

the solutions of the partial differential equations involved, with some of the simpler diffraction problems as examples illustrating that theory.

The book contains four chapters. The first deals with Huygens' principle in what may be called its acoustical form. The theorems of Poisson and Helmholtz are given, but are shown to be included in that of Kirchhoff, which is the proper analytical formulation of the 'acoustical' principle. The two-dimensional analogue is due to Volterra. Marcel Riesz treated the case of cylindrical waves in an elegant manner, using the theory of the analytical continuation of a function of a complex variable.

The second chapter gives Kirchhoff's theory of diffraction, and the criticisms of it by Poincaré and Kottler. This theory, in addition to being difficult to apply to special problems, seems to involve conditions not intended by its author.

The third chapter takes account of polarization, and gives the three methods due to Kirchhoff, Larmor-Tedone, and Kottler. It is shown that the first and second fail, but the third appears to have overcome the difficulty of defining "blackness".

The fourth chapter gives Sommerfeld's and Voigt's methods of solving certain diffraction problems, chiefly two-dimensional, such as diffraction by a half-plane. These give results agreeing fairly well with experiment, but a rigorous theory, taking into account the properties of the material of the screen, is still lacking.

It is unfortunate that the book did not appear about the time of the original lectures. At present mathematical physicists are busy with the rapid developments of modern physics, and older problems are likely to be neglected.

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ENZYMES FROM MANY ASPECTS

Ergebnisse der Enzymforschung

Herausgegeben von F. F. Nord und R. Weidenhagen. Band 8. Pp. x+324. (Leipzig: Akademische Verlagsgesellschaft m.b.H., 1939.) 28 gold marks.

THE early volumes of this annual compilation dealt with the individual enzymes, their properties and mode of action: attention is now turning to the role of enzymes in normal and pathological metabolism.

The opening article by R. W. G. Wyckoff of Pearl River, New York, deals with the subject of purified viruses, those agents of transmissible disease which are smaller than demonstrable micro-organisms. In connexion with them the question has been raised whether they are living agents or a transitional form intermediate between animate and inanimate matter. Their study may be an approach to the meaning of the term 'alive'.

The experimental problem is to get them in concentrated and purified form. More than one hundred virus diseases are now known, each with its characteristic causative agent in which a protein carries the virus. The proteins are large aggregates, and we are beginning to find out something about their size and shape by the application of a number of ingenious physical methods.

Attention is further being turned to the discovery of macromolecules in healthy tissues; several have been found in plants—they are pigmented, sediment at about the same rate, and may be macromolecular chlorophylls. They are smaller than the smallest virus proteins.

The mechanism of a still very obscure reaction,

that of symbiotic nitrogen fixation, is discussed by P. W. Wilson of Madison, Wisconsin. A forty-page summary emphasizes that what is now required are experimental data rather than interpretations: the difficulty is to devise crucial experiments.

Each enzyme has in the laboratory an optimum pH concentration for maximum activity, but it is uncertain whether the same applies to its behaviour in the tissues. H. J. Vonk of Utrecht discusses this subject in relation to the digestive enzymes. As the various enzymes have different pH optima, the concentration in the intestine cannot be the best for any one of them but must be a compromise suitable more or less to all.

Enzymes are beginning to be sought for as an aid to clinical diagnosis. A rather lengthy essay by R. Ammon and E. Chytrek of Breslau summarizes present knowledge.

R. J. Dubos of New York describes the enzymatic analysis of the antigenic structure of pneumococci. It is known that the capsular polysaccharides of the different types are of paramount importance in conditioning the serological specificity and virulence of these organisms. When virulent pneumococci are treated with enzymes which destroy their capsule, they lose also the property to agglutinate in specific antiserum.

There are in all eleven articles, but enough has been said to indicate the variety of subject. The contributions are, as usual, international in source, and it is interesting to note two from Indian laboratories, though the work of Miss Scott Moncrieff was done at Cambridge.

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