Book Reviews

The Detection and Measurement of Infra-Red Radiation. R. A. Smith, F. E. Jones, R. P. Chasmar. Clarendon Press, Oxford, 1957 (order from Oxford University Press, New York). xiii + 448 pp. Illus. + plates. $11.20.

A recent British publication, *The Detection and Measurement of Infra-red Radiation,* has helped to fill a gap in our scientific literature. The authors are R. A. Smith, F. E. Jones and R. P. Chasmar. The book is one of a series of monographs on the physics and chemistry of materials published by the Clarendon Press at Oxford.

The book starts in a natural manner with a description of the infrared spectrum, a historical background, a survey of detection methods, and a review of the uses of infrared radiation. In the second chapter, various radiation laws are derived. At this point the authors introduce a certain amount of mathematical rigor. However, at no time is the book unduly theoretical. The physical approach has guided the authors, and a fairly succinct picture is given.

There is a chapter devoted to thermal detectors, in which the elementary mathematical theory underlying the thermocouple, bolometer, and pneumatic cell is given. Various instruments are also described, but perhaps not in the detail some might desire.

Considerable space is given to photodetectors. Those seeking a clear description of the photoconductive process will find it in this chapter. Thallium sulfide, lead sulfide, lead telluride, and lead selenide cells are discussed. Some of the more interesting new cells are omitted. Possibly the English suffer from classification restrictions, too.

Three chapters are devoted to fundamental limitations in detection. These, combined with the chapter on radiation laws, contain the real essence of the book. Various noise sources are described and related to fundamental phenomena. Brownian movement, Johnson noise, shot noise, current noise, flicker noise, other electrical noise, thermal fluctuations, radiation fluctuations, and minimum detectable power form the sections of the first of these chapters. The second deals with fluctuations in amplifiers and indicating instruments. This chapter will appeal to the electrical engineer interested in noise reduction. The third of these important chapters deals with the ultimate sensitivity of infrared detectors. Thermocouples, bolometers, pneumatic detectors, and photoelectric and photoconductors are treated.

Chapters are devoted to radiant sources, optical materials, and optical components. A good deal of reference data is to be found in these sections. Undoubtedly, these sections broaden the appeal of the book. However, it is my opinion that, since this material cannot be fully covered in such a book, it might better be left to a strictly reference source.

Separate chapters are also used to describe infrared spectrometers and amplifiers used with infrared detectors. The last chapter deals with atmospheric transmission. This chapter is very inconclusive, unfortunately, and does not include the recent data obtained in this country.

The book is excellently referenced, reads exceptionally well, and maintains mathematical rigor without losing the physical description.

Generally, the book is excellent and constitutes a long-needed reference on the subject. Perhaps it will put an end to the trivial reports now glutting the field, which are put out by engineering groups as they "discover" infrared.

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Traité de Microscopie. Instruments and techniques. A. Policard, M. Bessis, and M. Locquin. Masson, Paris, 1957. vi + 608 pp. Illus. F. 5200.

The first third of *Traité de Microscopie* discusses the structure and use of microscopes, with preference given to French and European instruments, although others are not excluded. Optics and aberrations are briefly treated, and light sources are rated in order of intensity, but without quantitative data. Microscopists are advised to clean their instruments daily, check them weekly, and have them overhauled once a year. May these instructions be followed! Advice is offered for the protection of microscopes against dust in dry, and fungus attacks in damp, hot climates.

Brightfield, darkfield, phase, Wild Varicolor phase, Nomarski's interference, infrared, ultraviolet, television, flying spot, particle sizing, polarization, and metallographic microscopes are described in varying detail, and measurement techniques and their associated errors are well covered.

"Recording" includes the camera lucida, photomacrography, photomicrography, microscopes with built-in cameras, special methods (such as bas-relief from solarization), and tilting mechanisms for stereo pictures. The use of dry and liquid filters is treated in detail. Emulsions, including color, and processing receive slight consideration. Electron, x-ray, proton, and ion microscopes, reconstruction microscopy by holographs, and a one-and-one-half-page bibliography complete this section.

The remaining two-thirds of the book covers methods. Preparation methods for fresh material are largely concerned with cells and fragments of blood. Phase microscopy and intravital staining are discussed. Of six references, five are on blood. The next ten pages are on dissociation, digestion, and mechanical separation of cellular constituents (four references). Fixation is then covered in 19 pages, with 18 references. Freeze-drying is discussed. Very little of the extensive work with the phase microscope on the effects of fixing fluids is mentioned.

"Microtomy" includes the paraffin and celloidin methods, the gelatin method, various kinds of microtomes, knife sharpening, sectioning, and frozen sectioning, and the chapter ends with a table of difficulties and ways to avoid them. Knife sharpness is discussed later under electron microscopy.

The standard staining methods are allotted 33 pages, with three of 22 references more recent than 1945. Metallic impregnation, mounting methods, and smear examination methods follow.

General histochemical methods and methods for proteins, nucleic acids, lipids, glucides, inorganic elements, enzymes, and pigments are covered in 88 pages; then special techniques are given for decalcification, depigmentation, microincineration, polarization microscopy, fluorescence microscopy, micromanipulation, autoradiography, ultracentrifugation, microelectrophoresis, electron microscopy, counting, and tissue collection and biopsy. A table of refractive indices, an 18-page vocabulary of French to German to English words, an index, and a table of contents complete the book.

In comparison with Langeron's *Précis de Microscopie*, this book seems less complete and is more difficult to use. Writ-

ing the material in two sections makes the treatment spotty. One finds the description of the microscopes in one place and their use in other parts of the book; filters are discussed in several places; objectives are discussed under microscope optics and defined under photomicrography, and so on.

The vocabulary could be improved by omitting the words which vary only slightly in spelling and including words like *manche à balai* ("joy stick"—that is, micromanipulator control) whose meaning is not obvious from the words themselves. Some of the preparation is a bit careless: *Kristall* is given as the English for *cristal,* some references include only month and year, a book reference lists the third author as the first, the origin of Fig. 4 is not acknowledged, and so on.

There is much valuable material in this book, which presents French microscopy as it is viewed by three experts.

OSCAR W. RICHARDS
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Corrosion and Wear Handbook for Water Cooled Reactors. TID 7006. D. J. DePaul, Ed. U.S. Atomic Energy Commission, 1957 (order from Government Printing Office, Washington, D.C.). 293 pp. $2.25, paper.

Corrosion and Wear Handbook for Water Cooled Reactors is the sixth report in an unclassified series on reactor technology sponsored by the Naval Reactors Branch of the Atomic Energy Commission.

The handbook supplies theoretical background as well as experimental data on corrosion and wear of materials in water-cooled nuclear reactors. These data were provided by both governmental and private organizations which were prime- or subcontractors for the *Nautilus* Submarine Reactor and the Shippingport Pressurized Water Reactor projects.

The book is organized in three parts. Part A (four chapters) states the problems of using high-purity, high-temperature water as a reactor coolant. This part generally discusses nuclear reactors for power plants, choosing reactor materials, fundamental facts of corrosion and wear, and water technology. Part B (four chapters) gives basic reference data for use in design work. Corrosion and wear properties of various materials and combinations of materials under specified conditions are listed, as are the effects of variable factors on corrosion and wear and on recommended testing procedures. Part C (six chapters) deals with such special problems as crevice, stress, and intergranular corrosion, and with application and manufacturing problems involving wear.

Dictionary of Microbiology. Morris B. Jacobs, Maurice J. Gerstein, William G. Walter. Van Nostrand, Princeton, N.J., 1957. 276 pp. $6.75.

The authors have been liberal in marking out the scope of this dictionary, the first in its field. It "defines the terms commonly used in microbiology and the related fields of bacteriology, mycology, virology, cytology, immunology and immunochemistry, serology and microscopy." The fence erected to define these areas proved to be permeable to many of the protozoa of medical importance, but most of the helminths were effectively excluded. There are an estimated 4700 entries, consisting mainly of brief definitions or descriptions, arranged in a pleasing double-column format with key words in bold-face type. An occasional helpful chart or diagram is included. Cross references appear to be ample.

There may be a need for an alphabetically arranged reference book in microbiology, but opinions will differ concerning the form it should take. Entries as brief as most of those in the present volume will certainly restrict its usefulness. Perhaps this degree of brevity was felt to be necessary in order to produce a book of moderate size. Nevertheless, space could have been saved by other means, such as the omission of numerous terms that are defined as well and more completely in an ordinary desk dictionary and the avoidance of unnecessary repetition in the description of the several species of one bacterial genus. The striving for brevity, with the breadth of scope indicated above, may have contributed to inadequate coverage (for example, *myeloblast* and *myelocyte* are included; *lymphoblast* and *erythroblast* are excluded) as well as to unfortunate ambiguities and outright errors of fact. Examples will be found in the definitions of *fluctuation test, macrophage,* and *vaccination, bacterial.*

A better effort than that represented by this book will have to be made before the question of the usefulness of a dictionary of microbiology can be adequately answered by practical test.

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The Modern Researcher. Jacques Barzun and Henry F. Graff. Harcourt, Brace, New York, 1957. xiii + 386 pp. $6.

This useful handbook for anyone who has to put his thoughts in writing, from a college freshman to a foundation president, is offered in the twofold conviction that poor expression is nothing more than poor thinking and that there is no substitute for hard work. All is explained—how to use a library, how to take notes from the books found there, how to compose a periodic sentence, how to give a paper a beginning and a middle and an end, how to correct galley proofs. In addition, considerable space is devoted to a discussion of history, its methods of research, its logic, and its laws (if such there are). This discussion represents, at least in part, good popularizing, but it is never made clear just why it is included in the book, unless the reason is that the two authors are both also professional historians.—J. T.

A History of Luminescence from the Earliest Times until 1900. vol. 44 of *Memoirs* of the American Philosophical Society. E. Newton Harvey. American Philosophical Society, Philadelphia, Pa., 1957. xiii + 692 pp. Plates. $6.

When an electron in a molecule or atom is raised to a high-energy level and then drops back again, radiant energy is emitted. In some cases the emitted rays are visible to the human eye. When heat furnishes the energy for excitation, as in the sun, a candle, or tungsten filament, low-efficiency incandescence is observed. When the excitation energy is supplied from other sources, such as a chemical reaction, luminescence or "cold light" is observed. Examples of luminescence are numerous. There is *electroluminescence,* resulting from a flow of current (fluorescent lights, aurora borealis, *ignis lambens,* and St. Elmo's fire). *Phosphorescence* is the lasting luminescence which results from the exposure of a substance to irradiation. When the light emission is of very short duration (10^{-9} sec) it is known as *fluorescence. Thermoluminescence* is the emission of light on slightly heating a substance to liberate excited electrons from a trapped state. *Triboluminescence* and *piezoluminescence* are light emissions that result from rubbing and pressing a material, respectively.

There are many other examples of luminescence, including light emission by organisms (bioluminescence), and the purpose of the present book "is to trace the discovery and the ideas regarding these lights without heat from the earliest times until the end of the 19th century." The book is divided into three parts. In the first part a general survey of our knowledge of luminescence is given, while parts 2 and 3 deal with special types of luminescence associated with the nonliving and the living world, respectively.

For students of luminescence, physical or biological, this book is required reading. To others, it will be the fascinating