scientific research, the improvement of science education, the development of human resources (including the training of more scientists and engineers) are all social problems. These and other social aspects of the use of science and technology are illuminated in many papers, especially in volumes 9 to 11.

James R. Killian, Jr., in a discussion entitled "Science and public policy," says that "This new domain of political science—the relating of science and scientists to government policy—has gained new importance from the unfolding opportunities to put science to work for the less developed nations." Charles V. Kidd's essay, "The loss of scientists from less to more developed countries" is a thoughtful analysis of that problem. Jerome B. Wiesner writes on policies for scientific and technological education, Wilbur Schramm and Gerald F. Winfield on new uses of mass communication, Hollis W. Peter on guidelines in the process of change, and F. M. Tiller on cooperative programs for strengthening engineering education. These and many other contributions are well worth reading.

These volumes are recommended for enjoyable browsing, for use in courses or seminars that deal with social implications of science and technology, and for convenient reference to obtain a short summary of applicable knowledge on the topics covered. It would also be a good idea to suggest that professional colleagues and institutions in newly developing countries request a set through the local United States A.I.D. mission.

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Solar Research

Solar Flares. Henry J. Smith and Elske v. P. Smith. Macmillan, New York; Collier-Macmillan, London, 1963. xii + 322 pp. Illus. $12.95.

A great many of us find that writing is the most difficult task of the day. I, for one, must enlist the aid of friends to review the end result, an imposition on their time. But even after I have forced the manuscript upon my friends, it often proves difficult to get honest criticism—to have them really chop up my work and say what they think. Certainly the friends and coworkers of the Smiths have failed them, if they saw the manuscript of *Solar Flares*. And one wonders about "the expert and painstaking assistance" of the editorial adviser.

In this book the Smiths attempt to provide a critical survey of recent research, both theoretical and observational, on the subject of solar flares in all their varied aspects. The project is ambitious, and it was undertaken conscientiously. But the book should begin with chapter 6, "The nature of flares and stellar activity," for it is in this chapter that a flare is defined. Chapters 2 through 5 then follow in order. Chapter 1, "Solar phenomena," should be reorganized and rewritten. It is too confusing, abounds in incorrect statements, and fails to supply the reader with adequate background.

Chapter 2 begins with a discussion of the instrumentation for observing the optical phases of flares. Figure 3 is wrong. Section 1.2 covers the analysis of photographs for flare positions, area, and brightness. In section 1.3 we learn that the classification of flares by "importance" is based primarily on corrected areas, but area corrections to flare observations are not discussed until section 3.1. The sections that follow cover the published sources of flare data; the statistical interpretation of the relation of flares to sunspots; and the characteristics of flares—durations, brightness, areas, shapes, behavior, and effect on prominences.

The physical processes related to flares, as they are obtained by the analysis of spectroscopic observations, are the subject of chapter 3. Here the Smiths have collected and summarized a large body of data, some of it from European sources, including a great deal from the Crimean Astrophysical Observatory. The expert well understands the shaky ground and the inconsistencies in the interpretation of the Balmer line profiles discussed in section 4; indeed, the expert himself has contributed to the inconsistencies—let others beware. This discussion is followed by a good account of other elements that can be detected by their emission lines. Section 11 covers ultraviolet radiation and x-rays.

I am not competent to review chapter 4 (31 pages) which deals with radio emission from flares. Chapter 5, "Solar corpuscular emission and geophysical phenomena," is excellent. The solar-modulated phenomena, 1 year, 27 days, and the sudden Forbush decreases are described and interpreted on the basis of the many proposed mechanisms that have been set forth. High- and low-energy cosmic ray emission is treated in detail and well. The geomagnetic field with its variations and finally the physics of the ionosphere are briefly touched upon.

This book is a survey, but it is not suitable for use as a textbook. It is well indexed and well referenced; apparently there are no serious omissions of relevant research. The authors are to be congratulated on their excellent coverage of the research contributions from Eastern Europe.

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Astronomical Data

Stars and Stellar Systems. Gerard P. Kuiper and Barbara M. Middlehurst, General Eds. vol. 3, *Basic Astronomical Data*. K. Aa. Strand, Ed. University of Chicago Press, Chicago, 1963. xviii + 495 pp. Illus. $12.50.

This book, the fourth published volume of an announced nine-volume series, is of the same high quality, interest, and usefulness as its predecessors. It is especially valuable inasmuch as no book like it has previously been published, yet it deals in a detailed and authoritative way with the classification of astronomical data that is at the very heart of progress in this observational science. Little attempt has been made to discuss instrumentation, observational techniques, or reduction methods, for these topics were covered in volumes 1 and 2.

The 22 chapters and the two appendixes were written by 28 authors, each an active worker and an authority in his field. The first seven chapters deal with positions and proper motions and associated star catalogs. The next four chapters deal with stellar classification through spectra or by photometric observation. Chapters 12 and 13 discuss interstellar absorption; chapters 14 and 15 give empirical physical data on stars, and chapter 16 is concerned with interstellar polarization. The next three chapters describe surveys of, and