present book is an attempt to provide the same treatment for the exciting field of biochemical mechanisms. The first third of the book is a summary of fundamental concepts in physical chemistry and physical organic chemistry which are applicable to a discussion of biochemical mechanisms. The last two-thirds of the book offers a brief description of some of the work with organic model systems of enzymatic reactions and of investigations of enzymatic reactions themselves, with emphasis on the former aspect. The reactions discussed include esterification and hydrolysis, elimination reactions, decarboxylations, oxidations, condensations, alkylation reactions, and rearrangement reactions. There are some provocative ideas that will undoubtedly lead to future research. However in its brief compass, this book only whets the appetite for a further look into this area of research that is destined to become of great importance in the future.

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Founder of Modern Atomism

Roger Joseph Boscovich. 1711–1787. Studies of his life and work on the 250th anniversary of his birth. Lancelot Law Whyte, Ed. Allen and Unwin, London, 1961. 230 pp. Illus. 32s.

To most scientists today the name of Roger Joseph Boscovich is wholly unknown, and yet his scientific writings elicited the highest praise from leading men of science, including—among others—Faraday, Clerk Maxwell, J. J. Thomson, Laplace, Ampère, Helmholtz, Hertz, and Lorentz. In 1870 Mendeléeff compared Boscovich to Copernicus and held him to be "the founder of modern atomism," while in 1905 Kelvin described his own position as "Boscovichian pure and simple." Boscovich's contributions to science were many, but the two most outstanding were certainly his theory of "point atoms," in opposition to crude views of atoms as tiny material bodies, and his doctrine of the relativity of space and motion. His exposition of these topics (like so much of what he wrote) has so modern a ring that it is difficult to see how such a man has all but slipped away from us, to be rescued today from partial oblivion only by scholars such as those who have contributed to the volume under review.

Born (in 1711) and brought up in Dubrovnik, Boscovich was educated by the Jesuits and became a member of their society, following a period of training and education that lasted 19 years. Appointed professor at the Collegium Romanum, he began to publish works on mathematics, astronomy, dynamics, and geodesy, and became famous for Latin verses on scientific subjects. On visits to France and England he worked for his order and made contact with foreign scientists; he was elected a fellow of the Royal Society of London on 15 January 1761. The Royal Society invited Boscovich to become a member of the expedition to California in 1769 to observe the transit of Venus, but he was unable to do so. His later life was spent partially on political and diplomatic missions and partially on scientific work, until his death in 1787.

The present book is especially welcome because it is half (pages 1–101) biographical and half (pages 102–212) analytical. In an essay on "Boscovich's atomism," the editor of the volume, Lancelot L. Whyte, analyzes both Boscovich's mathematical theory of atomism and his general philosophy of science (operational and somewhat positivistic). Zeljko Marković contributes a critical analysis of Boscovich's major work, *Philosophiae naturdlis theoria*, fortunately available in an English translation published in 1922. Boscovich's influence on British chemical theory is explored by two American historians of science, L. Pearce Williams and Robert E. Schofield. Zdenek Kopal gives us an estimate of Boscovich's contributions to astronomy and geodesy, including the important experiment he designed "to measure the aberration of starlight by means of a telescope filled with water," so as to discover whether the speed of light is independent of the medium through which it travels. J. F. Scott deals with mathematics at large, and Churchill Eisenhart presents Boscovich's work on the combination of observations, showing him to have been "the first to devise a completely objective procedure for uniquely determining the coefficients of a two-parameter line $y = \alpha + \beta x$ from a set of three or more observational points."

The bibliography of Boscovich's works and of writings on him in English will enable scholars to find out more about him. The volume as a whole should go far toward redressing the neglect into which he has fallen. But as to the question of why Boscovich does not have the reputation today to which he would seem to be entitled—this remains unanswered by the authors of this volume.

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Studies of Random Phenomena

Mathematical Statistics. Samuel S. Wilks. Wiley, New York, 1962. xvi + 644 pp. $15.

Mathematical Statistics. John E. Freund. Prentice-Hall, Englewood Cliffs, N.J., 1962. 260 pp. Illus. $7.50.

Elements of Mathematical Statistics. Howard W. Alexander. Wiley, New York, 1961. xi + 367 pp. Illus. $7.95.

Introduction to Probability and Mathematical Statistics. Z. W. Birnbaum. Harper, New York, 1962. viii + 325 pp. Illus. $6.50.

We are considering four books that are intended for three different levels of readers: Alexander and Freund are both for use at the junior level, Birnbaum at the senior level, and Wilks at the graduate level. Alexander's book is an introduction to probability and mathematical statistics for students who have no prior acquaintance with probability or statistics but who have completed a year of calculus. Freund expects his readers to have had a basic course in calculus, including some elementary material on partial differentiation, multiple integration, and series, but no prior acquaintance with probability or statistics. Birnbaum's book, although intended as an introductory text in probability and mathematical statistics, is for students with a firm grasp of calculus, some knowledge of the theory of matrices and determinants, and familiarity with simple statistical routines. It is not a book from which a beginner can learn the elements of statistical technique. Wilks' book is a graduate-level introduction to mathematical statistics, for readers with good undergraduate backgrounds in mathematics but no prior knowledge of probability or statistics.

Each of these books contains an in-

dex and a collection of problems, but only Alexander and Freund include answers (and then for the odd-numbered problems only). Wilks' book is the only one that does not contain some of the more common statistical tables. Alexander has an appendix on matrices, Freund has an appendix on sums and products, and Birnbaum has two appendices—one on some elementary concepts of the theory of sets and one on the inequalities of Schwarz and Cauchy. Alexander has a bibliography of 15 items, and comments thereon, and Wilks gives 19 pages of references and author index. Each of these books, commensurate with its general level of presentation, introduces probability in terms of set and measure theory. Alexander and Freund do not discuss partial or multiple correlation. I do not propose to undertake a detailed review of the contents of these books, but it is my opinion that each of the authors has reasonably well accomplished his indicated objectives and that the books may well serve as suitable texts for use at the three levels I have indicated (junior, senior, and graduate), although a prior introduction to probability and mathematical statistics would also be useful to the reader of Wilks' book. Freund is a good and experienced textbook writer.

I found misprints, errors, and questionable exposition in each of the four books, but not to such an extent as to degrade their utility and I do not propose to pick at these in detail. I do wonder why Alexander and Birnbaum omitted consideration of factorial moments and their generating function, which are especially convenient in the study of discrete distributions, and I am disappointed by the minimal treatment accorded by these authors to the analysis of categorical data in the form of three-way, or higher order, contingency tables.

Wilks' book is certainly one that will be a must for the personal library of every serious statistician. It is a thoroughly up-to-date book that can well serve as the textbook for a two-year comprehensive course in advanced mathematical statistics. Particularly good is the breakdown between parametric and nonparametric estimation and between tests of parametric and nonparametric statistical hypotheses. It is my opinion, based on classroom experience, that Wilks' exposition would have been improved had he used matrix notation more widely throughout his book, where applicable. In view of the numerous abbreviations and notational symbolism introduced in the more than 600 pages of his book, an index or summary of abbreviations and notations would be very helpful to the reader. I hope that Wilks will consider these last items for the next edition of his book.

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New Books

General

After a Hundred Years. The yearbook of agriculture, 1962. U.S. Department of Agriculture, Washington, D.C., 1962 (order from Superintendent of Documents, GPO, Washington, D.C.). 703 pp. Illus. $3.

Careers in Astronautics and Rocketry. Training and opportunities in the space and missile fields. Carsbie C. Adams and Wernher von Braun. McGraw-Hill, New York, 1962. 267 pp. Plates. $6.95.

Il Chimico Scettico. Robert Boyle. Boringhieri, Torino, Italy, 1962. 319 pp. Paper.

La Cosmologie de Giordano Bruno. Paul-Henri Michel. Hermann, Paris, 1962. 348 pp. Paper, NF. 15.

The Department of Scientific and Industrial Research. vol. 9, New Whitehall Series. Sir Harry Melville. Oxford Univ. Press, New York, 1962. 200 pp. $4.

The Joyous Cosmology. Adventures in the chemistry of consciousness. Alan W. Watts. Pantheon, New York, 1962. 116 pp. Illus. $5.

The Liberal Papers. James Roosevelt, Ed. Quadrangle Books, Chicago, 1962. 354 pp. $5.

Miracle Drugs and the New Age of Medicine. Fred Reinfeld. Sterling, New York, ed. 2, 1962. 126 pp. Illus. Plates. $3.95.

Power Relations within the Chinese Communist Movement, 1930–1934. A study of documents. Tso-Liang Hsiao. Univ. of Washington Press, Seattle, 1961. 414 pp. $7.50.

Scientific Method. Optimizing applied research decisions. Russell L. Ackoff. Wiley, New York, 1962. 476 pp. Illus. $10.25.

Socialized Medicine in England and Wales. The National Health Service, 1948–1961. Almont Lindsey. Univ. of North Carolina Press, Chapel Hill, 1962. 574 pp. $8.50.

Stars, Men, and Atoms. Heinz Haber. Golden Press, New York, 1962. 189 pp. Illus. $3.99.

A Treasury of World Science. Dagobert D. Runes, Ed. Philosophical Library, New York, 1962. 999 pp. Illus. Plates. $15.

Undergraduate Education in Foreign Affairs. Percy W. Bidwell. Columbia Univ. Press, New York, 1962. 223 pp. Paper, $5.

Mathematics, Physical Sciences, and Engineering

Advances in Astronomy and Astrophysics. vol. 1. Zdeněk Kopal, Ed. Academic Press, New York, 1962. 376 pp. Illus. $10.

Analytic Geometry. A vector approach. Charles Wexler. Addison-Wesley, Reading, Mass., 1962. 301 pp. Illus. $6.

Asphalts and Allied Substances. Their occurrence, modes of production, uses in the arts, and methods of testing. vol. 3, *Manufactured Products*. Herbert Abraham. Van Nostrand, Princeton, N.J., ed. 6, 1962. 980 pp. Illus. $25.

Catalysis by Metals. G. C. Bond. Academic Press, New York, 1962. 528 pp. Illus. $15.50.

Communications Satellites. Proceedings of a symposium held in London, May 1961, organized by the British Interplanetary Society. L. J. Carter, Ed. Academic Press, New York, 1962. 211 pp. Illus. Plates. $7.

Computer Basics. vol. 6, *Solid State Computer Circuits*. Sams, Indianapolis, Ind., 1962. 223 pp. Illus. Paper, $4.95.

Elements of Physics. D. Lee Baker, Raymond B. Brownlee, and Robert W. Fuller. Revised by Paul J. Boylan. Allyn and Bacon, Boston, 1962. 691 pp. Illus.

Fundamental Problems in Statistical Mechanics. Proceedings of the International Summer Course in Science, arranged by the Netherlands Universities Foundation for International Co-operation, August 1961. Compiled by E. G. D. Cohen. North-Holland, Amsterdam; Interscience, New York, 1962. 261 pp. Illus. $7.50.

Hydroboration. Herbert C. Brown. Benjamin, New York, 1962. 303 pp. Illus. $10.

Introduction to Molecular Spectroscopy. Gordon M. Barrow. McGraw-Hill, New York, 1962. 331 pp. Illus. $10.75.

An **Introduction to the Theory of Newtonian Attraction**. A. S. Ramsey. Cambridge Univ. Press, New York, 1940 (reprint, 1961). 193 pp. Illus. Paper, $1.95.

Lectures on Modular Forms. No. 48, *Annals of Mathematical Studies*. R. C. Gunning. Notes by Armand Brumer. Princeton Univ. Press, Princeton, N.J., 1962. 94 pp. Paper, $2.75.

The Mainstream of Physics. Arthur Beiser. Addison-Wesley, Reading, Mass., 1962. 480 pp. Illus. $9.75.

Mathematical Theory of Sedimentation Analysis. vol. 11 of Physical Chemistry, A Series of Monographs. H. Fujita. Academic Press, New York, 1962. 327 pp. Illus. $11.

Momentum, Heat, and Mass Transfer. C. O. Bennett and J. E. Myers. McGraw-Hill, New York, 1962. 709 pp. Illus. $13.50.

Physical Chemistry. Eric Hutchinson. Saunders, Philadelphia, 1962. 657 pp. Illus.

Physics of the Nucleus. M. A. Preston. Addison-Wesley, Reading, Mass., 1962. 671 pp. Illus. $15.

A Short Textbook of Colloid Chemistry. B. Jirgensons and M. E. Straumanis. Macmillan, New York, ed. 2, 1962. 516 pp. Illus. $10.75.