

devoted to the physical applications of the various methods; a valuable section deals with the results of O. Wiener's "Theorie des Mischkörpers," another with liquid anisotropism, and so on. Part 3 deals with the various optical methods employed to glean information as to the structure of dispersoids, and the directions of the particles. Celluloid and rubber are among the substances specifically discussed. The name of Richard Zsigmondy, the editor of the series, will be a guarantee of the reliability of this 'handbook,' which naturally explains much of the recent work of the authors.

Handbuch der biologischen Arbeitsmethoden. Herausgegeben von Prof. Dr. Emil Abderhalden. Lieferung 205. Abt. 2: *Physikalische Methoden*, Teil 2, Heft 4. *Polarimetrie*, von Heinrich Kessler; *Spektroskopische Methoden des Mediziners*, von Fritz Löwe; *Nephelometrie*, von Marie Anna Schirmann. Pp. 1345-1536. (Berlin und Wien: Urban und Schwarzenberg, 1926.) 8.70 gold marks.

FULL theoretical accounts of the subjects of polarimetry, spectroscopy, and nephelometry are given, together with descriptions of selected pieces of apparatus. The accounts are written from the point of view of the biologist rather than the physicist, especially the section dealing with spectroscopy, in which special reference is made to the blood pigments. The work should be consulted by all those interested in these particular branches of biological methods.

Modern Physics.

Die elektrische Leitfähigkeit der Atmosphäre und ihre Ursachen. Von Prof. Dr. Victor F. Hess. (Sammlung Vieweg, Heft 84-85.) Pp. viii + 174. (Braunschweig: Friedr. Vieweg und Sohn A.-G., 1926.) 8.50 gold marks.

As at once a professor of experimental physics and a field observer, Dr. V. F. Hess is specially fitted to write a general text-book on atmospheric electricity, and we learn from the preface that a work of this character by himself and his colleague at the University of Gratz, Prof. H. Benndorf, is in preparation. The present work deals with only part of the subject, and even within its ostensible limits it is not apparently regarded as altogether exhaustive. On one or two points the more extensive work in contemplation is referred to for further information, and in particular it will supplement the bibliography of the present work, though that is fairly extensive.

In the main the book treats of the electrical charges in the atmosphere and their origin. The theory of the Gerdien and Ebert apparatus is discussed, and the various methods of investigating the radioactive phenomena of the atmosphere. Various allied questions, e.g. the electricity of rain and thunderstorms, are only lightly touched on. As a pioneer investigator of the penetrating 'cosmic' radiation, Dr. Hess naturally gives special attention to that subject. He traces its development from

the independent discovery by Gockel and C. T. R. Wilson of the ionisation in closed vessels, followed by the field work of McLennan, Wright, and others, then by the balloon observations by Gockel, Kolhörster, and himself, and finally by the recent work of Kolhörster and Millikan. He objects not unreasonably to the term 'Millikan rays' used by some Americans, but in his references to the conductivity of the upper atmosphere—a subject on which he supplies most up-to-date information—he makes free use of the term Kennelly-Heaviside layer, to which like exception can be taken.

The book so far as it goes may claim to replace the earlier German text-books by Gockel and by Mache and v. Schweidler, and within its sphere it is not inferior to the recent French works. It is interesting to note that in the name index at the end, the references to Elster and Geitel are only as numerous as those to Kolhörster, and only half as numerous as those to Prof. W. F. G. Swann. Dr. Hess does not, however, seem to notice that if the somewhat serious defect in the Ebert apparatus which he accepts as proved by Prof. Swann really exists, then much of the information which appears in the present book and elsewhere respecting negative ions must require correction. The view is taken that if satisfactory results are to be obtained in the open, the Ebert apparatus must be surrounded by a large mesh earth-connected wire screen. This seems a matter which deserves international consideration. C. CHREE.

Müller-Pouillet's Lehrbuch der Physik. Elfte Auflage. Herausgegeben von A. Eucken, O. Lummer, und E. Waetzmann. In fünf Bänden. (1) Band 2: *Lehre von der strahlenden Energie (Optik)*. Erste Hälfte. Bearbeitet von O. Lummer. Pp. xviii + 928 + 7 Tafeln. 50 gold marks. (2) Band 3: *Wärmelehre*. Erste Hälfte: *Physikalische chemische und technische Thermodynamik (einschl. Wärmeleitung)*. Bearbeitet von Arnold Eucken. Pp. xviii + 1185. 63 gold marks. (Braunschweig: Friedr. Vieweg und Sohn A.-G., 1926.)

THIS eleventh edition of one of the best-known German treatises on physics is the first that has appeared since the War. It shows conclusively that Germany is neither forced nor willing to abdicate her former leading position in the matter of exhaustive text-books.

(1) This volume may be regarded as Dr. Otto Lummer's last legacy to humanity. It was already in type when he died in July 1925, and has been finally brought out by A. Eucken and E. Waetzmann. It is significant of modern developments that the conception of an ether of space, which in the late pre-War years seemed to be losing ground, has to some extent been rehabilitated by the generalised theory of relativity, and particularly by the system worked out by Weyl in 1918. These theories regard the electromagnetic field and the gravitational field as two aspects of the 'metric' field which comprises all phenomena of time and space. The old contrast between