future years. In this vein, one might wish that the authors had laid to rest the notion that there is something special or unique about primary induction, other than spatial and temporal complexity involving a series of secondary inductions.

The researcher, the lecturer, and the student will find this volume an invaluable sourcebook. Cross-checking of techniques, embryo stages, and similar details has enabled the authors to offer plausible explanations for apparent contradictions found in the literature. This, plus such complete coverage of the data available up to 1961, allows one to use the book to establish the place of individual research papers in the overall scheme of current knowledge.

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Histone Chemistry and Biology

The Nucleohistones. James Bonner and Paul Ts'o, Eds. Holden-Day, San Francisco, Calif., 1964. xviii + 398 pp. Illus. $12.75.

There is good reason to believe that the histones, a class of basic proteins which occur in the nuclei of animal cells, are chemically combined with the DNA of the nucleus. Since the quantities of histone and DNA present are about the same order of magnitude, it is not surprising that, as the biochemical role of DNA has become understood, many investigators have begun to wonder what the histones might be doing to the biochemical properties of DNA. Impetus was given to the study of this problem by the suggestion, made nearly 15 years ago by Stedman and Stedman, that histones may act as regulators of gene activity, giving rise to differentiation of morphology and function in animal cells, all of which have the same complement of genetic material.

The Nucleohistones is a collection of papers presented at a meeting held in April 1963, to review all aspects of histone chemistry and biology. Many of the chemical papers deal with details of preparation and chromatographic fractionation. J. M. Neelin, in his discussion of preparation of histones from chicken erythrocytes, writes that "Either histones have presented chemists with an unprecedented array of precise and reproducible artifacts, or histones examined by current techniques exhibit an imposing heterogeneity." Under these circumstances, it is difficult to carry out physicochemical analysis of the histones either free or in combination with nucleic acids. Some attempts have been made by means of infrared spectroscopy and optical rotatory dispersion to determine the secondary structure of histones combined with DNA. Tentative models have also been proposed for a regularly ordered histone-nucleic acid structure, based upon x-ray diffraction studies.

The majority of papers are concerned with the biochemistry of the histones, and with their possible regulatory role. Although no conclusive demonstration of this role has yet been presented, a number of experiments discussed by Allfrey and Mirsky, and by Bonner and Huang, show that histones are capable of inhibiting DNA-primed synthesis of RNA, and, through it, synthesis of polypeptides in vitro. Furthermore, different histone fractions are not equally effective inhibitors, although there does not yet appear to be any simple correlation between the chemical properties of the fraction and its effect. A number of excellent and relevant papers are devoted to such diverse topics as the control mechanism of puffing in giant chromosomes, the effect of polyamines on DNA-dependent RNA synthesis, and the electrical properties of DNA in solution.

The questions raised by the presence of the histones have not been completely answered. It appears likely that histones exhibit some regulatory role; but their mechanism and scope of action are not understood, nor is it at all clear that they are the sole regulatory substance. Histones are held to the DNA helix by strong electrostatic interactions, but the overall strength of the interactions does not appear to be determined solely by the charge on the protein, depending apparently on details of amino acid sequence and local configuration which remain to be elucidated. The contributors to this book are aware of these problems. It is probable that the most revealing experiments will be carried out during the next few years; this book is a useful record of the discussion of an important scientific problem at a crucial moment in its development.

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Astronomy

Star Evolution. Course 28, International School of Physics, "Enrico Fermi," 1962. L. Gratton, Ed. Academic Press, New York, 1964. x + 488 pp. Illus. $18.50.

This volume contains the text of lectures given at a summer course in Varenna, Italy, in 1962. The level is suitable for research workers and advanced graduate students in astronomy. Seventeen papers cover various subjects relating to the evolution of stars, ranging widely both in stellar types considered and in theoretical techniques employed. About a third of the papers relate to specialized pieces of research, but the remaining majority attempt to survey parts of the area from some general point of view. The editor, who also directed the course, succeeded in assembling an outstanding group of lecturers, many of whom had made major contributions in the areas that they cover.

Among the papers are several of particular interest. A. R. Sandage and L. Gratton survey the empirical approach to evolution, including a thorough discussion of the use of homology arguments. G. Burbidge covers nuclear astrophysics quite thoroughly in a paper reprinted from *Annual Review of Nuclear Science*, (1962). E. Schatzman discusses the pre-main-sequence stages in great theoretical detail, culminating in a presentation of his theory of the origin of stellar rotations and magnetic fields. R. Kippenhahn surveys progress on post-main-sequence models with inhomogeneous composition, including some excellent visual presentations of this complex material. N. Baker summarizes recent work on pulsating models for cepheids, and P. Ledoux discusses the general theory of stability. Other general papers cover stellar-model calculation (M. Wrubel), very young groups (L. Gratton), nebular variables (L. Rosino), evolution of galaxies (E. M. Burbidge), stellar hydromagnetics (I. W. Roxburgh), and close binaries (M. Hack).

The papers are for the most part quite clearly written, although it is unfortunate that the manuscript was not subjected to a final editing by someone whose native language is English. The price of the volume is regrettably high.

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