

Switching of globin genes

Cellular and Molecular Regulation of Hemoglobin Switching. Edited by G. Stamatoyannopoulos and A.W. Nienhuis. Pp. 792. (Grune and Stratton: New York, San Francisco and London, 1979.) \$68.50.

THIS multi-authored book contains the proceedings of a conference held in June 1978 which aimed to review the areas of haemoglobin synthesis and red blood cell differentiation pertinent to developmental and physiological 'switching' of globin genes. The sheer volume of information in this book is staggering, and it is difficult in this review to do justice to all 48 articles. The style of presentation was left to individual authors and I found most papers very readable, with many contributors presenting their work in a more general, and generous, way than is usually found in the literature. One disappointing feature of the book is that it lacks a general overview of the type previously published for the meeting (see *Cell*, 15, 307-315; 1978), and this leaves the reader to judge how far the field had progressed in 1978.

The book is divided into three main sections covering the changes in haemoglobin synthesis during development, haemoglobin switching and erythroid differentiation, and the molecular biology of globin genes. The first article by Weatherall clearly describes what is known about the genetics of human disorders that are characterised by the persistent synthesis of fetal haemoglobins after birth, and subsequent papers examine human fetal globin chain synthesis *in vivo*. Using animal models for studying the 'switching' of haemoglobins, the concept of stress erythropoiesis in baboons (De Simone *et al.*) and in sheep (Wood *et al.*) is introduced, leading to a series of articles describing the controls of haemoglobin synthesis in these model systems.

Attention is next focused on erythroid precursor cells with articles showing the hormone influence on differentiation and the differences between stem cells isolated from bone marrow and peripheral blood. Highlights of this section include a review by Eaves on erythropoietic differentiation. Rapid progress has been made in the culture of haemoglobin-producing cells *in vitro* and Nienhuis shows examples of this in an article on 'switching' in cultured sheep stem cells. Ingram proposes a provocative model to explain the possible effect of various chemical inducers on the metabolic events in Friend cells which leads to differentiation and the subsequent accumulation of globin mRNA species.

The final section of the book deals exclusively with the molecular layout of globin genes and includes an elegant description of mouse β -globin gene

arrangement by Leder and an explicit guide to cloning genomic DNA in λ bacteriophage by Lacey *et al.* A series of three papers show how the human globin gene map looked in 1978. Globin mRNA is well reviewed in a series of articles covering such topics as sequence, modification, processing, and developmental changes. In the final part entitled "Control of globin gene expression", Weintraub proposes how classes of nuclear protein may interact with DNA in active genes conferring the conformation required for specific expression; this is the only paper to mention nucleosomes. Young *et al.* show the use of DNase I for probing active globin genes in fetal and anaemic sheep, their results

indicating quite different mechanisms for gene activation and deactivation. Finally Deisseroth and Hendrick explain their results with cell fusion and Anderson *et al.* report the progress in trying to use cell microinjection as a potential assay for those elusive regulatory factors.

I feel sure researchers in the haemoglobin field will find this a valuable reference book. It also offers much to the clinician attempting to understand the newer areas of biology.

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Rotating stars

Theory of Rotating Stars. By J.-L. Tassoul. Pp. 506. (Princeton University Press: Princeton, New Jersey, and Guildford, UK, 1979.) Hardback £25; paperback £9.40.

ROTATION pervades the domains of astronomy at every level: planetary, stellar, galactic, and beyond. This book is devoted to the stellar level. The study, both observational and theoretical, of rotating stars is a growing speciality among astrophysicists. No other reference work in the subject even attempts the breadth of coverage presented in this book. It will be heavily used, not only by specialists, but also by non-specialists looking for a concise and authoritative picture of the status of one or another branch of the subject. The explanations are sufficiently clear and self-contained that it could serve as a graduate-level text.

The first two chapters summarise the historical development and observational background, emphasising the problems confronting theory, thereby motivating the choices of theoretical questions found in the remainder of the book. These are followed by a chapter on hydrodynamics, specialised to the conditions prevailing in stars. This is an especially important chapter. It underlies the rest of the book in the sense that virtually all questions subsequently addressed are formulated as hydrodynamical problems. It is not an easy matter to develop hydrodynamics in one chapter (in fact, certain special aspects of the subject, stability theory in particular, are developed in chapter six). Tassoul does a very good job in my opinion, both in explaining the subject matter and in guiding the reader to the literature. For example, specialists in stellar hydrodynamics have had an unfortunate tendency to ignore the large and related body of material in geophysical hydrodynamics. Tassoul is careful to make

the appropriate references to the geophysical literature.

Chapters four to seven are very much preparatory, theoretical, and hydrodynamical in nature, covering steady-state models of rotating axisymmetric stars, techniques for constructing them, techniques for studying their stability, and some results of a general character regarding their stability. Chapter four, on permanent rotations, collects a number of classical results on the nature of the allowable rotating configurations, many of which appear only in older, relatively inaccessible texts or articles. Some are given in detail, like Hamy's proof that a centrally condensed barotrope cannot be stratified on concentric spheroids. Others are only stated, like Lichtenstein's theorem that a uniformly rotating and uniformly dense self-gravitating mass possesses an equatorial plane of symmetry. In chapter five, a number of approximate methods, perturbation and numerical, for constructing rotating configurations, are described. Chapter six is devoted to an up-to-date description of stability techniques, some of which find applications in chapter seven to obtain limitations on the allowable distributions of angular momentum.

The discussion of specific subspecialties begins with chapter eight (on meridional circulation) and concludes with chapter sixteen (on rotation in close binaries). In between there are chapters on the Sun's differential rotation, on the distinctions between uniformly and differentially rotating models, on the questions of collapse and fission, on a closer examination of the relation of the models to observations, on white-dwarf stars, on oscillation and stability properties, and on magnetic fields in rotating stars.

There exist some books and review articles covering some of these narrow areas in depth, and others covering broader areas superficially. Until the appearance of this book, there existed no reference attempting broad coverage in depth. Tassoul has filled this gap with a high standard of scholarship. In some respects,