

Access to the Sun

Robert Rosner

The Sun as a Star. NASA SP-450.
Edited by Stuart Jordan.
NASA/CNRS: 1982. Pp. 518. Pbk \$11.

ALTHOUGH several good monographs on solar physics have recently appeared — F.Q. Orrall's *Solar Active Regions* (Colorado Associated University Press, 1981) and E.R. Priest's *Solar Flare Magnetohydrodynamics* (Gordon & Breach, 1982), for example — these have tended towards treatment of specialized topics and an up-to-date overview has been lacking. *The Sun as a Star* does a commendable job of filling this gap, reviewing much of current observational and theoretical work relevant to present-day solar research, and its possible extension to stellar research. The material is, in large part, written at a level appropriate to first-year graduate students; it is by far the most accessible general account of solar physics I have seen to date, and has already been extensively used in our solar and stellar physics course.

The chapters have each been written by active researchers, and generally convey an accurate sense of the broad thinking on the subject; there is relatively little of the narrowness of perspective one at times encounters in similar reviews. Particularly noteworthy and complete are the discussions of photospheric phenomena and global oscillations by J. Beckers and F.-L. Deubner, of wave generation and propagation by R. Stein and J. Leibacher, and of magnetic flux tubes by H. Spruit. These contributions bring together material which has not been recently reviewed elsewhere in such depth, and do so at a level which is comprehensible to the neophyte.

I also very much enjoyed the multifaceted discussions of plasma heating in the solar outer atmosphere given in individual contributions by G. Withbroe, D. Wentzel, J. Hollweg and R. Kopp. Indeed, the entire volume is characterized by clear organization and careful integration of the various subject areas; most chapters have an accessible, didactic style, which is most welcome for a book intended to be an introduction to the subject (and is a surprising feature for a work written by such a wide variety of specialists).

Only a few topics are treated at a level dissonant with the rest of the volume. These include, principally, the (theoretical) discussions of solar flares, which are not fully self-contained but rather require considerable familiarity with the plasma physics literature in order to be properly appreciated (the text edited by E.R. Priest, mentioned above, as well as the review monograph from the Skylab Solar Flare Workshop edited by P.A. Sturrock (Colorado Associated University Press, 1980) would provide some of the necessary

background). An annoying quirk is the placement of the table of contents some 53 pages into the text following the preface and summary (both given in English as well as French); thus, it is somewhat difficult to find the table of contents itself, as well as to locate specific articles.

Several useful features grace the text, including the summary given in the beginning by S. Jordan (which provides a "road map" for the remainder of the volume), and the final chapter (by R. Rutten and L. Cram), in which possible future research directions are outlined. The coverage of the literature is more than

adequate, and includes lists of spectral atlases and the like. On the whole, the editor has assembled a monograph of great value to the budding solar astronomer: it is an ideal text for an introductory course in solar and stellar astronomy (even its price is very modest in comparison to standard monographs in astronomy), and provides an adequate and well-referenced overview for all astronomers interested in solar phenomena and its analogues in astrophysics. □

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Changeable cells

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Cell Differentiation: Molecular Basis and Problems.

Edited by Lutz Nover, Martin Luckner and Benno Parthier.
Springer-Verlag: 1982. Pp. 650. DM118, \$55.

The prime object in the study of cell differentiation is that of understanding the mechanisms of gene expression and their regulation. The complexity of these mechanisms is exemplified by the fact that probably no other phenomenon in biology draws so heavily upon so many research areas, including molecular genetics, immunology, mechanism of hormone action, cell reproduction, tumour biology, virology and others. The contributors to *Cell Differentiation* take a correspondingly broad approach to the subject, exploiting what has been learned from a wide variety of experimental systems to assess where we stand.

The book is divided into three parts. The first deals with general molecular genetics of prokaryotes and eukaryotes — for many readers this is all review, but it is well done and should be valuable for even advanced students — whilst Part II contains a detailed discussion of the principles of gene expression and its regulation as these principles have developed from the study of many kinds of prokaryotes and eukaryotes.

Both of these sections are up-to-date, comprehensive and well referenced. There are a few gaps, however. Almost nothing is said about studies on differential transcription of mRNA during development, abundance classes of mRNAs and differences in mRNA populations among different tissues. Some readers may be unhappy about the absence of information on patterns of repeated and unique sequences and their possible significance in gene function. No mention is made of the Britten-Davidson model of regulation of expression. Some might also object to the broad definition of cell differentiation as virtually any change in gene expression.

For the authors, differentiation may be reversible or irreversible, includes the phenomenon of "determination" during development, and applies to substrate-mediated regulation of gene expression in prokaryotes.

The final section consists of in-depth descriptions and analyses of a wide range of experimental systems that bear on gene expression or cell differentiation. These include contributions on the arabinose genes in *E. coli*, chloroplast differentiation, insulin action, isozymes, storage proteins in plant seeds, the immune system, bacteriophage cycles, morphogenesis of *Acetabularia*, development of *Dictyostelium*, plant crown gall tumours, oncogenesis in animals, the cell reproductive cycle, polytene chromosomes and several other topics. Some of these chapters are more thorough than others, but all are worth reading. The main criticism is the omission of references to some important research publications. The reader could also immediately think of other analyses or experimental systems that perhaps should have been included. For example, almost nothing about the rapidly developing field of developmental genetics appears in the book. One might also have wished for a short final chapter to summarize the principal conclusions and insights gained from various experimental systems, and to formulate an outline of what remains to be done.

It is easy to criticize books on cell differentiation and development because the problem has so many intricacies — everyone has his own ideas about where and how the solution should be sought. The editors and authors of this book have theirs. Overall, this is nonetheless a valuable book; it is well organized and clear, and contains an enormous amount of accurate information about a wide diversity of organisms. Although the book deals with research areas that are moving ahead rapidly, it should for many years provide both students and researchers with a rich source of basic information. □

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