waves of some sort originating below the chromosphere) raise the reader's hopes for an exposition of hydromechanical excitation, the function of sound waves in the medium, the conduction of heat, and the like. But discussion never goes beyond the qualitative stage. Similarly, the corona is given short shrift in the text. This book deals solely with the chromosphere.

It seems unlikely that a discussion of the chromosphere alone, divorced from its surroundings, can lead to a unique model. Nevertheless, specialists will find the methods and conclusions of this remarkable monograph well worth study.

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Oberling Memorial Volume

Ultrastructure in Biological Systems. vol. 1, *Tumors Induced by Viruses: Ultrastructural Studies.* Albert J. Dalton and Françoise Haguenau, Eds. Academic Press, New York, 1962. xi + 229 pp. Illus. $9.50.

This monograph, the first of a series on ultrastructure in biological systems, is most appropriately dedicated to the memory of the late Charles Oberling. The editors and the six contributors, who were all former students or personal friends of Oberling, conduct their investigations in four different countries.

The monograph is divided into seven major sections and is chiefly concerned with the following tumors, or with the agents that induce the tumors: the avian sarcoma-leukosis complex, contributed by Françoise Haguenau and J. W. Beard; infectious papillomatosis of rabbits (Shope), contributed by Karl-Hermann Hollmann; the Shope fibroma virus of rabbits, contributed by H. Febvre; the milk agent, contributed by Dan H. Moore; electron microscopy of polyoma virus, contributed by Robert R. Dourmashkin; ultrastructural studies on three different types of mouse leukemia, contributed by Etienne deHarven; and the Moloney agent, contributed by Albert J. Dalton.

The major sections represent individual and comprehensive review articles, each of which has a separate and full list of appropriate references. Each section is systematically divided into a considerable number of subsections, which are arranged in an orderly manner that makes it relatively easy to find a particular item. The reported facts and findings are presented in a concise and thorough manner, with appropriate critical comments. The great bulk of pertinent information relative to the tumors and the agents considered in the monograph is thus made available. An author index and a concise subject index are appended.

The editors have discharged their responsibilities in commendable fashion, for the several reviews form a coherent résumé. The monograph, which is printed on glazed paper, is well composed and easily read. The many figures, usually occupying an entire page, are of good quality and show well the fine structural details revealed by the electron microscope when specimen and instrument are manipulated by experts.

The monograph will be a valuable addition to the library of investigators who are interested in the tumors that are covered and in the agents that induce them.

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Interdisciplinary Approach

Macromolecular Specificity and Biological Memory. Francis O. Schmitt, Ed. Massachusetts Institute of Technology Press, Cambridge, 1962. viii + 119 pp. $3.

This monograph is a summary of 25 lectures given at Massachusetts Institute of Technology in the spring of 1961 on the molecular basis for memory and recall. It is a splendid example of interdisciplinary cooperation, which is assuming increasing importance in the solution of major scientific problems. Some of the formidable difficulties posed by biological memory are analyzed by a wide spectrum of distinguished specialists, from mathematicians discussing relevant aspects of information theory to behavioral scientists primarily concerned with the mechanics of the learning process. But it is upon the natural scientists and the clinical investigators that the major burden falls. In a series of essentially speculative essays, the possible nature of biological memory is examined at the systemic, molecular, and submolecular levels. Substantial bibliographies greatly enhance the monograph's value.

The editor, Francis O. Schmitt, professor of biology at M.I.T., makes clear in his preface that the lectures were intended to be exploratory and provocative, rather than comprehensive. In this they succeed admirably well. But in certain other respects the monograph is disappointing. There is perhaps too much speculative emphasis on a memory storage function for nucleic acids. But this may be unavoidable in the light of recent advances in our knowledge of the genetic code. At the opposite extreme, no attempt is made to distinguish explicitly between information and meaning. In terms of macromolecular specificity and biological memory, information defined by the Wiener-Shannon equation and its corollaries is the only presently feasible path of quantitative analysis. Meaning, on the other hand, is a much more elusive concept. Symbol information can have many different meanings. Thus, the Gestalt concept, in which a whole is greater than the sum of its parts, may be involved in the definition of meaning. Finally, little of the illustrative material which must have been an essential part of the original lectures is included. This is particularly unfortunate in the case of intricate descriptions of brain structures.

On the whole, however, I believe this little book will prove to be most valuable to those interested in what will undoubtedly become one of the great scientific adventures of our time.

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Notes

Statistics

The **Handbook of Statistical Tables** by D. B. Owen (Addison-Wesley, Reading, Mass., 1962. 592 pp. $12.50) is intended for students in advanced statistics courses and for both practicing applied and mathematical statisticians. The collection contains over 100 tables (or, when appropriate, graphs or nomograms) for the standard statistical functions as well as for many that are less familiar. Presumably it is intended for use with some table of standard mathematical functions, since not even the most necessary of these are included.

Each table includes a brief introduction that defines the function, gives its source (frequently a recomputation, an inaccessible report, or a journal publication), contrasts it with other existing tables, and outlines its applications. The 251-entry bibliography supplements this information. In some cases, special interpolation techniques are given, although linear interpolation generally appears to be adequate.

The format is convenient. The number of the table appears at the outside bottom corner of each page, and the page number is at the top. In the interest of accuracy and economy, most of the tables have been reproduced photographically, either from computer listings or from the original publication. The result is unesthetic but legible. A detailed table of contents and an extensive index assist in making full use of the resources provided by this comprehensive, and relatively inexpensive, volume. It is recommended to all three of the classes of reader for which it was intended.

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New Books

Mathematics, Physical Sciences, and Engineering

Acrolein. C. W. Smith, Ed. Wiley, New York, 1962. 282 pp. Illus. $12.50.

Advanced Calculus for Applications. Francis B. Hildebrand. Prentice-Hall, Englewood Cliffs, N.J., 1962. 655 pp. Illus. $13.

Advances in Inorganic Chemistry and Radiochemistry. vol. 4. H. J. Emeleus and A. G. Sharpe, Eds. Academic Press, New York, 1962. 352 pp. Illus. $11.

Advances in Petroleum Chemistry and Refining. vol. 5. John J. McKetta, Jr., Ed. Interscience (Wiley), New York, 1962. 559 pp. Illus. $20.

The Age of Electronics. Carl F. J. Overhage, Ed. McGraw-Hill, New York, 1962. 227 pp. Illus. $7.95.

Artificial Earth Satellites. A translation of *Iskusstvennye Sputniki Zemli*, vols. 7 and 8, 1961 (published by the Academy of Sciences of the U.S.S.R.). L. V. Kurnosova, Ed. Consultants Bureau, New York, 1962. 254 pp. Illus. Paper, $15.

Basic Astronautics. An introduction to space science, engineering, and medicine. Frederick I. Ordway, III, James Patrick Gardner and Mitchell R. Sharpe, Jr. Prentice-Hall, Englewood Cliffs, N.J., 1962. 600 pp. Illus. $16.

Bibliography on Hydrocarbons. 1946–1960. J. A. Muckleroy, Ed. Natural Gas Processors Assoc., Tulsa, Okla., 1962. 94 pp. $15.

The Collected Papers of Lord Rutherford of Nelson. vol. 1, *New Zealand, Cambridge, Montreal*. Published under the direction of Sir James Chadwick. Interscience (Wiley), New York, 1962. 931 pp. Illus. $19.50.

Computation of Multistage Separation Processes. Donald N. Hanson, John H. Duffin, and Graham F. Somerville. Reinhold, New York; Chapman and Hall, London, 1962. 368 pp. Illus. $4.95.

Geology and Earth Sciences Sourcebook. For elementary and secondary schools. Robert L. Heller, Ed. Holt, Rinehart, and Winston, New York, 1962. 511 pp. Illus. Paper, $2.40.

Handbook of Adhesives. Irving Skeist, Ed. Reinhold, New York; Chapman and Hall, London, 1962. 698 pp. Illus. $23.50.

Handbook of Nonparametric Statistics. Investigation of randomness, moments, percentiles, and distributions. John E. Walsh. Van Nostrand, Princeton, N.J., 1962. 575 pp. Illus. $15.

Introduction to Calculus. Kazimierz Kuratowski. Translated from the Polish by J. Musielak. Pergamon, London; Addison-Wesley, Reading, Mass., 1962. 315 pp. Illus. $5.

Introduction to Gas Dynamics. Ralph M. Rotty. Wiley, New York, 1962. 285 pp. Illus. Plates. $8.75.

Introduction to Polymer Chemistry. John K. Stille. Wiley, New York, 1962. 259 pp. Illus. $6.95.

Introduction to Set Theory and Topology. Kazimierz Kuratowski. Translated from the revised Polish edition by Leo F. Boron. Pergamon, London; Addison-Wesley, Reading, Mass., 1962. 283 pp. $6.50.

Laboratory Planning. For chemistry and chemical engineering. Harry F. Lewis, Ed. Reinhold, New York; Chapman and Hall, London, 1962. 536 pp. Ilus. $20.

Laboratory Practice of Organic Chemistry. G. Ross Robertson and Thomas L. Jacobs. Macmillan, New York, ed. 4, 1962. 392 pp. Illus. $5.50.

Low-Temperature Physics. Lectures delivered at Les Houches during the 1961 session of the Summer School for Theoretical Physics, University of Grenoble. C. DeWitt, B. Dreyfus, and P. G. de Gennes, Eds. Gordon and Breach, New York, 1962. 654 pp. Illus. Cloth, $20; paper, $9.50.

Luminescence of Organic and Inorganic Materials. Papers from the international conference held at New York University. Hartmut P. Kallmann and Grace Marmor Spruch, Eds. Wiley, New York, 1962. 688 pp. Illus. $16.

Marine Air Conditioning, Heating, and Ventilation. Thermotank, Ltd. Pergamon, New York, 1962. 117 pp. Illus. $10.

Mathematics for the Physical Sciences. Herbert S. Wilf. Wiley, New York, 1962. 296 pp. $7.95.

Mathematics for Quantum Mechanics. An introductory survey of operators, eigenvalues, and linear vector spaces. John David Jackson. Benjamin, New York, 1962. 107 pp. Illus. Paper, $3.50; cloth, $4.75.

Mechanical Properties of Polymers. Lawrence E. Nielsen. Reinhold, New York; Chapman and Hall, London, 1962. 283 pp. Illus. $11.

Mechanics for Engineers. Statics and dynamics. Ferdinand P. Beer and E. Russell Johnston, Jr. McGraw-Hill, New York, ed. 2, 1962. 785 pp. Illus. $10.75.

Neutron Physics. Proceedings of the symposium held at Rensselaer Polytechnic Institute in May 1961. M. L. Yeater, Ed. Academic Press, New York, 1962. 311 pp. Illus. $12.

Nuclear Instruments. Proceedings of the symposium held at Harwell in September 1961. J. B. Birks, Ed. Academic Press, New York, 1962. 252 pp. Illus. $10.

Numerical Mathematical Analysis. James B. Scarborough. Johns Hopkins Press, Baltimore, Md.; Oxford Univ. Press, London, ed. 5, 1962, 615 pp. Illus. $7.

Physical Organic Chemistry. Jack Hine. McGraw-Hill, New York, ed. 2, 1962. 562 pp. Illus. $11.50.

Physical Properties of Polymers. F. Bueche. Wiley, New York, 1962. 364 pp. Illus. $9.50.

Principles of Radioisotope Methodology. Grafton D. Chase and Joseph L. Rabinowitz. Burgess, Minneapolis, Minn., ed. 2, 1962. 380 pp. Illus. + charts. $6.

Progress in Astronautics and Rocketry. vol. 8, *Guidance and Control*. Robert E. Roberson and James S. Farrior, Eds. Academic Press, New York, 1962. 685 pp. Illus. $9.25.

The Pyrimidines. D. J. Brown. Wiley, New York, 1962. 799 pp. Illus. $40.

Quantum Statistical Mechanics. Green's function methods in equilibrium and nonequilibrium problems. Leo P. Kadanoff and Gordon Baym. Benjamin, New York, 1962. 214 pp. Illus. Paper, $4.95; cloth, $6.95.

Radio Noise of Terrestrial Origin. F. Horner, Ed. Elsevier, New York, 1962. 202 pp. Illus. $8.75. Proceedings of the session held by the fourth Commission on Radio Noise of Terrestrial Origin, during the 13th General Assembly of the International Scientific Radio Union (London, September 1960).

Rhenium. A symposium held by the Electrochemical Society in May 1960. B. W. Gonser, Ed. Elsevier, New York, 1962. 237 pp. Illus. $11.

A Short History of Astronomy. From earliest times through the 19th century. Arthur Berry. Dover, New York, 1962 (reprint of the 1898 edition). 471 pp. Illus. Paper, $2.

Solar Activity and the Ionosphere. For radio communications specialists. N. Ya. Bugoslavskaya. Translated from the Russian by G. O. Harding. Pergamon, New York, 1962. 50 pp. Illus. $2.50.

Stars and Stellar Systems. Gerard P. Kuiper, Ed. vol. 2, *Astronomical Techniques*. W. A. Hiltner, Ed. Univ. of Chicago Press, Chicago, 1962. 656 pp. Illus. $16.50.

Static Power Convertors. Performance and application. Robert Wells. Wiley, New York, 1962. 287 pp. Illus. Plates. $7.

Theory of Elementary Particles. Paul Roman. North-Holland, Amsterdam; Interscience (Wiley), New York, ed. 2, 1962. 596 pp. Illus. $12.75.

Vectors. A programmed text for introductory physics. Prepared by Basic Systems, Inc. Appleton-Century-Crofts, New York, 1962. 177 pp. (teacher's manual, 16 pp.). Illus. Paper, $2.20.