

Spectra and Hilbert Space

Linear Transformations in Hilbert Space: and their Applications to Analysis. By Prof. Marshall Harvey Stone. (American Mathematical Society Colloquium Publications, Vol. 15.) Pp. viii+622. (New York: American Mathematical Society; Cambridge: Bowes and Bowes; Berlin: Hirschwaldsche Buchhandlung; Paris: Albert Blanchard; Milano: Nicola Zanichelli, 1932.) 6.50 dollars.

THIS most welcome treatise fills a serious gap in English mathematical literature. It provides for the first time a comprehensive account of the general transformation theory which steadily dominates theoretical quantum mechanics and is guiding the development of more than one branch of pure mathematics.

The book is ambitious in plan and eminently successful. Starting from abstract Hilbert space, the author develops the linear transformation theory in full panoply through some four hundred pages. Pride of place is naturally taken by the spectral theory initiated by Hilbert in his classical work on integral equations and developed in

recent years by J. v. Neumann and others, including the author himself. An occasional short descent to more special illustrations helps the reader to adapt himself without distress to the rarefied air of Hilbert space and prepares for the final section.

That the theory is, in Polya and Szegő's happy terms, a generalisation "by condensation" and not "by dilution", is abundantly proved when we come to its applications in more special fields. These occupy the last third of the book. First, we are shown in detail how the Carleman theory of integral operators can be brought under the general theory of symmetric transformations. Next, ordinary differential operators of the first and second orders are discussed at length, with a side-glance at the Heaviside operational calculus. Finally, Jacobi matrices, continued fractions and the moment problem are fitted into the general scheme.

The printing and general layout are attractive, but it is a great pity that the work was not issued in two volumes. Its present form is cumbersome. Even so, there will be few analysts who will not wish to possess a copy. E. H. L.

Short Reviews

Fortschritte der Botanik. Herausgegeben von Fritz von Wettstein. Band 1: *Bericht über das Jahr 1931.* Pp. vi+263. (Berlin: Julius Springer, 1932.) 18.80 gold marks.

THIS attempt to present a brief report each year of the progress made in different fields of botany would be a useful addition to the voluminous literature of the subject if it saved the reader's time in delving into other and lengthier communications, or if it guided him to interesting work he had otherwise missed.

The present volume is intended to review the literature of 1931 with just sufficient analysis of earlier work to indicate the significance of the contributions of 1931. On the whole, the reviewer finds it disappointing. The fact that Continental work mainly is considered may be an advantage to the English reader, who is probably already familiar with English and American work, but the field to be covered is so vast that the brief summaries that alone are possible do not seem adequate and many fields of work are entirely neglected. Thus there is practically no mention of the modern work, with physical methods, upon the structure of the cellulose wall, and plant anatomy receives very cursory mention. Cytology can receive but very inadequate treatment in 10 pages, of which more than half refer to the Protista and in which there is curiously frequent reference to unpublished

work in view of the fact that the review is for 1931.

Botanical work is reviewed in 16 contributions by 15 different authors under the following main heads: morphology, systematic, metabolism (including water movement), physiology of organ formation, ecology. It is proposed to issue a similar volume annually but it is questionable whether a volume on the lines of the old *Progressus Rei Botanicae* would not be more valuable. In *Progressus* the same field was not reviewed each year but each review was more exhaustive, with adequate bibliographic treatment, so that the subject could then well be left to await re-examination after a suitable interval when the work since done in this field justified its reconsideration.

Egyptian Government. *Views of Typical Desert Scenery in Egypt.* Prepared by the Geological Survey of Egypt. Presented to the International Geographical Congress at Paris 1931, by Command of His Majesty King Fouad I. Pp. xiv+34 plates. (Giza: Survey of Egypt, 1931.)

THIS album of views of typical desert scenery in Egypt was prepared at the desire of His Majesty King Fouad I for presentation to the International Geographical Congress at Paris in 1931. The selection, arrangement, and descriptions of the