Radioastronomy of the Sun

Solar Radiophysics. Studies of Emission from the Sun at Meter Wavelengths. D. J. McLean and N. R. Labrum, Eds. Cambridge University Press, New York, 1985. xii, 516 pp., illus. $59.50.

This book is concerned with the radio emissions at meter wavelengths that originate primarily in the tenuous plasma of the solar corona. A rich and complex variety of phenomena are observed in this spectral region. The book presents a picture of these phenomena and interprets the observations in terms of the physics of the solar corona and radiation processes. The editors intend that it will be of value to the specialist in both observational and theoretical aspects of the subject and also to workers in related fields who require a more general background on the subject. Such a book is needed because of the progress made since the publication, in 1964, of M. R. Kundu's *Solar Radio Astronomy*. The book also marks the end of an era. The CSIRO radio heliograph in Culgoora, Australia, put into operation in 1967, was decommissioned in 1984. The authors of the book are those who built, operated, and interpreted the data from this unique facility.

The first part of the book, Introductory Concepts, provides historical background and essential information on the solar atmosphere and flares as well as theoretical concepts bearing on the generation of radio waves in a plasma. The historical chapter by J. P. Wild, one of the pioneers in this field, is quite informative and conveys the excitement that must have been generated by the early discoveries in the field. D. B. Melrose covers the basic theory of radio emission in a plasma in a coherent and easily understood manner. Part 1 will meet the needs of the nonspecialist and could be used as well by students entering this field. The second part of the book, Instrumentation, needs an introduction to basic concepts. It would have been helpful to begin the section with a simple discussion of such topics as antennas, radiometers, and polarization. As it is, the authors start out by introducing "a typical metre wave solar observatory" but discuss, instead, the unique Culgoora Observatory. Nevertheless, the discussion of the observing problem and required instrumentation is well done. Of particular interest is the description of the measurement of solar brightness distributions and how this was accomplished at Culgoora. Part 3, Theory, brings together much of the important information on solar radio emissions from plasma, gyromagnetic, and bremsstrahlung processes. There are also discussions of electron beam and radio wave propagation through the solar corona. This section will appeal mostly to the theoretician. Some critical historical references are omitted, and there is perhaps too much emphasis on the authors' own work. The fourth part of the book, the longest, consists of a number of reviews on the radio observations and their interpretation. Although there is a wealth of information in this part of the book, it does not come across as a coherent unit. There is too little cross-referencing and often too much emphasis on the authors' own research. The final part of the book, The Future, says little and could have been omitted.

Generally speaking, the book does meet its specified goals. Written by a group of researchers each of whom has made major contributions in this field, it is a valuable resource for the specialist and nonspecialist alike.

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North American Plants

Flora of the Great Plains. The Great Plains Flora Association. University Press of Kansas, Lawrence, 1986. viii, 1392 pp., illus. $55.

Many people think of the Great Plains as interminable grainfields—the part you sleep (or daydream) through when driving across the country. This book demonstrates that the Plains are diverse and interesting and that the composition of their flora is changing and worth notice. Moreover, it accomplishes this with a minimum of technical terminology, so the information is accessible to, and will interest, nonprofessional and professional alike. By including the transitional area between forest and grassland, the authors present a coherent picture of the complexity of variation and distribution of the plants, many of which have their easternmost or westernmost populations within the *Flora*'s area. R. B. Kaul, in his chapter "Physical and floristic characteristics of the Great Plains" (which, with acknowledgments and introduction by T. M. Barkley, is the introductory part of the book), points out that the flora is a relatively new one, composed of grassland species that replaced cool-temperate forest species as the climate warmed at the end of the Pleistocene. General discussions (among the best parts of the book) that accompany the keys and descriptions often mention the apparent expansion or contraction of a taxon's range, making it clear that the flora is still evolving. The feeling of active change is maintained through discussions of probable hybridization and introgression and extent of morphological variation.

Flora of the Great Plains provides descriptions, distributions, and identification keys for all vascular plants that occur spontaneously in the area between the eastern base of the Rocky Mountains, the western border of continuous eastern forests, the Canadian border, and northern Texas. It was edited, and mostly written, by 14 taxonomists from 12 institutions, who formed the Great Plains Flora Association (GPFA) in the mid-1970s at the suggestion of Ronald L. McGregor (University of Kansas). The GPFA completed an *Atlas of the Flora of the Great Plains* in 1977 as a first step toward publication of the *Flora*, of which T. M. Barkley is the primary editor.

By my count, 2933 species in 841 genera and 160 families are treated in detail, with many more mentioned in discussions. Families are circumscribed and arranged following Cronquist's *Integrated System of Classification of Flowering Plants* (Columbia University Press, 1981); the listing of genera and species is alphabetical. The descriptions are thorough and consistent. The GPFA members wrote most of the treatments, although other authorities contributed for some groups. The authors studied more than a million specimens in herbaria of the GPFA member institutions. Some of these were recent collections, made as part of the *Flora* project; most were earlier collections, many of which had not been consulted before for regional floras or even monographs. Recent literature was consulted and is cited. Names found in two dozen relevant floras are accounted for through synonymy, but the greatest contribution here may be the disposition of numerous taxa recognized by Rydberg in his *Flora of the Prairies and Plains of Central North America* (New York Botanical Garden, 1932), which until now was the only available reference for the area and which maintained an extremely narrow species concept. The present *Flora* will be of great value to agronomists and other land managers because it includes information on dangers of species poisonous to livestock and on potential weeds, phytopathology, and conservation status.

Distributions are given to the state level, except when they are restricted or disjunct, in which case counties are specified. A map showing the counties is unfortunately lacking. General distributions outside the *Flora* area are also given, and there are tantalizing references to what might be happening beyond the area. In many cases taxonomic problems within the area could not be