functional units of a digital computer. These sections are preceded by an introduction that describes the general characteristics of a computer. The section on logic and arithmetic begins with a description of various number representations, including binary and decimal, describes in considerable detail the arithmetic processes involved, and concludes with a discussion of machine logic, including AND, OR, and NOT elements. In the section on building blocks, there is a description of the various types of components used to build up the logical blocks developed in the first section. Included are mechanical, electromechanical, vacuum-tube, electromagnetic, diode, and transistor components. Emphasis is on the logical functions performed, rather than on circuit principles. In the final section the logical and functional building blocks developed in the second section are combined into the five functional units of a digital computer: memory, input, output, arithmetic, and control. This section culminates in the description of a specimen digital computer which combines the functional units already described.

A unique feature of the book is the summary, provided at the end of each chapter, which includes the basic ideas and definitions of the chapter.

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Pesticide Handbook

Pesticide Index. Compiled and edited by Donald E. H. Frear. College Science Publishers, State College, Pa., 1961. 193 pp.

Frear has prepared a list, cross-indexed and arranged in alphabetical order, of 3000 names (common, coined, and chemical names are included) which have been applied to chemical pesticides. Approximately 700 of the entries are considered main entries; these summarize properties, chemical structure, and uses of the compounds.

Air Force Research

Air Force Scientific Research Bibliography, 1950–1956. G. Vernon Hooker, Mabel H. Duffner, Aaron S. Dann, and Doris C. Yates. Science and Technology Division, Library of Congress, Washington, D.C. (order from Superintendent of Documents, GPO, Washington, D.C.). xx + 1147 pp. $6.75.

This one-volume index contains more than 4000 summaries of publications that resulted from research supported by the Air Force during the period from 1950 to 1956. Technical notes and reports, books, papers published in symposium proceedings, and articles published in journals are summarized. In addition to the alphabetical subject index, the entries are indexed by contractor, by author, and by AFORS control number. Current and original sources are indicated for the reports. Volume 2, scheduled for publication in 1962, will cover 1957 and 1958. When volumes covering research up to 1960 have been published, future bibliographies of research sponsored by the Air Force will be published by the Armed Services Technical Information Agency.

New Books

Biological and Medical Sciences

Advances in Ophthalmology. vol. 2. E. B. Streiff, Ed. Karger, Basel, Switzerland, 1961. 272 pp. Illus. $16.

Anatomy of the Monocotyledons. vol. 2, *Palmae.* P. B. Tomlinson. Oxford Univ. Press, New York, 1961. 466 pp. Illus. $10.10.

British Flies. pt. 3, *Empidinae and Hemerodrominae.* J. E. Collins. Cambridge Univ. Press, New York, 1961. pp. 556–782. Illus. $6.

The Cell. Biochemistry, physiology, morphology. vol. 3, *Meiosis and Mitosis.* Jean Brachet and Alfred E. Mirsky, Eds. Academic Press, New York, 1961. 453 pp. Illus. $12.

European Society of Haematology, Proceedings of the Seventh Congress. vol. 1, 172 pp., $8; vol. 2, pts. 1 and 2, 1332 pp., $58. E. Neumark, Ed. Karger, Basel, Switzerland, 1960.

Insect Sounds. P. T. Haskell. Quadrangle Books, Chicago, 1961. 197 pp. Illus. $5.75.

Instrumental Methods for the Analysis of Food Additives. William H. Butz and Henry J. Noebels, Eds. Interscience, New York, 1961. 296 pp. Illus. $11.

An Introduction to the Study of Protozoa. Doris L. Mackinnon and R. S. J. Hawes. Oxford Univ. Press, New York, 1961. 523 pp. Illus. $12.75.

The Origin of Medical Terms. Henry