of "Kreuger 60") the author betrays his unequal familiarity with all the subjects treated. Such blemishes, however, are few and unimportant. If we have a controversy with Dr. Swann it is less in his practice than in his theory of popular writing. "I cannot escape the belief," he writes in the preface, "that a great deal of the confusion which is frequently left in the mind of the layman after reading a popular presentation of some of the more abstruse branches of natural philosophy, is a result of . . . an unnecessary subjugation of the philosophical and mathematical ideas." This may be so, but is not an unnecessary exaltation of the mathematical ideas a much greater and commoner evil? How many lay students of relativity, for example, have not been completely misled by talk of 'curvature' of space-time, having been induced thereby to search for a mental picture of something similar to the familiar curvature of a sphere? The whole conception is, of course, primarily a mathematical one. Its application to the sphere corresponds to the familiar notion of curvature, while its application to space-time corresponds to nothing so imaginable. Surely it would have been better if in popular presentation, the 'mathematical idea' had been eliminated and the theory expressed, as it easily can be, in terms of intelligible operations.

On the whole, however, Dr. Swann's exposition calls for little but praise. H. D.

Experimental Optics

Physical Optics. By Prof. Robert W. Wood. Third edition. Pp. xvi+846+18 plates. (New York: The Macmillan Co., 1934.) 31*s.* 6*d.* net.

PROF. R. W. WOOD'S "Physical Optics" was issued in 1905 and revised in 1911, when it was expanded by 150 pages, with nearly a hundred new illustrations. The new edition shows a similar expansion of 132 pages, but includes nearly 500 pages of new material, nine new plates, and more than 150 new illustrations. The photographs thus reproduced were, however, designed for use rather than for ornament, and are disappointing in comparison with the beautiful pictures which are often used to illustrate spectroscopic phenomena.

The book retains its unique character as a record of experimental methods and results, and is of special value as a guide to the contributions to physical optics which have been made in the laboratory of the author at Baltimore. It is difficult to realise that the second edition goes back to a date preceding the development of Bohr's theory of line spectra. Quantum theory was then covered by a couple of pages on the "very recent light-quanta hypothesis of Planck and Einstein", and the remainder of the book was based exclusively upon 'classical' methods of analysis. The new edition therefore provided an opportunity for writing up *de novo* the whole of the work done in applying the quantum theory to optical phenomena. In the hands of so keen an experimenter as Prof. Wood, the narrative takes on an unusual form, since it is founded on observation and consequent theory rather than conversely. The new chapter on "The Origin of Spectra" is therefore exceptionally well-adapted for readers who think more easily in terms of facts than of symbols; and the same features are seen in new chapters on resonance radiation and fluorescence of atoms and molecules, and in the reconstructed chapters on magneto- and electro-optics, in the course of which the spinning electron is introduced as a solution of the problem presented by the 'abnormal' Zeeman effect in light emitted in a magnetic field.

In his original preface, the author expressed the hope "that the perhaps too frequent references to experiments with which he has been more or less directly associated will not be taken as an indication of a lack of perspective". In view of this frank acknowledgment, the reader need not be unduly disappointed when he finds that other topics are dealt with much less adequately. Thus, in the new edition, refractive dispersion in the region of absorption is still discussed in terms of 'damping'; and the sections dealing with absorption are equally inadequate, since a well-qualified colleague has remarked that the author's commendation of Vierordt's spectrophotometer, which "would now be considered a museum specimen", is "about sixty years out of date". Similarly, in a field in which the reviewer is specially interested, an erroneous statement that the anomalous rotatory dispersion of tartaric acid depends on an optically active absorption band in the infra-red, has been deleted; but no new data have been added, and half a dozen measurements, made in 1858 by methods which have been obsolete for more than half a century, are still cited as adequate illustrations of this phenomenon. In this chapter, moreover, the author has abandoned his policy of describing facts rather than theories, since the only important addition is a summary of Werner Kuhn's theory of dissymmetrically coupled electrons, which is already becoming obsolescent in view of more recent work by Born. Readers who wish to learn about modern work in branches of physical optics not of special interest to the author must therefore be prepared to seek information elsewhere; but others will be equally grateful to him for leaving these alien topics to take care of themselves, in order to concentrate on those questions about which he can give so much interesting first-hand information. T. M. LOWRY.