in proof generalize the result to less restricted cases.

The first third of the book is nominally on integration theory but actually covers far more. Linear functionals in L^p and C are covered, as are the Banach-Steinhaus and Hahn-Banach theorems. Finally, positive linear functionals are considered, culminating in the Radon-Nikodym theorem.

The Fredholm integral equation of the second kind is treated in L^2 by the Schmidt method, Fredholm's method, and a more abstract method based on complete continuity. Generalization is then made to Hilbert and Banach spaces, and applications are given. The symmetric case is then treated. Interesting and elegant applications are made to potential theory and almost periodic functions.

The spectral theory for bounded symmetric, unitary, and normal transformations in Hilbert space is given by two methods, the one of Riesz and the other of Nagy. Unbounded transformations are then considered and the spectral decomposition is obtained for self-adjoint transformations followed by extensions of symmetric transformations. The functional calculus of self-adjoint transformations and the perturbation of the spectrum are treated. A chapter on groups and semigroups of transformations follows, including the results of Stone and of Hille-Yosida. Ergodic theory is also presented. The final chapter treats spectral theories for linear transformations of general type giving applications to results of Wiener, Beurling, Gelfand, and von Neumann.

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Gas Kinetics. An introduction to the kinetics of homogeneous gas reactions. A. F. Trotman-Dickenson. Academic Press, New York; Butterworths, London, 1955. 322 pp. Illus. $8.

In this relatively short book, the author gives a useful summary of the working equations of current theories of the rates of homogeneous gas-phase chemical reactions, a critical review and tabular summaries of experimental results (with the exclusion of reactions by molecular oxygen), and a detailed description and evaluation of several recently developed experimental methods.

After an introductory chapter, which includes a few tables of heats of formation, bond energies, and so forth, there is a long chapter on theories of chemical kinetics. This book is the first one to review N. B. Slater's theory of unimolecular reactions, and, after a full presentation of its features but not a derivation, a critical review is given of its advantages and disadvantages. A detailed presentation, again without derivation, of the transition-state theory is given, and use (mostly qualitative) is made of this theory throughout the book. There is a brief presentation of the collision theory of bimolecular reactions with reference to a convenient source of its derivation. The problem of energy transfer between molecules is emphasized and discussed in the language of Slater's theory. The critical presentation of these theories without derivation makes this chapter very full and rich, an excellent source of equations; but the book can hardly be described in terms of its subheading, "an introduction to the kinetics of homogeneous gas reactions."

The author's organization, presentation, and evaluation of experimental results (pp. 64–309) are outstandingly efficient and mature. In a typical family of reactions, there is given a rather detailed description of the experimental apparatus, a full mechanism that the author believes to cover the possibilities, a thorough discussion of the key reaction or else of a typical reaction in the series, an analysis of probable and possible errors both in the experiment and in the mechanism, and finally a complete table (sometimes five entries, sometimes 80) of all reactions in the series. Usually, these useful tables are resolved into elementary reactions, including activation energies and preexponential factors (these two quantities the author defines as "rate factors"); references are given for each entry; and often the author inserts an evaluation of the "reliability." The author has obviously worked through and recalculated a large number of key articles.

In judging a book of this type, which gives a critical condensation of a broad field, another worker in the field may agree or disagree with the author concerning specific evaluations, emphases, or omissions. Personally, I particularly liked Trotman-Dickenson's careful definitions of *elementary reactions, order,* and *mechanism,* but the definition of *rate* was surprisingly clumsy and uncertain; apparently the author is unaware of the well-established de Donder notation for the rate of reaction. The book, to its credit, contains frequent warnings against errors due to surface reactions, especially for slow reactions, low pressures, small bulbs; but there is no warning against the equally serious errors due to thermal gradients [S. W. Benson, *J. Chem. Phys.* **22**, 44 (1954)], which are worst for fast reactions, high pressures, large bulbs. It was a distinct disappointment to see the author on page 271 agree with the old treatment of the reaction $2NO + O_2$ with its out-of-scale 5-A bond lengths which supposedly undergo a grand free internal rotation; with methods of modern molecular spectroscopy one can do much better than this 20-year-old first approximation.

In spite of my disagreement on a few technical details, I regard this as one of the best books in the field.

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Active Transport and Secretion. Symposia of the Society for Experimental Biology, No. VIII. R. Brown and J. F. Danielli, Eds. Academic Press, New York, 1954. vi + 516 pp. Illus. $8.

This book is the printed series of papers read at a symposium of the Society for Experimental Biology held in Bangor. It is the eighth of an annual series of symposium reports and combines in a single volume the research and thinking of outstanding investigators in the field of active transport, using both animal and plant material.

The first two reports, by J. A. Ramsay and Hugh Davson, are concerned with water and electrolyte movements in invertebrates and vertebrates, respectively, and the next contains a discussion by Thomas Rosenberg of how "active transport" should be defined. Davson mentions the experimental problem posed by fluids, such as the aqueous humor of the eye, which differ very slightly but significantly from those to be expected in a simple ultrafiltrate of plasma. Rosenberg "does not regard questions of terminology as a mere formality. Hazy definitions . . . are often the main obstacles to attempts to gain further theoretical and practical insight."

The next four papers are concerned primarily with movement of water. J. R. Robinson and J. A. Kitching present experimental data from a number of forms, the latter discussing "Animals without kidneys." Robinson stresses his view of nonequilibrium concentrations of water in extracellular and intracellular fluids in the same animal. J. W. L. Beament discusses water transport through model membranes and in insects, including the phenomenal ability of an ultrathin layer of wax to conserve water. D. C. Spanner suggests a means by which water transport could conceivably occur through temperature gradients while, at the same time, he recognizes the very serious objections to such a view. He is impressed, as others have been, by the very small temperature difference that is equivalent in effect to a large pressure difference.

A group of four papers on active transport in the erythrocyte follows. Paul G. LeFevre considers monosaccharides and

quantitative aspects of a membrane-carrier transport mechanism. W. Wilbrandt, in a general discussion of the transfer of a wide range of compounds through the epithelial cells of the kidney tubule and intestine, arrives at a membrane-carrier type mechanism the features of which are then illustrated by results on sugar transport in erythrocytes. Montague Maizels and E. J. Harris cover cation transport. The latter states in conclusion, "Results obtained for human red cells indicate that a single mechanism brings about active sodium ion extrusion and active potassium ion accumulation."

Three chapters on microorganisms, by Aser Rothstein, E. F. Gale, and P. Mitchell, include the uptake of sugars by yeast, the accumulation of amino acids and the transfer of phosphate, probably $H_2PO_4^-$, within staphylococcal cells. The extent and selectivity of the amino acid accumulation is especially striking.

H. Lundegardh contributes one of the longer reports in describing his pioneering studies covering many years of work on the ion absorption and transport of root tips, primarily spring wheat. His interpretation in terms of "anion respiration" through the cytochrome system is also described. Three further studies on plants are then presented. J. F. Sutcliffe is concerned with cation absorption by nongrowing beet disks. R. Scott Russell extends Lundegardh's idea of cytochrome oxidase as the energy source for ion accumulation to ascorbic acid oxidase, the principal terminal oxidase in barley roots. Although he concludes that energy for active accumulation of electrolytes may come from this system also, he does not interpret the experimental results in the same terms of "anion respiration." The final paper of this group, by F. C. Steward and F. K. Miller, considers salt accumulation at both the cellular and plant levels of organization. In the first portion, the authors have as their aim the discovery of the relation in growing cells between water and salt accumulation on the one hand and respiration and protein synthesis on the other. Both dividing and nondividing tissues are included.

Hans Ussing reports on his work with frog skin, in which current from the short-circuited skin is equivalent to sodium ion transport. In addition, he finds effects of atropine, TEPP, and so forth, suggesting possible similarities between sodium ion transport in frog skin and the extrusion of sodium ion by nerve. Some of the extremely illuminating work on cation transport in nerves by A. L. Hodgkin and R. D. Keynes is described by them in the succeeding paper.

E. J. Conway presents his "redox-pump" theory of active transport through membranes as well as experimental work on sodium and potassium transport in yeast, sodium ion excretion by, and localization in, skeletal muscle, and the formation of gastric hydrochloric acid. A report by H. Burr Steinbach entitled "The regulation of sodium and potassium in muscle fibers" is followed by three papers in new and old fields that have received relatively little attention. These are a consideration of the exciting properties of mitochondrial preparations by R. E. Davies, (incidentally, the captions under two figures on page 460 have been reversed), the transport of proteins by F. W. R. Brambell and W. A. Hemmings and of lipids by A. C. Frazer. The final paper is a thoughtful analysis of certain morphological and molecular aspects of transport by J. F. Danielli.

The collection of reports illustrates the great advances that have been made experimentally and conceptually in developing the parts of a systematic transport physiology. It also makes readily available for study a wealth of material covering many aspects of this highly significant field. For the reader, it would have been easier if the different authors had given more direct attention to correlating or contrasting their own views with the views of others actually expressed at the conference. Although there were presumably many interesting and informative reactions to the papers of others on the part of the highly qualified persons in attendance, these, except for Danielli's, are not often reflected in the published volume.

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Proceedings of the 1954 Glasgow Conference on Nuclear and Meson Physics. Sponsored by the International Union of Pure and Applied Physics. E. H. Bellamy and R. G. Moorhouse, Eds. Pergamon Press, New York–London, 1955. ix + 352 pp. Illus. + plates. $9.50.

This volume records the papers of the 1954 Glasgow conference, which took place under the auspices of the International Union of Pure and Applied Physics.

The papers, of which there were just over 100, are arranged in eight sections: nuclear forces and nucleon scattering; nuclear data and nuclear models; photodisintegration; beta- and gamma-ray transitions; π-mesons; field theory; high-energy experimental technique; and heavy mesons and hyperons.

The editors state in the preface that most of the discussion, suitably edited, appears after the relevant paper but, for reasons of economy, papers often could not be fully reported. In particular diagrams were heavily cut.

New Books

The Warfare of Democratic Ideals. Francis M. Myers. Antioch Press, Yellow Springs, Ohio, 1956. 261 pp. $3.50.

Traité de Zoologie. Anatomie, Systématique, Biologie. Tome XVII, *Mammifères.* Les Ordres: Anatomie, Éthologie, Systématique. Fascicules I and II. Pierre-P. Grassé, Ed. Masson, Paris, 1955. 2300 pp. Paper, 2 vol., F. 22,000; cloth, 2 vol., F. 23,600.

Electronic Data Processing for Business and Industry. Richard G. Canning. Wiley, New York; Chapman & Hall, London, 1956. 332 pp. $7.

La Prospection de l'Uranium. Manuel pratique à l'usage de tous. Préface du Marcel Roubault. Commissariat à l'Énergie Atomique. Masson, Paris, 1955. 59 pp. F. 450.

Between the Planets. Fletcher G. Watson. Harvard University Press, Cambridge, Mass., rev. ed., 1956. 188 pp. $5.

Poliomyelitis. Papers and discussions presented at the third International Poliomyelitis Conference. International Poliomyelitis Congress. Lippincott, Philadelphia–Montreal, 1955. 567 pp.

Principles of Renal Physiology. Homer W. Smith. Oxford University Press, New York, 1956. 237 pp. $5.

Reduction with Complex Metal Hydrides. Norman G. Gaylord. Interscience, New York–London, 1956. 1046 pp. $15.

Dictionary of Arts and Crafts. John L. Stoutenburgh, Jr. Philosophical Library, New York, 1956. 259 pp. $6.

Champs de Vecteurs et de Tenseurs, Introduction à l'électro-magnétisme. Edmond Bauer. Masson, Paris, 1955. 201 pp.

Logic and Scientific Methods. An introductory course. Herbert L. Searles. Ronald, New York, ed. 2, 1956. 378 pp. $4.25.

Théorie Générale de L'Équation de Mathieu et de Quelques Autres Équations Differentielles de la Mécanique. Robert Campbell. Masson, Paris, 1955. 272 pp. Paper, F. 2400; cloth, F. 2900.

Chimie Physique Nucléaire Appliquée. Jacques Errera. Masson, Paris, 1956. 226 pp. F. 2100.

L'Évolution de la Lithosphere. I, *Pétrogénèse.* Henri Termier and Geneviève Termier. Masson, Paris, 1956. 654 pp. Paper, F. 8000; cloth, F. 8800.

Propagation des Ondes dans les Milieux Périodiques. Léon Brillouin et Maurice Parodi. Masson, Paris; Dunod, Paris, 1956. 347 pp. Paper, F. 4000; cloth, F. 4600.

Electronics. An introduction for the nontechnical reader and student to all aspects of electronics in this modern age of science. A. W. Keen. Philosophical Library, New York, 1956. 256 pp. $7.50.

The Harvey Lectures, 1954–1955. Delivered under the auspices of the Harvey Society of New York. Series L. Academic, New York, 1956. 421 pp. $8.

The Language of Modern Physics. An introduction to the philosophy of science. Ernest H. Hutten. Allen & Unwin, London; Macmillan, New York, 1956. 278 pp. $3.75.

Blur of the Retinal Image. Glenn A. Fry. Ohio State Univ. Press, Columbus, Ohio, 1955. 120 pp.