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.

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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.

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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

two volumes will deal with transformed animal cells and the RNA tumor viruses.)

The present volume does justice to the progress that has been made in our knowledge of the biological behavior and molecular biology of several major classes of DNA tumor viruses in this relatively short period. The book is introduced by a clearly written chapter on the basic features of the major DNA tumor virus groups that effectively molds much seemingly disparate information into a coherent unit. There follows a series of comprehensive and knowledgeable reviews of the biology and molecular biology of individual viruses. The ordering of these chapters is logical in that discussions of small viruses are followed by discussions of viruses of increasing genome size. The biological and the known molecular biological properties of SV40 and polyoma viruses, the human papovaviruses, papilloma viruses, adenoviruses, adenovirus-SV40 hybrids, herpes simplex, and other oncogenic herpesviruses such as Marek's disease virus, Epstein-Barr virus, herpes saimiri and ateles, and Lucké frog virus are individually considered. Where presented, critical examinations of molecular biological mechanisms are generally incisive, and many enlightening illustrations and tables are provided. A number of judicious attempts are made to relate important features of the biology, replication, and control of gene expression and what is known of the transforming mechanisms of certain viruses to analogous features of others, helping to give cohesion to the volume. A comprehensive bibliography follows each chapter.

The monograph is replete with information useful for the planning of experiments on most of the viruses considered. As one example, detailed restriction maps of prototype DNA's of types 1 (F) and 2 (G) herpes simplex virus and Hsu I maps of the four isomers of herpes simplex virus type 1 DNA are presented in a well-integrated figure. Another example is a particularly useful and unique flow diagram denoting the individual experimental manipulations involved in the isolation of each of the non-defective and certain defective adenovirus-SV40 hybrids. In addition, for investigators interested in the papovaviruses and adenoviruses, there are appendixes containing details of the genome structure of SV40, polyoma virus, BK virus, and the group A, B, and C human adenoviruses. Included are the complete nucleotide sequences of SV40, polyoma virus, and BK virus and partial nucleotide sequences of certain of the human adenoviral genomes, along with detailed restriction maps of these viruses.

This volume should serve as an invaluable reference for both investigators and students.

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A Regional Prehistory

The Archaeology of New England. DEAN R. SNOW. Academic Press, New York, 1980. xvi, 380 pp., illus. $32.50. New World Archaeological Record.

With the New World Archaeological Record series, Academic Press has breathed new life into an ambiguous and tenuous literary genre—the regional culture history. To Snow's credit, he has striven in this contribution to the series to transcend the traditional descriptive-catalogue format for regional prehistories. He has, however, in keeping with tradition, eschewed a consistent theoretical perspective. Instead, he presents sets of ideas about prehistory. The ideas, drawn from many discrete sources, are frequently inconsistent from one context to another within the book. With such a structure it is very easy for an author to depend on crisp aphorisms and confident assertions rather than fully reasoned arguments. Because of this, the book raises anew the old questions about the intended audience and the ultimate purpose of regional prehistories. For whom is Snow writing, and does he mean primarily to entertain or to instruct?

Snow's definition of New England is novel, based as it is upon a combination of river drainages and narrative convenience. Extensions to the northeast to include the St. John drainage and to the south to include Long Island are defensible on both geographic and demographic grounds. The inclusion of the main-stem Hudson valley is justified mainly by historic criteria—the occupation of the area by Algonquian-speakers—while that of the Mohawk valley is rather more arbitrary, being justified because the Iroquoian Mohawk provide a cultural and historical contrast. Snow approaches New England from its margins; he presents the coast of Maine and the Hudson and Mohawk valleys in detail. The farther the narrative extends from either edge, the more the details blur, leaving the center blank in much of the discussion and on most of the distribution maps.

After a brief chapter introducing the reader to the author's approaches to New England's prehistory, an ethnohistoric tour of the region sets the stage and introduces the historically identified peoples. The remaining six chapters trace prehistoric events and phenomena up to the European colonization in the early 17th century A.D. The chapters are integrated by recurrent themes which together are specifically identified as important departures from "traditional" archeological historiography. The first of these is the contention that river drainages reliably defined community or group boundaries. Though this may be true at a high level of abstraction, the principle gives Snow repeated difficulties throughout the text.

A second major theme, "the use of radiocarbon and other independent dating techniques to define temporal [units]" (p. 13), is offered in opposition to the use of stylistic criteria for temporally grouping archeological assemblages. Rigid adherence to the principle Snow advocates might well give us a different kind of prehistory, albeit a geochronologically suspect one. Snow, however, is not so consistent in applying it as his reiterations would lead one to expect.

As some commitments to theoretical models are inescapable, Snow chooses versions of the "focal-diffuse" subsistence model and a "systems" perspective for cultural description. A list of 14 cultural subsystems is used to provide comparability between ethnohistorical and archeological cultural reconstructions. The relationships between the subsystems within any functioning culture are not explored. The "religious subsystem" is repeatedly equated with burial practices, to the detriment of both concepts. The social organizations inferred for both historic and prehistoric peoples owe little to recent work in this subject, or to systems logic. An ambitious attempt is made to estimate population densities through time and space.

In the Paleo-Indian chapter, Snow's willingness to range far from the generous boundaries of his New England in search of cultural and paleoenvironmental analogues makes the environmental parts very weak. The environmental literature cited is not notably current, and some discredited notions about late Pleistocene climates, environments, and biota mar the text. The discussion of Paleo-Indian lifestyles reflects little of the recent spate of published research on living hunter-gatherers, caribou as human prey, or optimal foraging strategy modeling. The number of factual errors