book, as well as its organization, makes it possible for a student with a basic knowledge of quantum mechanics, or for a research worker, to utilize it readily and effectively. For example, there is the particularly clear and interesting section fairly late in the book on the Van Hove correlation function, complete with a particular example of scattering by liquids, which was illustrated earlier with several pieces of experimental data and a qualitative discussion.

There are, however, several omissions which are unfortunate because the authors' style and ability are so excellent. Except for a brief mention of nuclear resonance scattering early in the book none of the studies of these data and their implications in nuclear and fission physics are discussed. It is also regrettable that there is no discussion of neutron polarizability and its implications for the structure of the neutron. To dwell on these or other omissions would, however, be a disservice to an excellent book.

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Effects of Impurities

Localized Excitations in Solids. Proceedings of the first international conference, Irvine, Calif., 1967. R. F. WALLIS, Ed. Plenum, New York, 1968. xvi + 782 pp., illus. $22.50.

Over the past decade physicists have become very much interested in the effects of impurities on the excitations of otherwise pure materials. The impurity can be considered to act as a microscopic probe in the host material, and it is hoped that by measurement of its behavior information about the host can be obtained. However, most impurities produce large changes in the parameters defining the excitations in the host, and rather exact calculations with good models are required. When the changes are localized in the immediate vicinity of the impurity, the possibility of carrying out exact calculations does arise. The book under review contains the proceedings of the first international conference in which, predominantly, the properties of such impurities in a variety of systems are discussed.

The systems covered are drawn from lattice dynamics, magnetism, and semiconductor physics. As most work has been done on the impurity modifications of the vibrational modes of a crystal, the conference was dominated largely by papers on these effects. In this system the changes in the host crystal parameters are due to the different mass of the impurity and the different force constants coupling it to the motion of neighboring atoms. These changes can lead to resonant modes in the host crystal pass band or to localized modes in the band gaps. These two kinds of behavior are characteristic of all the impurity systems discussed here. As the impurity also removes translational invariance, radiation can couple with modes of all wavelengths, and optical absorption yields more information than usual. A variety of detailed calculations and experiments, both optical and thermal, are presented and reviewed, and it is noted that good agreement between them is becoming possible.

Discussion of the magnetic impurity problem is complicated by the lack of an exact solution for either a pure ferro- or antiferromagnet. Except at very low temperatures the necessary approximations lead to effective parameter changes throughout the crystal, in addition to the different impurity spin magnitude and associated Heisenberg exchange constants. Hence only rather simple model calculations are reviewed. However, a considerable amount of optical work in magnetic systems is presented, particularly on the sidebands induced in the electronic spectra of an impurity.

The study of electron-hole pairs bound to isoelectronic impurities in semiconductors forms the remaining major topic. Here it is the impurity potential that is of short range. Detailed calculations of fair accuracy are described, but probably more useful is a discussion of a very simple model illustrating the many complications of this system. Again a large quantity of optical data is presented and discussed.

Probably owing to the fact that the various topics are drawn from different fields, most of the reviews are quite accessible. In any case, this book is one of the very few places where these topics are brought together and is thus of interest to anyone wishing to be informed of this branch of impurity physics.

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All about Some Instruments

Magnetic Compasses and Magnetometers. ALFRED HINE. University of Toronto Press, Toronto, 1968. viii + 386 pp., illus. $30.

As I read this book, I was reminded of the Admiralty Manuals. For those who have not encountered them, it should be explained that Admiralty Manuals are series of monographs on topics of immediate concern to H.M. Royal Navy. They are models of exposition, full of precise and elegant descriptions in simple, clear English. Somewhere in the literary Valhalla there must be a reward for those who write them. Like the Admiralty Manuals, this book contains a mass of detailed knowledge for the specialist and is so well written that the general reader can enjoy it.

After a brief and interesting historical introduction, the author considers the basic principles of pivoted-needle and inductor instruments. The treatment is very thorough. For example, several pages are devoted to the important problem of the behavior of pivoted-needle compasses in a moving vehicle. This permits analysis of the effect of acceleration of the pivot or suspension arising when the vehicle changes speed, turns, pitches, rolls, or yaws. In particular, a detailed analysis of the northerly turning error is given. The development of what we now call flux gates, the best-known form of a saturable inductor, is traced from the simplest rotating coil devices. The flux gate itself is introduced as follows:

> The most common forms are single-core and twin-core inductors depending for their operation on a.c. excitation of such magnitude that the cores are periodically driven into saturation on either side of the unmagnetized or zero field state. The application of an ambient magnetic field along the axis of the core or cores alters the relative positions in the magnetizing cycle where saturation is reached in either direction of magnetization. The corresponding distortion of the flux can be detected as an e.m.f. in the excitation windings (or, better still, in a separate secondary winding), this e.m.f. being in certain conditions proportional to the axially applied field.

The four basic forms of saturable inductors are discussed, as are aspects of the design of cores and the behavior of inductors in moving vehicles.

Having established the basic principles of the detector systems, the author describes the various compasses

and magnetometers which make use of them, noting advantages and disadvantages of each particular instrument. Surveying and transmitting compasses each receive a full chapter. The gyromagnetic compass, which usually consists of a gyrostabilized inductor, is treated with the author's characteristic thoroughness.

The author introduces the problem of compass-position correction by noting that with the advent of iron and steel ships the corrections became a necessity. Earlier unexpected errors or deviations of the compass had almost certainly arisen owing to nearby cannon balls and such unfortunate habits as Captain Bligh's tendency to store pistols in the binnacle. However, with the advent of the new ships a number of serious incidents were blamed upon compasses. G. B. Airy and Lord Kelvin were called in to consult for the Admiralty Compass Committee. It is tempting to imagine the conversations which may have taken place between Kelvin and the naval officers on the Committee in this early encounter between the military and science. At any rate, Kelvin and Airy, relying heavily upon theoretical work by Poisson, became the pioneers of practical compass corrections, and their methods are used in ships to this day. The field due to permanent magnetization of the ship is canceled at the compass by small permanent magnets. The field due to soft-iron effects is canceled by soft-iron spheres on the binnacle athwartships.

Between the chapter on compass-position correction and the final chapter on compass testing, there is a somewhat unsatisfactory treatment of measurements of the earth's magnetic field by methods not involving the saturable inductor or the pivoted-needle. Too little is said about these other methods for the chapter to be very helpful.

This book has a wealth of technical detail concerning compasses and magnetometers. It is no exaggeration to say that it will be invaluable to those who use or make compasses. It will also be of great value to the student of the history of science and technology. The book will be less useful to those who use magnetometers in geophysical or space research, because the instruments covered in the book are not those most popular in these fields of research. It is sad that the author did not live to see the completion of his book, for it should have brought him great satisfaction.

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Phytochemical Reviews: Some New Arrivals

Recent Advances in Phytochemistry. Vol. 1. Proceedings of the 6th annual symposium of the Phytochemical Society of North America, Austin, Texas, 1966. T. J. MABRY, R. E. ALSTON, and V. C. RUNECKLES, Eds. Appleton-Century-Crofts, New York, 1968. xiv + 437 pp., illus. $16.50.

Progress in Phytochemistry. Vol. 1. L. REINHOLD and Y. LIWSCHITZ, Eds. Interscience (Wiley), New York, 1968. x + 723 pp., illus. $23.75.

Phytochemistry has its own journal for original articles and an assortment of recent reviews appearing in monographs, published symposium proceedings, or treatises on comparative biochemistry and biochemical systematics. Now two new volumes have appeared, each the first of a projected series. *Recent Advances in Phytochemistry* will consist of papers given at the yearly symposia of the Phytochemical Society of North America (formerly the Plant Phenolics Group). This will be the American counterpart of the published symposia of the British Phytochemical Society, edited recently by Pridham. In contrast to these series, *Progress in Phytochemistry* is not based on a symposium but represents a miscellaneous collection of topics.

The advent of two new series poses a problem for both institutional and private libraries, whose budgets are approaching deficit spending. On the other hand, the knowledge explosion makes scientists partly dependent upon others for critical reviews of original work. Are these two new series worth the annual outlay of funds?

Although some of the reviews are gems of newness (to me, at any rate), others are good examples of the problem of overlap and repetition that will continue to plague these series. Three examples of repetition that I can detect because of my reading interests are the articles by Erdtman and by Grisebach in *Recent Advances* and by Harborne in *Progress*. In the review by Grisebach, several figures and at least four tables are identical to ones he published in an earlier symposium. Erdtman's article, "Chemical principles in systematics," is similar to one he wrote in 1963, and Harborne's paper on the same subject presents few new ideas.

Both volumes suffer from a lack of a general author index and from the omission of titles of papers cited. The latter is particularly unfortunate in international reviews citing less readily available sources.

The first volume of *Recent Advances* is dedicated to the late R. E. Alston, a pioneer in biochemical systematics. The theme of this volume is the use of new chemical techniques in analyzing natural products. It is divided into four parts: The Role of Chemistry in Modern Biology, Nitrogen and Sulfur Compounds, Acetate and Mevalonate-Derived Compounds, and Flavonoids. Since this is a symposium-based series, the themes will vary from year to year. The delay of two years before publication will lessen the value of this series if not corrected.

Although many of the articles are merely an updating of the 1966 treatise *Comparative Phytochemistry*, edited by T. Swain, some of them are of considerable interest. Mabry continues his review of the betalains, the group of pigments formerly confused with the anthocyanins; Alston summarizes data concerning the *C*-glycosyl flavonoids; and Ollis discusses the iso- and less-well-known neo-flavonoids. Although they are of a more encyclopedic nature, I will find useful the updated article of Ettlinger and Kjaer on sulfur compounds and that of Ponsinet *et al.* on the systematic aspects of the distribution of di- and tri-terpenes.

The format and printing in *Recent Advances* are very good. Several of the writers include useful concluding remarks. Information in tables is frequently well presented. The editors should be commended for permitting the personalities of the authors to filter through, as on page 58. Occasional comments, such as that by a chemist on botanical nomenclature (p. 121), are somewhat naive, and one author is downright unfair when he states that "most botanists are poorly informed of the extent to which modern natural products chemistry is dependent on instrumentation" (p. 188).

According to the editors, Reinhold and Liwschitz, the reviews in *Progress in*