

known work on culture of plant cells from single parenchymal cell to plant could have occupied less space—missing from it is mention of the work on wild carrot. Elsewhere the free use of “new language” with its implications of rigor does little to increase the significance of some of the difficult-to-interpret experiments described.

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Hymenoptera

Trap-Nesting Wasps and Bees. Life Histories, Nests, and Associates. KARL V. KROMBEIN. Smithsonian Press, Washington, D.C., 1967. 576 pp., illus. \$12.50.

This thick volume is a detailed compendium of results obtained from the author's zealous use of trap nests to expose the home lives of 75 species of predaceous wasps, 43 nonparasitic bees, and 83 associated parasites and predators. The host insects are dealt with systematically in the order of their appearance in the catalog of North American Hymenoptera (*U.S. Dept. Agr. Monogr.* No. 2, 1951). The arthropod parasites and predators are listed in the discussions of the species they attack and then are discussed systematically and in more detail in the last third of the book. The principal nest associates included are mites, beetles, flies, and parasitic Hymenoptera.

Krombein's systematic bent is clearly shown in the careful organization and meticulousness of his studies. No other American work dealing with the findings of one man in the field of Hymenoptera biology can compare with this one in completeness and richness of detail. It is a great tribute to the author's dedication and organization that he was able to keep such a remarkable series of studies in high gear for 14 years in the midst of his busy and productive career as systematist and curator of aculeate Hymenoptera at the National Museum.

By now it should be apparent that the book is not written to attract the casual reader or to serve as a springboard for profound generalizations or flights of philosophical fancy. It is primarily an accumulation of facts on life history, nesting behavior, and biotic relationships. It is old-fashioned nature study, but prepared in an unusually systematic and painstaking fashion. It can-

not be said that this book fills the gap in our basic knowledge of aculeates, but it provides one of the most solid building blocks we have. The many active students of aculeate Hymenoptera will find it invaluable as a reference work. I would hope that the philosophically minded investigator will study Krombein's pages carefully to obtain the kind of documentation needed for meaningful generalizations on insect ecology and ethology.

Among the more enjoyable features of the book are the excellent illustrations (mostly photographic) of nests and their contents. Details of nest architecture, prey or pollen storage, egg placement, cocoon structure, and the intimate roles of parasites are well portrayed.

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Particles in Suspension

Aerosol Science. C. N. DAVIES, Ed. Academic Press, New York, 1966. 486 pp., illus. \$10.50.

According to the editor of this book, “it seemed a good idea to assemble a group of research workers who could write authoritative chapters on branches of aerosol science which were, or were going to be, of particular interest.” He also emphasizes that some of the more advanced knowledge has been rather inaccessible. *Aerosol Science* is the result. It consists of 12 review articles or chapters which discuss the behavior and properties of suspensions of particles (both liquid and solid) in gases from a fundamental point of view. No attempt is made to cover the entire field. For example, there is no chapter on sedimentation in general, although chapters on deposition from moving aerosols and on light scattering are included. There are about 950 references, some as recent as 1965, which markedly contribute to the value of the book.

The chapter on the generation and use of monodisperse aerosols is unique and will be especially useful to those undertaking research or testing with aerosols. Monodisperse aerosols are those in which the particles are all nearly the same size. The next two chapters deal with two very fundamental aspects of aerosols, namely coagulation and electrical behavior. The subjects have been reviewed many times,

but these up-to-date reviews are very well done. The chapter entitled Electric Charge and Radioactivity of Naturally Occurring Aerosols represents a strange departure from the material in the rest of the book, since it deals with geophysics rather than with the fundamental behavior of gas-borne particles. Also, it deals with a very limited aspect of the particles in the earth's atmosphere, and there are no other chapters dealing mainly with geophysics. Three reviews deal with photophoresis, thermophoresis, and diffusio-phoresis, respectively, and again, as in the chapter on aerosol production, fulfill the editor's aim of supplying not-readily-available information. The subject matter is very closely interrelated, and as so often happens in books written by many authors, there is some overlapping of the material treated. Photophoresis can be defined as the motion of gas-borne particles resulting from their illumination by a beam of light. Thermophoresis is motion as a result of the presence of a thermal gradient in the gas, and diffusio-phoresis is motion as a result of a composition gradient. Two chapters on filtration are largely fairly conventional discussions of filtration theory, especially with regard to fiber filters. Again there is some overlap of material, but the section on the theory of membrane filters is especially welcome. Hodkinson's review of the optical measurement of aerosols is again a departure from the trend of much of the book, since the emphasis here is on particle size determination. However, it is one of the best discussions of both the usefulness and the limitations of this application of light scattering (and extinction) that I have read. The editor was particularly successful in fulfilling his stated aims in the chapter on adhesion of particles. This subject is very important with regard to particle collection and surface contamination, and pertinent information is widely scattered through the literature. The book concludes with a useful but hardly unique review of deposition from moving aerosols.

In summary, several of the chapters do consist of the reviews of material that it is often awkward to obtain, and the book is highly recommended to scientists and engineers concerned with some of the more fundamental aspects of aerosol science and technology.

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