cal and preparative techniques have brought about a considerable revival of terpenoid research. This book documents much of this progress. It presents the views of 12 investigators who have a broad and varied interest in the field. A chapter of particular interest to me was one that dealt with the biological significance of terpenes in plants. Although no biochemical function of monoterpenes in plants is yet known, much is known about the functions of the higher terpenoids. Here the author was able to bring to the reader the manifold fashions in which terpenes interact with their biochemical environment. From gibberellins to sterols to carotenoids, the author traces their function and form.

Considerable emphasis is placed on terpenoid biosynthesis. Material is presented on specifically labeled substrates, biosynthesis of monoterpenes, terpenoid quinones, and prenols (polyisoprenoid alcohols). A chapter on structural determinations of carotenoids points up the role of modern analytical instruments in this complex field and reveals the great progress made since the introduction of such techniques as nuclear-magnetic-resonance spectroscopy. J. S. E. Holker's chapter on conformational analysis presents one of the clearest expositions of this subject that I have encountered.

Most certainly any volume with 12 authors has inherent disadvantages, from discontinuities in style to presentation of too specialized a view of a particular area of study. *Terpenoids in Plants* suffers from these to some extent, but offers in compensation an excellent overall review of the many facets of a complex and fascinating subject.

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Petrography

Electron Micrographs of Limestones and Their Nannofossils. ALFRED G. FISCHER, SUSUMU HONJO, and ROBERT E. GARRISON. Princeton University Press, Princeton, N.J., 1967. 157 pp., illus. Cloth, $6.75; paper, $3.25. Monographs in Geology and Paleontology, No. 1.

As its name implies, this first volume of the new series Monographs in Geology and Paleontology is an annotated collection of electron photomicrographs of representative limestones and their included minerals and microfossils. Fischer, Honjo, and Garrison present a survey of the microstructure of fine-grained limestones from many geologic environments ranging in age from Cambrian to Recent. These authors are well known for their work in this relatively new area of geologic research, and this book is a careful selection of some of their best published and unpublished photographs.

In addition to a discussion of the mineral grains, the overall limestone fabrics encountered, and the fossils in phyletic order, a thorough and clear treatment of the techniques of the replica method that are necessary for the proper interpretation of the resulting electron micrographs is given. The chief value of this book will be its usefulness to the carbonate petrographer faced with the task of unraveling the history of fine-grained limestones. Here is a reference book of electron micrographs valuable for comparative purposes. The value could have been substantially increased, however, by the use of more than one replica technique on several of the samples and by inclusion of some of the photomicrographs from other workers in the field.

Apart from some text references which were omitted from the remarkably up-to-date bibliography and a misplaced figure legend, the text is quite free of errors of production. Although many readers may take exception to some of the interpretations of the more than 80 beautifully reproduced plates, few can quarrel with the reasonable price of this book, which will undoubtedly find its way to the reference shelves of all serious students of fine-grained carbonate rocks.

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Semiconductors: Lines of Inquiry

The Physics of Semiconductors. Proceedings of an international conference, Kyoto, Japan, Sept. 1966, sponsored by the International Union of Pure and Applied Physics. TOSHINOSUKE MUTO, Ed. Physical Society of Japan, Tokyo, 1967. 794 pp., illus. $32.

The conference of which this volume forms the report was the eighth in an international series dating back to 1952. The proceedings were issued, readably and cleanly presented, clearly printed on good paper and well bound, a short three months after the conference was held. This efficiency and good judgment were typical of the conference, which in setting, organization, and presentation has had no superior among its predecessors and which will set a very difficult aiming mark for its successors.

The organizing committee made a severe choice from the submitted material, confining their selection to topics they considered suitable for 1966. To my mind they showed good taste—the older lines of research were solidly represented, while newer investigations which may be expected to be productive in the future, but which marked something of a departure from tradition, were introduced on the international scene. Thus in the former category we find reports of competing methods of calculating theoretically the band structure of diamond-family semiconductors, considered alongside optical measurements which in principle determine the structure above the lowest band edges but which in practice seem to be full of problems of interpretation; we find ever more complex experiments and detailed interpretation of optical experiments at intense magnetic fields; we find a session on the fundamental mechanisms of radiative recombination with or without the interaction of complex defects, very little on laser action (but apparently a deliberate omission of extensive reporting on semiconductor lasers); we find that the hydrogenic impurities still provide experiments and theoretical problems, but that the deeper impurity states have usually not found better than the most phenomenological cataloguing of their energies; we find that transport effects, and especially the oscillatory low-temperature effects, are providing basic data on the less well-understood materials; and we find a great interest in hot electrons and current instabilities such as the Gunn effect.

In the second category I found impressive the very interesting papers on electron-phonon interaction, especially those on interactions leading to sound amplification. A long session was devoted to magnetoplasma and magnetoacoustic phenomena, and it seems certain there will be more to come. There

were papers on impurity conduction, but they were confined to the classical semiconductors, while one knows that there is a vast unexplored wilderness of amorphous and disordered structures lying just beyond. Newest on the scene were reports on magnetic semiconductors and superconducting semiconductors, and it seems likely that these will receive further attention at these conferences.

The papers showed that in certain topics we are now dotting the *i*'s and crossing the *t*'s, but that in others hard, unresolved fundamental questions remain. Muto in his opening address drew attention to these in the areas of deep impurity centers, impurity conduction, and collective oscillations. It was evident that the techniques of investigation were becoming increasingly sophisticated, with extensive use of differential methods in optical spectra, laser sources, high-resolution optical equipment, and intense magnetic fields. Not as evident was any extensive attempt to produce very pure materials with well-categorized composition and defect structure, and this, if it reflects reality, might spell trouble in the future. Still, the conference showed that the discoveries and techniques of this discipline are having an impact on all of solid-state physics and that even the oldest and most jaded of us can find exciting new things in semiconductors. Students of solid-state physics may read this volume with profit. For the professional semiconductor man, it in common with the reports from previous such conferences will be an indispensable reference for several years to come.

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Laboratory Problems

Husbandry of Laboratory Animals. Proceedings of the third international symposium, September 1965. M. L. CONALTY, Ed. Academic Press, New York, 1967. 666 pp., illus. $28.

The International Committee on Laboratory Animals (ICLA) is an independent, nongovernmental organization, founded under UNESCO auspices in 1956, whose objective is to improve the quality, availability, and efficiency of utilization of laboratory animals. This volume comprises 37 papers presented during the ICLA's third symposium, held in Ireland during two weeks of September 1965. It exemplifies the "rule" that the publication resulting from a lengthy symposium is likely to be lengthy. As one who attended the symposium, I felt it was too long; and the published proceedings confirm this opinion. The book contains a potpourri of papers of uneven quality, some of which clearly duplicate information already in the literature. Subjects covered include various aspects of laboratory animal husbandry, disease, nutrition, and effects of environment on animals. Papers on how to handle "unusual" species, such as scorpions and cobras, and "how to" information on production or handling of commonly used species, such as rats and guinea pigs, are coupled with scientific reviews on such topics as "aspects of physiological stress in animals" and "influence of psychological factors on disease susceptibility." A one-page note on ringtail in rats with no citations from the literature, said to be "a shortened version of an unscripted talk," contrasts with a fine 53-page review of effects of rearing temperature on physiological characteristics with 224 literature citations. In short, the publication faithfully reflects the symposium; it is a mixture of extremely valuable and extremely superfluous papers of diverse scope and content.

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Feeding the Hungry and the Prospering

Alternatives for Balancing World Food Production and Needs. A conference, Ames, Iowa. Iowa State University Press, Ames, 1967. 281 pp., illus. $4.95.

This is a collection of papers prepared for a conference sponsored by the Center for Agricultural and Economic Development at Iowa State University. As with almost all symposium volumes, the quality of the papers is uneven.

There are some excellent summaries of the present state of our knowledge in a variety of fields bearing on the problem; for instance, there is an "overview" given by Lester Brown, a review of ecological factors affecting nutrition and food use by Nevin Scrimshaw, an examination of the prospects for world population control by Donald Bogue, and a review of ways of meeting the protein deficit by A. D. Odell. Few if any of the contributions reflect new research not previously reported elsewhere, nor was it possible in a brief conference of this sort to lay adequate stress on the connections and interdependencies among all the various factors treated by different disciplines that are reported on in the conference papers.

The overall impression left by the book is a much more balanced and optimistic one than is given by some of the more extreme predictions of disaster in the race between population and food made in such books as *Famine 1975!* by William and Paul Paddock, or even in the recent report of the President's Science Advisory Committee on the world food problem. Several of the authors offer a much-needed corrective to the overemphasis on the population explosion as the main thing to worry about and underline the equal or greater importance of the income explosion on which we all hope the underdeveloped world is launched and which creates a problem of expanding food production to meet the demands resulting from higher income levels that is at least as great as that posed by the increase in number of mouths to feed.

There are some rather surprising gaps among the topics presumably assigned by the conference organizers. There are no systematic treatments of problems or prospects in the supply of the major inputs, such as water, fertilizers, and pesticides, required to multiply world food production and no thorough discussion of the revolution, past and potential, in plant genetics, which has produced the new seed varieties on which a large part of our hopes for a radical acceleration in agricultural productivity in the next couple of decades is based.

Nonetheless, taken not as a comprehensive treatise but as a collection of brief papers on some important aspects of the problem of population and food supplies, this is a valuable addition to the burgeoning literature on one of the critical problems of our time.

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