Book Reviews

The Biochemistry of Semen. T. Mann. Methuen, London; Wiley, New York, 1954. 240 pp. Illus. + plates. $2.90.

In the prefatory remarks, T. Mann states: "Biochemistry of semen is a relatively modern but rapidly expanding field of physiology; consequently, many of our present views, particularly as regards the biological significance of various chemical constituents of semen, may have to be revised or modified in the near future. That being so, I like to look upon this book, or at any rate those parts of it which deal with the newer, still fluid concepts, as something in the nature of an Interim Report, designed to furnish information and to convey ideas emerging from the state of knowledge as available at the time of writing, however imperfect that may be." I think the epitome of excellent scientific judgment was achieved in the author's preface, especially since approximately 950 references, 33 of which were by himself, embrace his textual facts. Moreover, Mann is a pioneer investigator in this field, and his signature affixed to a compact, monumental book such as this one suffices to give authenticity to his descriptive analysis of our present-day knowledge of the biochemistry of semen.

The Biochemistry of Semen is divided into nine chapters: "The two components of semen: spermatozoa and seminal plasma"; "Chemical and physical properties of whole ejaculated semen"; "The influence of extraneous factors, hormones, and environmental conditions"; "Intracellular enzymes"; "Protein constituents and enzymes of the seminal plasma"; "Lipids and their role in the metabolism of semen"; "Fructose and fructolysis"; "Spermine, choline, ergothioneine, and certain other bases in semen"; and "Citric acid and inositol."

I particularly enjoyed reading the chapter on the influences of extraneous factors, hormones, and environmental conditions on semen. It is interesting to note the progress made in this area during the past 100 years. In this connection, Koelliker's 1856 paper "Physiologische Studien über die Samenflüssigkeit" is a good landmark for tenable comparisons. Most of the present-day reports on semen reflect largely upon Koelliker's early observations. The extension of his early work is largely endocrinological.

This book is very concise and in some areas it is much too telegraphic. The numerous references are presented in an intelligent manner, and the author evaluates many of them for the reader. It is my idea that the book could have been richly enhanced with more illustrative material and shorter tables. In the final analysis, *The Biochemistry of Semen* very carefully summarizes the biochemical knowledge of a very complex area of the endocrinology of reproduction.

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Topley and Wilson's Principles of Bacteriology and Immunity. 2 vols. G. S. Wilson and A. A. Miles. Williams & Wilkins, Baltimore, ed. 4. 1955. xlviii + 2331 pp. $24.50.

The preface states that this book was intended originally for the general student of medicine and biology but that the character of the fourth edition has been changed. The treatise is now designed for postdoctoral students, teachers, and research workers who are interested in the microbiology of infection.

The text has been expanded by 277 pages, but the outline is unchanged, with 93 chapters divided into four parts: "General bacteriology" (432 pp.); "Systematic bacteriology" (664 pp.); "Infection and resistance" (253 pp.); and "The application of bacteriology to medicine and hygiene" (870 pp.). As many as 500 references are cited in certain chapters, and a few of these are as late as 1953–54. An index of 48 pages is included in both volumes. The number of tables has been reduced by 11 (to 196), and the figures, several of which are new, have been increased by one (to 303).

In part I new material has been added to nearly every chapter. Although a few statements have been added to the chapter on history, the latest reference cited is 1938. Topics such as the tricarboxylic acid cycle, transamination, and phosphorylation are not listed in the index, and one has to hunt in the chapter on nutrition and metabolism to find a discussion of these topics. The continuous-culture technique for stabilizing microbial populations at a given growth phase is not mentioned in the chapter on growth and death of bacteria.

Expansion in part II is greatest in the chapters dealing with pure-culture methods and the identification of bacteria. The other chapters describe the characteristics of approximately 40 bacterial genera, the animal viruses, and related microorganisms. The Salmonella section has been enlarged to cover the antigenic description of more than 300 serotypes. The genus *Bacterium* is retained for the coli-aerogenes group.

Part III is enlarged most in the chapters on anaphylaxis, hypersensitivity and allergy, the antibody-forming apparatus, natural antibodies, immunity to virus diseases, and mechanisms in immunity. The sections on measurement of immunity and on herd infection and immunity are good.

Part IV contains chapters on the normal flora of the human body, the various microbial diseases of man and animals, and the bacteriology of air, water and sewage, and milk. The text, figures on mortality indices, and tabular data on some diseases, such as tuberculosis and poliomyelitis, are current, whereas similar information on other important diseases is demoded.

In a book dealing with a broad and rapidly expanding field there are bound to be omissions. It is nearly impossible for two people to keep abreast in all the areas covered. Those who grew up with the earlier editions of this book will continue to use it as an indispensable encyclopedia. Younger people will find the mass of basic material a bit overwhelming but nevertheless easy to read.

There are remarkably few errors in the book and the illustrations and printing are of highest quality.

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Functional Analysis. Frigyes Fiesz and Bela Sz.-Nagy. Translated from the French ed. 2 by Leo F. Boron. Ungar, New York, 1955. 468 pp. $10.

This is a translation of the excellent textbook originally published by the Hungarian Academy of Science. This book is obviously the result of years of research and teaching on the part of its outstanding authors. There is no book in the field that can be compared with it. Frequent use is made of the pedagogic device of proving results at a simple level and then showing later how a few modifications

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