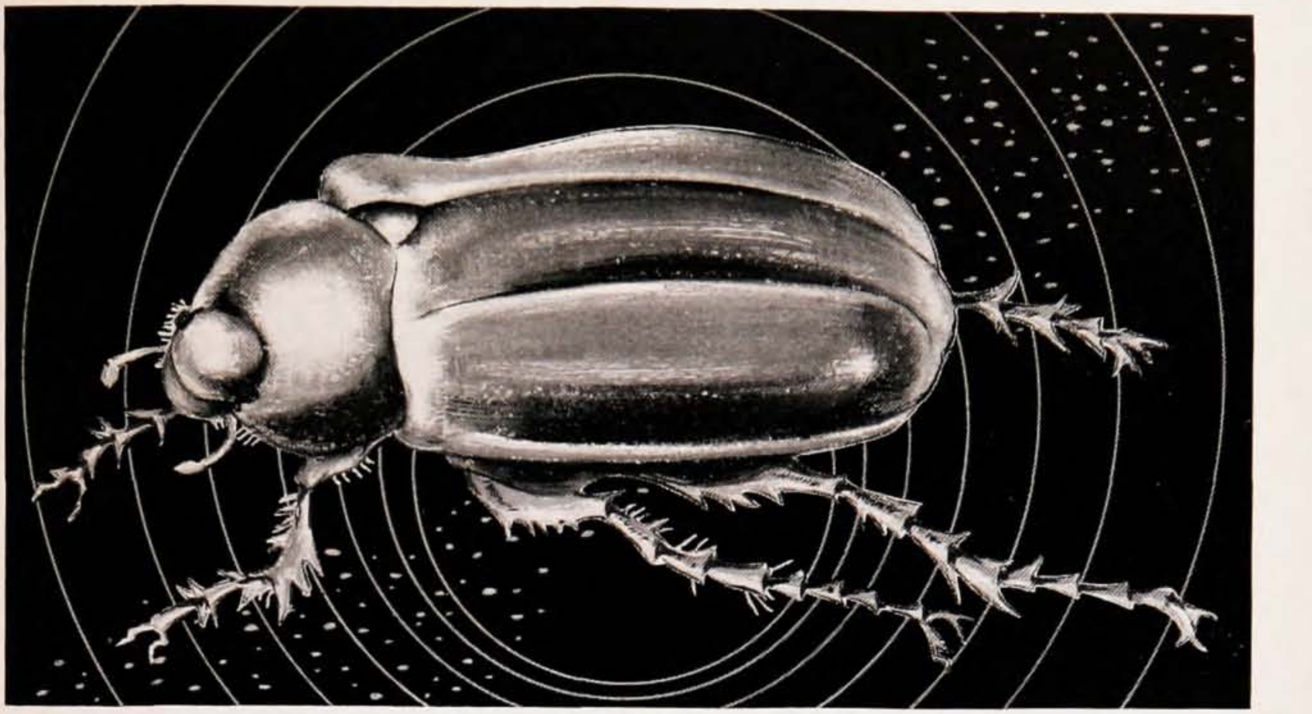
in reading the text and recommends it highly, not only to the specialist in the field, but also to every scientist interested in acquiring a modern point of view on problems of wave propagation in inhomogeneous media. As a text it can be successfully used in a (year) course for students in physics, applied mathematics, or engineering. On the other hand, the first three chapters together with some selection from the other chapters would make excellent material for an advanced undergraduate course in physics or engineering.

Electronic, Radio, and Microwave Physics. By D. E. Clark and H. J. Mead. 521 pp. The Macmillan Co., New York, 1961. $25.00. *Reviewed by Sanborn C. Brown, Massachusetts Institute of Technology.*

THIS book should serve as a useful reference for students in the field of electronics or microwave physics. It is written for physicists from the point of view of physicists and is based on fundamental physical laws and relationships rather than engineering techniques. The first four chapters do well in introducing the necessary mathematical background and the principles of electromagnetic theory, transmission lines, and waveguides. Much space is devoted to such topics as nuclear magnetic resonance, electron magnetic resonance, radio and microwave spectroscopy, as well as to the study of the properties of dielectrics and ferrite materials. Unfortunately, except for a brief sketch of the reflection of radio waves from the ionosphere, little mention is made of the use of microwaves as a tool for investigating the physics of plasmas. A chapter devoted to the proper measurements of such parameters as power attenuation, frequency, impedance, and so on, would not seem out of place in such a volume although they have not been included. On the other hand, one chapter, Chapter 8, is devoted to the study of artificial lines and filters, and I doubt whether this subject merits such detailed attention in view of the many other subjects that are not treated in the book at all.

It would appear as if this book were really two books under a single cover. In the middle of the book there is a sharp change in subject matter and continuity, and interest is focused on the physics of electron tubes and their applications. The treatment is generally good and based on fundamental principles. The reader is taken logically through the field of ultrahigh-frequency electronics with a discussion of klystrons, traveling-wave tubes, and magnetrons. Notable by its absence, however, is any treatment of solid-state electronics or any discussion of the solid-state diodes, transistors, tunnel diodes, or crystal detectors. It would seem that a chapter could have been devoted to this subject in the interests of completeness. The final chapter is concerned with a discussion of probability theory and noise, which is useful and necessary to much of the work encountered in the field of electronics.

Somewhat disappointing is the sparseness of the



THE RADAR CROSS SECTION of a JUNE bug...

. . . is 10^{-5} sq. meters. At least, those that sometimes interfered with our significant research in the measurement of radar cross sections were that big.

Meaningful research, however, must surmount more serious barriers than June bugs. Barriers, for example, like those of semantic differences between the tongues of electronics engineers and physicists, between aeronautical engineers and psychologists. This is particularly true in a research laboratory, where professional men of vastly different backgrounds work with and try to understand each other as they push back the frontiers in new fields.

Here, scientists and engineers with minds open to new ideas, adept at stepping over barriers between technologies, will find a broad array of problems to solve — in an environment that encourages the development of original ideas. Here, engineers conducting plasma sheath research work shoulder to shoulder with scientists doing research in ion cyclotron resonance, or in re-entry interactions with the upper atmosphere, or in gaseous electronics.

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references. A good reference book should provide an abundant opportunity for the inquiring reader to be directed to the subject of interest and to related subjects. The reference to the literature in this book is very inadequately done and does not help the student in going deeper into many of the subjects introduced by the book where further elaboration might be most useful.

Despite the lack of treatment of several topics of great interest to the modern experimental physicist, this book should find a useful place in the reference library of physics laboratories.

The Theory of Crystal Structure Analysis. By A. I. Kitaigorodskii. Transl. from Russian by David and Katherine Harker. 275 pp. Consultants Bureau Enterprises, Inc., New York, 1961. $12.50. *Reviewed by Leland C. Allen, Princeton University.*

EVERY physicist has at least an elementary understanding of the physical principles underlying the use of x-ray diffraction methods to determine the atomic geometry of crystals, and almost every one has heard of the famous "phase problem" concerning the coefficients in a Fourier series expansion of the crystal charge density. Yet, because of the classical and straightforward physics involved in x-ray diffraction, very few physicists, outside of those actively engaged in the field, have any idea of the techniques actually used in the structure determination of a moderately complicated crystal. Since about 1950, a revolution in methods has taken place and two pathways to the unraveling of crystal structures have been evolved. The first is the reciprocal-space or phase-determination pathway and this has been concerned with the development of statistical and probabilistic relationships between the Fourier-expansion coefficients. This is the primary research interest of Prof. A. I. Kitaigorodskii and the central part of the book under review is devoted to a generalization and review of the work of Kitaigorodskii and others on these techniques. (The heavy-atom scheme which has proved so successful in a variety of biologically interesting systems is a quite limited and specialized case in which heavy atoms of known position dominate the phases, and so this scheme is not the principal concern of a book devoted to the theory of general decomposition methods.) The second is the direct space or Patterson map deconvolution route. The methods employed are the image-seeking and superposition techniques and with these there is no "phase problem." Although these latter methods are used by the majority of crystallographic laboratories they receive little attention in the book and the reader interested in them should refer to the standard texts by Buerger or Lipson.

Perhaps the most unique and valuable feature of the book is a brief (18 pages) mathematical introduction. This chapter presents in an especially clear, concise, and general manner all of the transforms which interrelate the measured and theoretical quanti-