two orbital periods. Such an integral relationship was not known for any other planet, and it clearly plays an important role in understanding how the planets came to have the motions they possess today. Venus, being concealed by cloud, did not have an official rotation period. It now seems that it rotates backward and in the Sun-Earth frame it appears to make four backward rotations in one synodic period. (The synodic period, or time between inferior conjunctions, is 584 days, the sidereal period is 225 days, and the rotation period 243 days approximately.)

These almost unbelievable discoveries, especially the synchronization of Venus with the Earth, emphasize that we do not know how the solar system evolved, but they furnish new handholds. We may look forward to rich data of the same kind when the numerous satellites of Jupiter and Saturn come within radar range.

When another 40 decibels over and above that necessary to work with Jupiter can be brought to bear, then it is expected that Saturn, Uranus, Ganymede, Callisto, Io, and Europa can be studied; but as of the date of writing, Jupiter remains a marginal target. An improvement of 40 decibels results from an increase of a factor of 10 in antenna diameter; so if $10 million is the cost of the largest radar astronomy antennas, it appears that the hoped-for data would come at a cost of perhaps $1 billion. At such a price it may be that the radar astronomy of the outer planets and their satellites will be done by small radars on space probes sent to the outer planets, some years from now.

Radar Astronomy, which is the only substantial book in its field, contains basic chapters on scattering by targets, radio propagation through the atmosphere and ionosphere, radar systems, antennas, transmitters and receivers, and data processing, all written by well-known experts, and, in addition to the planetary studies referred to above, has major chapters dealing with the Moon and the Sun.

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Theoretical Study of Plasma Phenomena

Electromagnetic Fluctuations in Plasma. A. G. SITENKO. Translated from the Russian edition (Kharkov, 1965) by Morris D. Friedman. Academic Press, New York, 1967. xiv + 256 pp., illus. $12.50.

This book deals with the theory of fluctuations of electron density, electric field intensity, and other related quantities in plasmas. It contains a collection of specific results, for correlation functions and power spectra, in a large number of special cases. These results should be very useful to persons whose research involves fluctuations in plasmas, among them those who are investigating noise measurements, deflection of charged-particle beams, or electromagnetic-wave scattering by fully ionized plasmas.

The results of the theory are derived by the author in a rather formal way, so that the reader who desires a clear exposition of the fundamental principles of the subject, based on physical ideas, must look elsewhere. It's a shame that the author does not present the test-particle method of Rostoker, which is an important contribution to the subject.

The basis of the method which the author uses to obtain most of his results is the fluctuation-dissipation theorem. The derivation of this theorem, from the general principles of quantum mechanics, is given in chapter 1. Since the theorem applies only when the distribution functions are Maxwellian, the results obtained are not very general. Also, the author has considered only plasmas that are spatially homogeneous, which will make the book somewhat less useful for experimentalists than for theorists.

With these limitations, the author does discuss the results of the theory of electromagnetic fluctuations for many interesting cases. He considers both electron plasmas and electron-ion plasmas, including cases where the electrons and ions have different temperatures, both with and without an external magnetic field. He emphasizes the types of waves which can propagate in such plasmas. The power spectra for some of these cases are used in calculations of the dynamical friction and diffusion coefficients, and of the electromagnetic-wave scattering coefficients in a plasma. These subjects are treated in considerable detail, and this is one of the attractive features of the book. The author also discusses quantum plasmas, degenerate electron gases, and superconducting plasmas, although the treatment of these subjects is rather sketchy.

The general approach used by the author, the formal deduction of results from the general fluctuation-dissipation theorem, gives one very little physical insight into the dynamics of plasma behavior, that is, "what the particles are doing." However, the abundance of detail, the many interesting cases considered, and the 27 illustrative figures should make the book a useful reference for specialists.

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Optical Properties

Dynamical Processes in Solid State Optics. Summer Lectures in Theoretical Physics, Tokyo, 1966, Part 1. RYOGO KUBO and HIROSHI KAMIMURA, Eds. Syokabō, Tokyo; Benjamin, New York, 1967. viii + 245 pp., illus. $7.50.

This is a collection of ten excellent, but unfortunately not reasonably related, articles. Even the writer of the dust-jacket blurb for this small volume recognized three topics: macroscopic optical properties of dielectrics, structures in the spectra of solids, and laser physics. But it is not in the choice of subject matter alone that the content is heterogeneous: there are both review papers and research papers. Furthermore, the former range from the general (Burstein on dielectric media) to the very recent (Phillips on work in optical spectra of solids reported since the completion of his last review article in 1965); the latter, from comparatively recondite and specific contributions (Hopfield on elastic scattering at inelastic thresholds) to what is essentially a new chapter in a long series of papers by one author (M. Lax) on classical and quantum noise.

Much has been written lately on the so-called "information explosion" and the obsolescence of scientific journals it allegedly entails [see, for example, W. S. Brown, J. R. Pierce, and J. F. Traub, *Science* **158**, 1153 (1967)]. Organized distribution of unrefereed "preprints" is one consequence of this dissatisfaction with journals; the ever more frequent publication of the proceedings of conferences, symposia, summer schools, and the like is another. This latter practice serves a valid purpose when the meeting is a coherent one, either scientifically or pedagogically; it does not when many unrelated subjects are touched on from many different view-

points. In that case the presumably desired purpose of bringing the author and the interested reader together is more likely to be served by publication of each individual article in an appropriate journal.

The contributions under review are of high quality and deserve to be read; but few readers will be interested in more than one or two of them. Unfortunately, between the hard covers of a vaguely, yet misleadingly, titled volume, each is likely to be missed by many of the workers most capable of benefiting from it.

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Pest-Control Method

Principles of Insect Chemosterilization. GERMAIN C. LABRECQUE and CARROLL N. SMITH, Eds. Appleton-Century-Crofts, New York, 1968. xii + 354 pp., illus. $16.

The concern that has been felt in recent years over the increasing incidence of insect resistance to insecticides and the possible hazards to man and wildlife associated with residues of some of the more persistent conventional pesticides has stimulated investigations into alternative methods of insect control. One of the methods which has met with some degree of success is that of inducing sterility in the pest population by means of either radiation or chemicals. Sterilization is of particular practical interest because it has the potential to counteract what is without doubt one of the major factors responsible for the success of our insect pests, namely, their awesome reproductive capacity.

Consisting of an introduction and six chapters by leading authorities in the field, this book covers comprehensively for the first time all major aspects of insect chemosterilization in a manner which is well coordinated, with a minimum of overlap and repetition.

A brief introduction (Lindquist) is followed by a discussion of the potential role of sterilization in pest control (Knipling) by either the mass release of sterile insects into a natural population or direct sterilization of the population itself. By referring to a number of simple mathematical models the author clearly emphasizes the theoretical advantages of sterilization over conventional chemical control and establishes basic criteria for the optimal utilization of the sterility technique in a number of practical situations.

The chapter on the techniques employed in the laboratory screening and evaluation of possible chemosterilants (LaBrecque) should prove a most useful source of reference to those directly involved in this kind of work. Included here is a comprehensive table of compounds reported to affect the reproductive capacity of many species of insects and mites.

In the course of development of new chemosterilants, compounds that have shown promise in initial laboratory screening tests must be evaluated under field conditions. Chemosterilant field studies with a number of insect species are covered in a later chapter (Weidhaas) which would have been more in context had it directly followed that on laboratory procedures. An interesting section of this chapter discusses the potential role of chemosterilants as biological tools which can be usefully employed in biological and ecological studies of insect populations.

Although the specific mechanism of action of chemosterilants remains largely unknown, much information exists concerning the results of cytogenetic and cellular interaction with the chemical. A chapter (LaChance, North, Klassen) discusses the various types of insect sterility that may result from these interactions and points out that, in addition to the cytogenetic damage to germ cells that results in dominant lethal mutations, aspermia, sperm inactivation, and infecundity, the chemical may also have important and more general somatic effects.

The chemistry and biochemistry of the chemosterilants themselves are presented in a chapter consisting of a series of sections concerned with specific compounds representing each of the major groups (Turner). Each section gives details of structure, physical properties, and methods of determination and purification of individual compounds in a form that will make the chapter invaluable for rapid reference. The sections devoted to the biochemical aspects of each chemosterilant are particularly interesting, for the author has drawn heavily on literature from the field of mammalian chemotherapy, where chemosterilants have been intensively studied as a result of their carcinostatic properties. Much of this information has not been previously published in a context of insect chemosterilization and its inclusion here might result in a useful cross-fertilization of ideas.

Although our present knowledge of the toxicological aspects—namely, mammalian symptomatology, metabolism, and chronic and acute toxicity—of chemosterilants leaves much to be desired, all available information is well summarized (Hayes) with direct reference to specific compounds.

This book can be highly recommended for all those interested in problems of pest control. A number of errors were noted which do not appear in the list of errata, but these do not generally detract from the overall value of the book, which will undoubtedly prove a major reference source in this important area of endeavor.

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A Metalloid Element

The Chemistry of Boron and Its Compounds. EARL L. MUETTERTIES, Ed. Wiley, New York, 1967. xvi + 699 pp., illus. $27.50.

The substantial growth in knowledge about the element boron and its compounds which occurred during the 1950's is now being reflected by the appearance of a number of books in the field. Certainly this book will stand as one of the major contributions. The full scope of the chemistry of boron has become fully apparent only within the last decade. The diversity of problems of chemical interest provided by this single element and the thorough and extensive coverage of the field by the present work make it possible to say with assurance that the book contains something of interest to every chemist. Topics covered range from the most fundamental structural problems to the applications of boron chemistry to organic synthesis. Each topic is treated by an acknowledged expert, and the resulting coverage is in general thorough and excellent.

The principal drawback to the present volume is one common to most collections of chapters written by different authors. For example, the termination date for coverage of the literature varies significantly from chapter to chapter. As a case in point, it is