

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 photo-detectors. 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 indi-

cating 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-