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.

DONALD H. MENZEL
Harvard College Observatory, Harvard University

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.

FRANK L. HORSFALL, JR.
Sloan-Kettering Institute for Cancer Research, New York

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.

ELIE A. SHNEOUR
Radiation Laboratory, University of California, Berkeley

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.