

Book Reviews

Stellar Spectra

Spectroscopic Astrophysics. An Assessment of the Contributions of Otto Struve. G. H. HERBIG, Ed. University of California Press, Berkeley, 1970. xii, 468 pp., illus. \$10.

This memorial volume is not only a tribute to a great astronomer; it also gives testimony to the influence that Otto Struve has had on other astronomers and their work. As Herbig says in a beautiful introduction, Struve was a great worker and his philosophy was, "If something is worth doing, it is thereby worth publishing. . . . He was impatient with those who, in search of perfection or for other reasons, did not justify their scientific existence by publication."

The work consists of reprints of ten papers by Struve, published between 1929 and 1952, in ten of the fields in which he was interested and in which he was a scientific leader. Following each paper is an article by a specialist in the field who shows the present state of knowledge. This kind of presentation is particularly appropriate for showing the modernity of Struve's work. Take, for instance, the first paper, on spectral classification. Struve in 1933 poses problems which are still open, like those of narrow-line B-type spectra, which belong to two classes of objects; intrinsically slow-rotators and pole-on rotators. "We do not yet know whether the spectra of these two groups of stars are identical," Struve remarks. An answer to this question is just now beginning to be given by theoreticians, while observations are unable to discriminate. The existence of peculiar B stars with weak helium lines or other abnormalities has been underlined by Struve, and only in these last years has it become clear that these peculiar B stars represent the extension to high temperatures of the group of magnetic stars of type A. The conclusion by Struve is that two parameters are insufficient to describe the spectrum of an early-type star, a conclusion which is still valid, as the comment by W. W. Morgan, a pioneer in two-dimensional spectral classifications, underlines: "Struve's discovery was the

forerunner of the present fantastic complexity of the classification of the B stars."

The papers on shell stars, symbiotic stars, and spectroscopic binaries indicate the richness of physical phenomena that the spectra of these objects reveal. Specially close binaries, to which Struve devoted a long series of observations summarized in his famous book *Stellar Evolution* (1950), pose a lot of problems owing to the closeness of the two components and therefore to their physical interactions, like exchange of mass between the two components, formation of streams and envelopes surrounding the whole system, and reciprocal excitation by radiation and possibly by corpuscular radiation. Many of the problems Struve set are now objects of study by theoreticians and have been partly solved; many, as Popper observes, "remain largely unanswered." A difficult observational problem that could now be solved by means of the image intensifiers, which permit spectra of relatively faint stars to be obtained in a few minutes, is that of the limb spectra. Struve pointed out that anomalous intensities of the lines are observed when only a crescent of the eclipsed star is visible, but this problem, as Popper observes, has received little attention, and the few existing observations are in contradiction.

In my opinion, this book can be extremely useful to students and to researchers. Don't think of it as a historical book. The papers by Struve are an example of how criticism and knowledge of physical laws must be used in order to understand observational data. The only criticism that can be made is that the style of the articles of the contributors is not consistent. In some cases the articles are excellent and stimulating reviews of the various subjects, like those one expects to find in such collections as the *Annual Review of Astronomy and Astrophysics* or *Stars and Stellar Systems*; in a few other cases they are personal judgments of Struve's work and his way of attacking problems.

M. HACK

*Osservatorio Astronomico,
Trieste, Italy*

Pre-Civil-War Science

Physician to the West. Selected Writings of Daniel Drake on Science and Society. HENRY D. SHAPIRO and ZANE L. MILLER, Eds. University Press of Kentucky, Lexington, 1970. xl, 424 pp., illus. \$12.50.

Through their selection of writings and introductory essays, the editors present Daniel Drake (1785–1852), the outstanding physician of the Ohio and Mississippi valleys before the Civil War, as scientist and citizen concerned with promoting the intellectual and economic advancement of the entire area.

As a scientist, Drake, in a spirit characteristic of American science at this time, promoted "Baconian" method, repeatedly emphasizing the importance of gathering facts through observation and organizing them with the intent of inducing generalizations. In this Drake followed his teacher Benjamin Smith Barton rather than Benjamin Rush. As the editors point out, the method was particularly suited to the time and place: in a new country even the amateur could make significant contributions by gathering facts, thus furthering the democratization of science. In accordance with his views, Drake played a leading role in the establishment of museums, journals, and similar institutions. His own scientific writings, from an account of an epidemic in 1808 to the monumental *Principal Diseases of the Interior Valley* (1850), exemplify his adherence to the method. It enabled him to examine critically existing theories, but proved inadequate for the construction of new generalizations.

Shapiro argues that Drake's Whiggery was the social-political counterpart to his Baconianism. Miller pays more attention to Drake's interest in urban economic development, and in building unity throughout the West by railroads as well as by scientific institutions. Other selections published here illustrate Drake's concern, especially in his later years, for temperance and good order. Several selections present his ideas on medical education. That he found it necessary to tell entering medical students they must be good boys, not skip class, and work hard tells a lot about the schools of his day.

Overall, the selections, of which most are printed entire and the rest in generous segments, tend to emphasize Drake's scientific method, policy, and program and other public questions more than the medical side of his career. Although it seems to this reviewer that the editors have sometimes strained

a little to fit Drake into the Baconian-Whig mold—his therapeutics, for example, is more traditional than otherwise—in general they have succeeded in buttressing their perceptive introductory essays through the selections printed, and they have been particularly successful in their stated purpose of presenting Drake as a representative figure of his time rather than as a hero struggling for individual success.

It is perhaps unfortunate that so many of Drake's writings were originally lectures. To modern readers' eyes, they suffer from the oratorical style of the 19th century, which could inflate a one-sentence thought into a full page of varied allusion and metaphor. Drake's largely descriptive scientific publications are written in a more direct and simpler style.

Finally, it is worth noting that some of the selections are from hitherto unpublished manuscripts, and that the book concludes with a comprehensive bibliography of Drake's writings.

JOHN B. BLAKE

*National Library of Medicine,
Bethesda, Maryland*

Prehistory

The Archaeology of Early Man. J. M. COLES and E. S. HIGGS. Praeger, New York, 1969. 456 pp., illus. \$16.

General summaries of man's cultural development over the past two to three million years are not numerous. The sheer scope of the topic, the obscurity of the sources where many of the basic data are recorded, and the frequently conflicting interpretations of these data by regional specialists have all contributed to the paucity of useful syntheses and summaries. For this reason, Coles and Higgs have done a real service for those who are interested in prehistory in presenting this volume that summarizes the archeological evidence from the earliest recognized tools to the beginning of food production. The authors have achieved a genuine success in bringing together a wealth of data into a thoroughly competent summary of our knowledge at the present time.

The layman or nonspecialist will find this book hard going. The text is often heavy with detailed description of stratigraphic sections and lithic artifacts, and the numerous drawings, although well executed, may tend toward monotonous repetition to the uninitiated. These details that may deflect

the casual reader are the strength of the book to the student of prehistory, however. One suspects that the major market for the book will be as a text for advanced undergraduate courses on world prehistory. A better text is not available.

Geography and time provide the major structure for the organization of the data. After a general introduction containing a discussion of some of the basic methods of prehistory, the book is arranged according to four main geographic areas: Africa, Europe, Asia, and the New World. Each of these areas is in turn divided into several regions, and for each region the more significant data are summarized, beginning with the earliest tools and ending with the most recent known Paleolithic materials. These summaries are then followed by detailed descriptions of the most important sites in the region, again arranged chronologically from early to late. Although the book deals with the evidence on a worldwide basis, the major emphasis is on Africa, Europe, and the Near East, reflecting not only the fact that more work on prehistory has been done there than in other parts of the world (except for North America) but also that the record of human occupation in this area is longer, at least so far as is now known. In general, the Americas are given only cursory treatment, and this section should probably have been omitted.

As must be expected in any summary of this magnitude, there are many details of interpretation with which one might quarrel, and, indeed, perhaps few regional specialists will truly be satisfied with the summaries of their areas. Most of the disagreements, however, either will reflect a different emphasis or will be based on knowledge recently acquired and not available to Coles and Higgs. The latter is certainly the case in their summary of the Egyptian Paleolithic. The new data obtained as a consequence of the salvage archeology done in the Aswan Reservoir and the subsequent work along the Nile have drastically altered our concepts of that area.

A more basic criticism of the book can be directed at the absence of some features that would have made it both more useful as a reference and more readable as a text. The absence of profile drawings, either to portray schematically the regional stratigraphic sequence or to show in detail the units described at the more significant sites,

is particularly puzzling. Many of the long and often tedious descriptions of these deposits could have been greatly clarified or even reduced in length had profile drawings been included. A similar question is raised by the absence of charts to summarize the chronological positions of the key localities in each region. Such charts would have greatly facilitated the reader's effort to visualize the time relationship between various levels in some sites, particularly in the more complex areas such as Western Europe. The book is also curiously deficient in references, in spite of the nearly eight pages in the bibliography. For the most part, the major sites are referenced by a single entry, the most important publication about the site. In some instances, however, the authors allude to different interpretations or new data which cannot be obtained from these initial references, and to track down some of the uncited material would require a considerable search of the literature. One suspects that these minor deficiencies are due largely to editorial policy at the publishers'. Presumably, more extensive bibliographic data and the inclusion of correlation charts would lend a more technical atmosphere to the book and thus make it less attractive to the general reader.

FRED WENDORF

*Department of Anthropology,
Southern Methodist University,
Dallas, Texas*

Airborne Pathogens

An Introduction to Experimental Aerobiology. ROBERT L. DIMMICK, ANN B. AKERS, ROBERT J. HECKLY, and H. WOLOCOW, Eds. Wiley-Interscience, New York, 1969. xviii, 494 pp., illus. \$23.95.

This is a worthwhile and timely addition to the Environmental Science and Technology series of books devoted to research on the quality of the environment and the methods for its conservation.

Too few people today appreciate the importance of the microbial world in maintaining the steady state in such component parts of the ecosystem as the air, soil, and water. The word "aerobiology" in its broadest definition refers to all relationships between the atmosphere and living beings. But this book is restricted to experimental laboratory studies on possible disease-producing airborne bacteria, fungi, and viruses