tra proposed by Walden, Roll-Fischer, Darbyshire, and Gelci, he has provided a more than 600-page volume that will be a useful textbook for a good many years. Also, the preface itself contains a most entertaining bit of personal philosophy presaging the delightful style and extensive scholarship which pervade all of *Wind Waves: Their Generation and Propagation on the Ocean Surface.*

J. J. SCHULE, JR.
U.S. Naval Oceanographic Office, Washington, D.C.

Quantitative Biology

Theoretical and Mathematical Biology. Talbot H. Waterman and Harold J. Morowitz, Eds. Blaisdell (Ginn), New York, 1965. xviii + 426 pp. Illus. $12.50.

This book contains a series of papers dealing with various aspects of the effort to make biology a quantitative science, and it aims to persuade more biologists to adopt analytical techniques in their work.

One can distinguish roughly three categories of papers. Some describe the successful application of analytical techniques in connection with experimental work for the investigation of a specific biological system. Others present some well-known mathematical tools and computer techniques and show how these could be successfully used for the investigation of biological problems. The third category consists of papers that deal with what could be described as philosophical questions about the possibility of making biology a quantitative science.

It is difficult to say how influential this book can be in persuading biologists to adopt the use of quantitative methods. This is so because unawareness of the advantages of such an approach is not the only reason many biologists are reluctant to use such methods.

For the student of biology who is inclined to follow the modern approach, the book is of unquestionable value. Among the contributions are descriptions of "classical" work like the studies on the nerve impulse described by K. S. Cole and the ones on cochlear mechanics by G. V. Békésy. These present excellent examples of successful application of analytical methods in biology. The same can be said about the papers by W. Reichardt (on the limulus eye and the movement perception by insects) as well as about those by B. Chance (transients in metabolism) and others.

In the papers by H. T. Morowitz and N. Rashevsky the reader will find an extensive presentation of the thesis that living organisms are not too complicated to be treated analytically and through general principles.

Although the book is primarily intended for biologists, it is also of interest for engineers and mathematicians who consider working in this field. They may find certain parts of the book uninteresting (for example, the descriptions of elementary computation techniques), but they will definitely benefit from other parts which show particular areas of biology where the application of analytical techniques is especially profitable, although the list is not complete. For example, one important area of quantitative biology (biological clocks) is not considered at all.

A final remark is that one would expect such a book to have a tighter and more systematic interconnection between its various parts. This expectation is especially justified because the presented works are not original but mostly reviews and summaries of work previously published by the contributors.

THEODOSIOS PAVLIDIS
Department of Electrical Engineering, Princeton University

Structural Chemistry

Electrons and Chemical Bonding. Harry B. Gray. Benjamin, New York, 1964. xvi + 223 pp. Illus. Paper, $3.95; cloth, $8.

Chemical Bonding. Audrey L. Companion. McGraw-Hill, New York, 1964. xii + 155 pp. Illus. $4.50.

All teachers of college chemistry will wish to peruse these two little books about chemical bonds.

At a level appropriate for well-prepared undergraduates in their first or second year, Gray presents a finely toned and systematic discussion of chemical bonding in a large number of molecules, from diatomics through organic molecules and octahedral complexes. He employs almost exclusively the simple molecular-orbital method. Companion covers almost the same ground, although her treatment is less mathematical. Both books contain discussions of elementary quantum-mechanical concepts, a number of problems, many tables, and very many illustrations. Both books necessarily are somewhat oversimplified. With respect to style, I prefer Gray's, which is straightforward, but some readers will prefer Companion's, which embodies special efforts at readability.

Chemists, a distinguished chemical physicist has remarked, are people who love molecules—for neophyte chemists these books should provide stimulating and helpful reading. Physicists take a more austere view of molecules—for them these books may seem curious. For the undecided, between the two professions, it still is the original research works on chemical bonding that, in my opinion, provide the best prospect of modern structural chemistry.

ROBERT G. PARR
Department of Chemistry, Johns Hopkins University

New Books

Mathematics, Physical Sciences, and Engineering

Electricity and Magnetism. B. I. Bleaney and B. Bleaney. Oxford Univ. Press, New York. ed. 2, 1965. 780 pp. Illus. $11.20.

Elements of the Theory of Nonlinear Oscillations. N. V. Butenin. Blaisdell (Ginn), New York, 1965. 236 pp. Illus. $7.50.

Geology: A Survey of Earth Science. Edgar Winston Spencer. Crowell, New York, 1965. 692 pp. Illus. $9.50.

Hydrogen in Titanium. V. A. Livanov, A. A. Bukhanova, and B. A. Kolachev. Translated from the Russian edition (Moscow, 1962) by A. Aladjem. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1965. 208 pp. Illus. $10.25.

Industrial Chemicals. W. L. Faith, Donald B. Keyes, and Ronald L. Clark. Wiley, New York, ed. 3, 1965. 862 pp. Illus. $25.

Inelastic Behavior of Load-Carrying Members. James O. Smith and Omar M. Sidebottom. Wiley, New York, 1965. 461 pp. Illus. $12.75.

Inorganic Chemistry. vol. 1, *Principles and Non-Metals.* C. S. G. Phillips and R. J. P. Williams. Oxford Univ. Press, New York, 1965. 699 pp. Illus. $8.

Instrumental Methods of Analysis. Hobart H. Willard, Lynne L. Merritt, Jr., and John A. Dean. Van Nostrand, Princeton, N.J., ed. 4, 1965. 802 pp. Illus. $10.75.

Introduction to the Atmosphere. Herbert Riehl. McGraw-Hill, New York, 1965. 377 pp. Illus. $8.95.

(Continued on page 805)

NEW BOOKS

(Continued from page 738)

An Introduction to Mathematical Statistics. H. D. Brunk. Blaisdell (Ginn), New York, ed. 2, 1965. 447 pp. Illus. $8.50. A Blaisdell Book in the Pure and Applied Sciences.

Introduction to Space Science. Wilmot N. Hess, Ed. Gordon and Breach, New York, 1965. 930 pp. Illus. $10, to individuals. Twenty-three papers contributed by the Staff of Goddard Space Flight Center, NASA.

Isomerization of Aromatic Compounds. V. A. Koptyug. N. N. Vorozhtsov, Jr., Ed. Translated from the Russian edition (Novosibirsk, 1963) by L. Mandel. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1965. 191 pp. Illus. $7.50.

Low Reynolds Number Hydrodynamics: With Special Applications to Particulate Media. John Happel and Howard Brenner. Prentice-Hall, Englewood Cliffs, N.J., 1965. 569 pp. Illus. $15.

Mathematical Aspects of the Three-Body Problem in the Quantum Scattering Theory. L. D. Faddeev. Translated from the Russian edition (Moscow, 1963) by Ch. Gutfreund. I. Meroz, Translation Ed. Israel Program for Scientific Translations; Davey, New York, 1965. 116 pp. Illus. $6.25.

Mechanical Testing of Materials. A. J. Fenner. Philosophical Library, New York, 1965. 231 pp. Illus. $15. Newnes International Monographs on Materials Science and Technology.

Microscopic Identification of Minerals. E. Wm. Heinrich. McGraw-Hill, New York, 1965. 427 pp. Illus. $10.50.

The Mineral Resources of Africa. Nicolas de Kun. Elsevier, New York, 1965. 766 pp. Illus. $40.

Modern Algebra. vol. 2. Seth Warner. Prentice-Hall, Englewood Cliffs, N.J., 1965. 358 pp. Illus. $15.

The Nature of Solids. Alan Holden. Columbia Univ. Press, New York, 1965. 251 pp. Illus. $6.95.

New Foundations of Quantum Mechanics. Alfred Landé. Cambridge Univ. Press, New York, 1965. 183 pp. Illus. $7.50.

Nouveau Traité de Chimie Minérale. vol. 8, pt. 2, *Silicum*. Paul Pascal, Ed. Masson, Paris, 1965. 732 pp. Illus. Paper, F. 120; cloth, F. 132. Contributors: Raymond Calas, Paul Pascal, and Jean Wyart.

Operational Methods in Nonlinear Mechanics. Louis A. Pipes. Dover, New York, 1965. 107 pp. Illus. Paper, $1.50.

Organic Reaction Mechanisms: An Introduction. Ronald Breslow. Benjamin, New York, 1965. 244 pp. Illus. Paper, $3.95; cloth, $7. The Organic Chemistry Monograph Series, edited by Ronald Breslow.

Oxidation of Metals. Karl Hauffe. Translated from the German edition (1956) by Karl Vorres. Plenum Press, New York, 1965. 464 pp. Illus. $19.50.

Petrochemical Calculations: Based on Equivalents (Methods of Paul Niggli). Conrad Burri. Translated from the German edition (Basel, 1959) by A. Katz. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1965. 312 pp. Illus. $15.25.

Phase Diagrams of Titanium Alloys. E. K. Molchanova. S. G. Glazunov, Ed. Translated from the Russian edition (Moscow, 1964) by A. Halbreich, N. Kaner, and M. Statter. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1965. 318 pp. Illus. $15.25.

Philosophical Problems of Elementary Particle Physics. I. V. Kuznetsov and M. E. Omel'yanovskii, Eds. Translated from the Russian edition (Moscow, 1963) by A. Sen and R. N. Sen. Israel Program for Scientific Translations. Jerusalem; Davey, New York, 1965. 300 pp. Illus. $15.25.

Physical Methods in Inorganic Chemistry. Russell S. Drago. Reinhold, New York; Chapman and Hall, London, 1965. 450 pp. Illus. $14.50.

The Physical Principles of Magnetism. Allan H. Morrish. Wiley, New York, 1965. 696 pp. Illus. $16.50.

The Physics of Ice. E. R. Pounder. Pergamon, New York, 1965. 159 pp. Illus. Paper, $2.95. The Commonwealth and International Library.

Polypropylene Fibers and Films. Anthony V. Galanti and Charles L. Mantell. Plenum Press, New York, 1965. 191 pp. Illus. $12.50.

Preparing for the Professional Engineer's Examination: A Review with Questions and Answers. Irving J. Levinson. Prentice-Hall, Englewood Cliffs, N.J., 1965. 367 pp. Illus. $12.50.

Principles of Chemical Equilibrium. Kelso B. Morris. Reinhold, New York; Chapman and Hall, London, 1965. 128 pp. Illus. Paper, $1.95. A volume in the series Selected Topics in Modern Chemistry Series, edited by Harry H. Sisler and Calvin A. VanderWerf.

Principles of Radiation Protection Engineering. Thomas Jaeger. Translated from the German edition by Lawrence Dresner. McGraw-Hill, New York, 1965. 463 pp. Illus. $15.

Problems on the Design of Machine Elements. Virgil M. Faires and Roy M. Wingren. Macmillan, New York, ed. 4, 1965. 169 pp. Illus. Paper, $3.95.

La Propagation des Ondes. Guy Boillat. Gauthier-Villars, Paris, 1965. 50 pp. Illus. Paper, F. 20. Traité de Physique Théorique et de Physique Mathématique Series, vol. 23, edited by J.-L. Destouches.

Quantum Organic Chemistry. Keniti Higasi, Hiroaki Baba, and Alan Rembaum. Interscience (Wiley), New York, 1965. 366 pp. Illus. $13.

Queues and Inventories: A Study of Their Basic Stochastic Processes. N. U. Prabhu. Wiley, New York, 1965. 287 pp. Illus. $12.95.

Random Processes and the Growth of Firms. A study of the Pareto law. Josef Steindl. Hafner, New York, 1965. 249 pp. Illus. $10.

Real and Abstract Analysis. Edwin Hewitt and Karl Stromberg. Springer-Verlag, New York, 1965. 484 pp. Illus. $9.50.

Recovery, Recrystallization, and Grain Growth. J. G. Byrne. Macmillan, New York, 1965. 189 pp. Illus. Paper, $3.95; cloth, $6.95. Macmillan Series in Materials Science, edited by Morris E. Fine, Johannes Weertman, and Julia R. Weertman.

Reference Electrodes for Fused Salts. A. F. Alabyshev, M. F. Lantratov, and A. G. Morachevskii. Translated from the Russian edition (Moscow, 1965) by Adam Peiperl. Sigma Press, Washington, D.C., 1965. 192 pp. Illus. $8.

Solid Semiconductors. A. K. Jonscher. Dover, New York, 1965. 101 pp. Illus. Paper, $1.35. Solid-State Physics Series, edited by L. Jacob.

Solids: Elementary Theory for Advanced Students. Gabriel Weinreich. Wiley, New York, 1965. 177 pp. Illus. $6.95.

Soviet Progress in Applied Ultrasonics. vol. 2, *Ultrasonics in the Chemical Industry*. Vladimir Andreevich Nosov. Translated from the Russian edition (Kiev, 1963) by J. E. S. Bradley. Consultants Bureau, New York, 1965. 172 pp. Illus. Paper, $25.

Squares and Square Roots. C. Attwood. Pergamon, New York, 1965. 137 pp. Paper, $2.95. Practical Tables Series, No. 6.

Stable Radicals. Anatolii Leonidovich Buchachenko. Translated from the Russian edition (Moscow, 1963) by C. Nigel Turton and Tatiana I. Turton. Consultants Bureau, New York, 1965. 188 pp. Illus. $15.

Structure of Aqueous Electrolyte Solutions and the Hydration of Ions. O. Ya. Samoilov. Translated from the German edition by D. J. G. Ives. Consultants Bureau, New York, 1965. 197 pp. Illus. Paper, $15.

The Structure of Lie Groups. G. Hochschild. Holden-Day, San Francisco, Calif., 1965. 240 pp. $10.95. Holden-Day Series in Mathematics, edited by Earl L. Coddington and Andrew M. Gleason.

Structures of Organic Molecules. Norman L. Allinger and Janet Allinger. Prentice-Hall, Englewood Cliffs, N.J., 1965. 144 pp. Illus. Paper, $2.50; cloth, $4.95. Prentice-Hall Foundations of Modern Organic Chemistry Series, edited by Kenneth L. Rinehart, Jr.

Théorie des Systèmes Évolutifs. Thèodore Vogel. Gauthier-Villars, Paris, 1965. 178 pp. Illus. Paper, F. 45. Traité de Physique Théorique et de Physique Mathématique Series, vol. 22, edited by J.-L. Destouches.

Theory of Categories. Barry Mitchell. Academic Press, New York, 1965. 284 pp. $13.75. Pure and Applied Mathematics, vol. 17, edited by Paul A. Smith and Samuel Eilenberg.

Theory of Functions of a Complex Variable. vol. 2. A. I. Markushevich. Translated from the Russian and edited by Richard A. Silverman. Prentice-Hall, Englewood Cliffs, N.J., 1965. 347 pp. Illus. $16. Selected Russian Publications in the Mathematical Sciences, edited by Richard A. Silverman.

Theory of Heat and Mass Transfer. A. V. Lykov and Yu. A. Mikhailov. Translated from the Russian edition (Moscow, 1963) by I. Shechtman. R. Hardin, Translation Ed. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1965. 568 pp. Illus. $21.50.

Theory of Jets in Ideal Fluids. M. I. Gurevich. Translated from the Russian edition (Moscow, 1961) by Robert L.

Street and Konstantin Zagustin. Academic Press, New York, 1965. 601 pp. Illus. $15.

The Theory of Metals. A. H. Wilson. Cambridge Univ. Press, New York, ed. 2, 1965. 354 pp. Illus. Paper, $2.95.

A Theory of Sets. Anthony P. Morse. Academic Press, New York, 1965. 162 pp. $7.95. Pure and Applied Mathematics Series, edited by Paul A. Smith and Samuel Eilenberg.

The Thermal Properties of Solids. H. J. Goldsmid. Dover, New York, 1965. 80 pp. Illus. Paper, $1.35. Solid-State Physics Series, edited by L. Jacob.

Threshold Logic: A Synthesis Approach. Michael L. Dertouzos. M.I.T. Press, Cambridge, Mass., 1965. 268 pp. Illus. $6.

Transistor Circuits. K. W. Cattermole. Gordon and Breach, New York, ed. 2, 1965. 486 pp. Illus. $14.50.

Conference and Symposium Reports

The Anatomy of Memory. vol. 1, *Learning, Remembering, and Forgetting.* A conference sponsored by the American Institute of Biological Sciences (Princeton, N.J.), September 1963. Daniel P. Kimble, Ed. Science and Behavior Books, Palo Alto, Calif., 1965. 463 pp. Illus. Paper, $4.35. The contributors are Sir John C. Eccles, Lawrence Kruger, Holgar Hyden, James McGaugh, Albert M. Uttley, and Heinz Von Foerster.

Biological Aspects of Social Problems. J. E. Meade and A. S. Parkes, Eds. Plenum Press, New York, 1965. 236 pp. $9.75. Proceedings of a symposium held by the Eugenics Society (of Great Britain) in October 1964.

Education and Economic Development. C. Arnold Anderson and Mary Jean Bowman, Eds. Aldine, Chicago, Ill., 1965. 448 pp. Illus. $10.75. Twenty-two papers presented at the Conference on The Role of Education in the Early Stages of Development (Chicago, Ill.), April 1963.

Energy Metabolism. Proceedings of the Third Symposium (Troon, Scotland), May 1964. K. L. Baxter, Ed. Academic Press, New York, 1965. 466 pp. Illus. $15. Forty-one papers.

Fluids in Subsurface Environments. Transactions of the 6th Annual Meeting of the Southwestern Federation of Geological Societies (Midland, Texas), January-February 1964. Addison Young and John E. Galley, Eds. American Assoc. of Petroleum Geologists, Tulsa, Okla., 1965. 422 pp. Illus. $10.

Gas Chromatography of Steroids in Biological Fluids. Proceedings of the workshop (Warrenton, Va.), February 1965. Mortimer B. Lipsett, Ed. Plenum Press, New York, 1965. 335 pp. Illus. $12.50. Twenty-eight papers.

Gases in Cast Metals. B. B. Gulyaev, Ed. Translated from the Russian edition (Moscow, 1964). Consultants Bureau, New York, 1965. 265 pp. Illus. Paper, $27.50. Forty-eight papers given at the Ninth Conference on the Theory of Casting Processes.

Ideas in Modern Biology. John A.

Moore, Ed. Natural History Press, Garden City, N.Y., 1965. 572 pp. Illus. $8. This book, volume 6 of the *Proceedings of the 16th International Congress of Zoology*, brings together 19 essays "based on papers delivered at the . . . Congress . . . and published here in expanded form. . . ." The sections are Genetic Continuity (2 papers); Cell Biology (4 papers); Development (3 papers); Evolution (4 papers); Phylogeny (3 papers); and Behavior (3 papers). Details about the other eight volumes of the *Proceedings* can be obtained from the Printing and Publishing Office, National Academy of Sciences-National Research Council, 2101 Constitution Avenue, NW, Washington, D.C., 20418.

Information System Sciences. Second Congress, November 1964. Joseph Spiegel and Donald Walker, Eds. Spartan Books, Washington, D.C., 1965. 531 pp. Illus. $23.75. Forty-seven papers presented at a symposium sponsored by Air Force Electronic Systems Division and the Mitre Corporation.

Life Sciences and Space Research. vol. 3. A session of the Fifth International Space Science Symposium (Florence), May 1964. M. Florkin, Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1965. 269 pp. Illus. $8.25.

Lubrication and Wear. Proceedings of the International Symposium (Houston, Texas), June 1963. D. Muster and B. Sternlicht, Eds. McCutchan, Berkeley, Calif., 1965. 982 pp. Illus. $20.

Mammalian Cytogenetics and Related Problems in Radiobiology. Proceedings of a symposium (Sao Paulo and Rio de Janeiro, Brazil), October 1962. C. Pavan, C. Chagas, O. Frota-Pessoa, and L. R. Caldas, Eds. Pergamon, New York, 1964. 445 pp. Illus. $15. Twenty-eight papers.

Mathematics and Computer Science in Biology and Medicine. Proceedings of a conference held by the Medical Research Council in association with the Health Departments (Oxford), July 1964. Harold Himsworth and George Godber, Eds. Her Majesty's Stationery Office, London, 1965. 327 pp. Illus. Paper. Twenty-seven papers.

Microelectronics and Large Systems. A symposium (Washington, D.C.), November 1964. Samuel J. Mathis, Jr., Richard E. Wiley, Lester M. Spandorfer, Eds. Spartan Books, Washington, D.C., 1965. 278 pp. Illus. $8.50. Thirteen papers.

Perspectives in Virology. vol. 4. Morris Pollard, Ed. Harper and Row, New York, 1965. 351 pp. Illus. $10.50. Seventeen papers presented at the Gustav Stern Symposium.

Plant Indicators of Soils, Rocks, and Substance Waters. A. G. Chikishev, Ed. Translated from the Russian edition (Moscow, 1964). Consultants Bureau, New York, 1965. 222 pp. Illus. $27.50. Forty-one papers given at the Conference on Indicational Geobotany, February 1961.

Quantitative Electron Microscopy. Proceedings of a symposium (Washington, D.C.), March-April 1964. Gunter F. Bahr and Elmar H. Zeitler, Eds. Williams and Wilkins, Baltimore, 1965. 615 pp. Illus. $12.50. Fifty papers presented at a symposium sponsored by Intersociety Committee for Research Potential in Path-

Science and Practice in Anesthesia. James E. Eckenhoff, Ed. Lippincott, Philadelphia, 1965. 160 pp. Illus. $7. Eighteen papers presented at the Bicentennial Anniversary Meeting of the University of Pennsylvania School of Medicine (Philadelphia), June 1965.

Seminar on the Atiyah-Singer Index Theorem. Richard S. Palais. Princeton Univ. Press, Princeton, N.J., 1965. 376 pp. Illus. Paper, $7.50. The volume contains mainly slightly revised notes of a seminar held at the Institute for Advanced Study in 1963 and 1964. The contributors are M. F. Atiyah, A. Borel, E. E. Floyd, R. T. Seeley, W. Shih, and R. Solovay.

Sex and Behavior. Frank A. Beach, Ed. Wiley, New York, 1965. xvi + 592 pp. Illus. $9.75. Twenty-two papers given at conferences held at Berkeley, Calif. in 1961 and 1962, sponsored by the Committee for Research in Problems of Sex, National Academy of Sciences-National Research Council.

Sixth International Conference on Soil Mechanics and Foundation Engineering, Proceedings (Montreal), September 1965. vols. 1 and 2. D. H. MacDonald, Ed. Univ. of Toronto Press, Toronto, Canada, 1965. vol. 1, 434 pp.; vol. 2, 602 pp. Illus. $100 per 3 volume set. Volumes 1 and 2 contain the 218 papers submitted as contributions to the conference; volume 3, which has been announced for publication in early 1966, will contain the reports of the general reporters at the conference, the texts of the lectures given at the start of each technical section as well as a record of the discussion at these sessions, and a summary of the program.

Social Structure and the Family: Generational Relations. Symposium (Durham, N.C.), November 1963. Ethel Shanas and Gordon F. Streib, Eds. Prentice-Hall, Englewood Cliffs, N.J., 1965. 408 pp. Illus. $9.95. Fifteen papers presented at a symposium sponsored by the Program in Socio-Economic Studies of Aging, Duke University and the Psychological and Social Science Section of the Gerontological Society.

Stationary Phase in Paper and Thin-Layer Chromatography. Proceedings of the 2nd Symposium (Liblice, Czechoslovakia), June 1964. K. Macek and I. M. Hais, Eds. Elsevier, New York, 1965. 358 pp. Illus. $16. Forty-nine papers presented at a symposium organized by the Chromatography Group of the Czechoslovak Chemical Society; the papers are in German or English.

Traffic Control Theory and Instrumentation. Based on papers presented at the Interdisciplinary Clinic on Instrumentation Requirements for Traffic Control Systems (New York), December 1963. Thomas R. Horton, Ed. Plenum Press, New York, 1965. 230 pp. Illus. $12.50. Eleven papers.

Ultrasonic Energy: Biological Investigations and Medical Applications. Elizabeth Kelly, Ed. Univ. of Illinois Press, Urbana, 1965. 396 pp. Illus. $12.50. Twenty-five papers presented at a symposium (Urbana, Ill.), June 1962.