Stellar Physics

The Brightest Stars. CORNELIS DE JAGER. Reidel, Boston, 1980 (distributor, Kluwer Boston, Hingham, Mass.). xii, 460 pp., illus. Cloth, $73.50; paper, $31.50. Geophysics and Astrophysics Monographs, vol. 19.

The last monograph on high-luminosity stars, by Cecilia Payne, was published in 1930. As de Jager points out in his introduction to the present volume, that was an important time in the development of stellar physics. The discovery of Saha's law about 10 years earlier had provided the foundation for a quantitative interpretation of stellar spectra. We are now again at a critical point in our analysis of the brightest stars. New observational techniques, including radio and infrared measurements as well as x-ray and far-ultraviolet studies from Earth-orbiting satellites, allow analyses not only of the stellar surface but also of the extensive envelopes that result from the mass loss that is ubiquitous among stars that are 10,000 (or more) times as luminous as the sun. At the same time, advances in theoretical techniques allow the treatment of extended atmospheres that are not in radiative or hydrostatic equilibrium. The study of the physics of extended atmospheres and the associated mass loss is critical to our understanding not only of the evolution of individual stars but also of the evolution of entire galaxies. Most of the elements heavier than helium are synthesized in the interiors of massive stars and are returned to the interstellar medium for incorporation into new generations of stars through stellar winds or supernova explosions.

De Jager has set himself the formidable task of surveying both the theory and observations of the most luminous stars in order to summarize modern thinking about their structure and evolution. The book ranges from the hottest to the coolest stars and includes extensive discussion of the chromospheres and coronas of supergiant stars. There is also an entire chapter devoted to novas and supernovas. The emphasis of the book is on the physical processes involved in determining the temperature and luminosity limits for stars, in driving mass loss and controlling the temperature and excitation conditions in stellar envelopes, and in producing variability in stars that are near the limits of stability.

The book is best suited for readers who already have a fairly complete background in stellar atmospheres. The professional astronomer who is interested in an up-to-date introduction to research on the brightest stars—or who is interested in doing such research himself or herself—will find it extremely useful. The number of typographical errors is distressing, however, and the English often awkward. It is indeed unfortunate that a book as valuable as this one should be marred by lack of editing.

SIDNEY C. WOLFF
Institute for Astronomy, University of Hawaii, Honolulu 96822

A Model System

Growth and Differentiation in *Physarum polycephalum*. W. F. DOVE and H. P. RUSCH, Eds. Princeton University Press, Princeton, N.J., 1980. xx, 252 pp., illus. $25.

The last two decades have seen a coming and going of a host of so-called model eukaryotic systems professed to be capable of shedding light on the complexities of metazoan development and differentiation. Most of these systems have fallen short of the aspirations for them for one reason or another. This book is a collection of six critical essays that proclaims the potential of yet another lower eukaryotic model system, the plasmodial slime mold *Physarum polycephalum*. Major emphasis is placed on the unique experimental utility of the system, its past contributions to cell and developmental biology, and the areas in which it is likely to be important in the future.

A pivotal paper by Gorman and Wilkins outlines in concise style the rich biological attributes of *Physarum* and sets the stage for the remainder of the book. Although the life cycle of this organism has been reviewed many times, the authors present a refreshingly new approach in which the differentiations initiated from the unicellular stages of the life cycle are compared to their better-known counterparts that occur in the plasmodial stage. The authors conclude that similar regulatory processes may underlie these developmental events.

The remainder of the volume is primarily devoted to three areas in which the *Physarum* system has made worthwhile contributions in the past and in which the possibilities for future advances appear to be most likely—the regulation of DNA replication and mitosis (Holt), transcriptive events during the cell cycle (Melera), and the elucidation of the roles of histones, nonhistone chromosomal proteins, and nuclear actin in genome structure and function (Walker *et al.*). This section of the book is highlighted by Holt's review of the unique suitability of the naturally synchronous plasmodium for studies of the regulation of cell cycle development. The ease with which plasmodia positioned at different stages of the cell cycle can be made to fuse with one another has revealed the existence of a diffusible factor (or factors) that regulates the timing of mitosis by an "averaging" mechanism. The system appears to permit the isolation and characterization of the active components, an endeavor that will obviously be quite rewarding. The critical nature of these essays is welcome, for it is a feature not often seen in previous reviews of the voluminous *Physarum* literature.

With the exception of a comprehensive treatment of genetic strains and methods by Haugli *et al.*, the book offers little assistance to the uninitiated on techniques for the maintenance and study of the various life cycle stages of *Physarum*. The relevant information, however, is referred to at a number of places in the text, including an anecdotal introductory chapter by H. P. Rusch, the recognized father of biochemical research on *Physarum*, in which the history of the *Physarum* cultures and research at the University of Wisconsin is lucidly recalled.

The volume achieves what it is meant to. The reader gets a critical appreciation for the uniqueness and utility of the system as well as for its drawbacks. One is left with the opinion that this is one eukaryotic model system that is deserving of concentrated efforts with modern biochemical methods.

WILLIAM R. JEFFERY
Department of Zoology, University of Texas, Austin 78712

Tumor Virology Updated

Molecular Biology of Tumor Viruses. Second edition. Part 2, DNA Tumor Viruses. JOHN TOOZE, Ed. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1980. xii, 958 pp., illus. $55.

Seven years have passed since the publication of the first edition of this monograph, which described important elements of the biology and molecular biology of DNA and RNA tumor viruses in one volume. In the ensuing period, the field has undergone a logarithmic expansion, and many questions that were unapproachable when the first edition was written have now been answered. So much information is now available that the editor has wisely chosen to present it in three separate volumes. (The other