Abnormal haemoglobins

Human Hemoglobins. Edited by H. F. Bunn, B. G. Forget and H. M. Ranney. Pp. 432. (Holt-Saunders: London; Saunders: Philadelphia, 1977.) £17; $18.

STUDIES of the inherited disorders of haemoglobin have contributed greatly to knowledge about abnormal gene action in human disease. In addition, they have made a considerable impact on such diverse fields as population genetics, anthropology, and developmental biology. The subject came into its own in 1949 with the discovery by Pauling and his colleagues that patients with sickle cell anaemia have an abnormal haemoglobin. Since then much has been learnt about the genetic control and synthesis of the human haemoglobins, and in the past few years the genetic defects in several disorders of haemoglobin synthesis have been defined at the molecular level. Indeed, the human haemoglobin field is one of the few areas in which molcular biology has made a major impact on clinical medicine.

It was realised in the early 1950s that there are two main types of inherited disorders of haemoglobin. First, there are the structural haemoglobin variants which usually result from single amino acid substitutions in one or other of the globin chains. Although many of these are harmless, some cause a clinical disorder by altering the configuration, stability or function of the haemoglobin molecule. In addition to helping clinicians to undrestand the pathophysiology of some common inherited anaemias, investigation of these haemoglobin variants has provided valuable information about the relationship between the structure of haemoglobin and its function as an oxygen carrier.

Even more fascinating is the information which has been obtained from researches into the disorders characterised by a reduced rate of synthesis of the globin chains of haemoglobin, the thalassaemias. These conditions occur commonly throughout the Mediterranean region, the Middle East, India and Pakistan, and South-East Asia. They cause a major public health problem in these countries and are among the commonest single gene disorders in man. Analysis of the molecular pathology of the thalassaemias has yielded a remarkable diversity of causes for the reduced rate of haemoglobin synthesis. These include gene deletions, chain termination mutations, abnormal crossing over with the production of fusion genes, frame shift mutations, abnormalities of gene transcription, and the production of structurally abnormal mRNA. Studies of the related disorder, hereditary persistence of fetal haemoglobin, have shown that areas of the cluster of haemoglobin genes are involved in the suppression of fetal haemoglobin production in adult life. Further investigation of these disorders by the recently developed techniques of restriction mapping and structural analysis of the globin genes promises to open up another fascinating chapter in the human haemoglobin field within the next few years.

The authors of *Human Hemoglobins* are well qualified to review this exciting field. Helen Ranney was first to show allelism between the genes for haemoglobin S and haemoglobin C and has made many important contributions to our understanding of the pathophysiology of the abnormal haemoglobin disorders. Frank Bunn has contributed a great deal to knowledge about the function of both normal and abnormal haemoglobins, and Bernard Forget has done valuable work in unravelling the molecular pathology of the thalassaemias and on the structure of human mRNA. As might be expected this trio have produced an excellent book. Early chapters deal with the structure and function of haemoglobin and the way this is modified in various disease states. Subsequent sections deal with the structural haemoglobin variants and thalassaemias, and the book ends with an excellent section describing some of the acquired disorders of haemoglobin. The writing is clear, lively and remarkably uniform for a multi-author work. The book is very well produced, remarkably free from errors of fact or type, and well illustrated; and there is an extensive and up-to-date bibliography. By current standards, it is reasonably priced.

It is impossible for one modest sized volume to deal comprehensively with every aspect of the abnormal haemoglobin field. If this book has a fault it is in its rather superficial treatment of the more clinical aspects of the structural haemoglobin variants and thalassaemias. Furthermore, it makes no attempt to deal in detail with such problems as genetic counselling, the population genetics of the haemoglobin disorders or the more practical aspects of laboratory diagnosis of these conditions. However, these minor criticisms detract little from what is an excellent account of a fascinating field. Indeed, the sections on the function of haemoglobin and its modification in different diseases, which are by far the clearest descriptions of this complicated subject that the present reviewer has read, alone are worth the price of the book. Both authors and publishers should be congratulated on *Human Hemoglobins*. It can be thoroughly recommended to anybody who wants an up-to-date account of this rapidly developing field and should be compulsory reading for those who believe that molecular biology has made no contribution to clinical practice.

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Mammalian circulatory mechanics

The Mechanics of the Circulation. By C. G. Caro, T. J. Pedley, R. C. Schroter and W. A. Seed. Pp. 527. (Oxford University Press: Oxford, London, New York and Toronto, 1977.) £22.

ABOUT one third of this book deals with basic mechanics, and as might be expected the emphasis falls strongly on the fluid dynamics. Personally I would have liked rather more on solid mechanics and mass transfer, but the balance is not at all unreasonable and the material is presented with admirable clarity. In the remainder, mammalian circulatory mechanics are discussed at length. There are chapters on the heart and the veins, regions frequently covered scantily (if at all) in texts of this sort. I was least satisfied with the chapter on the heart, but this really reflects the extreme difficulty of describing its action both succinctly and accurately. Most of the biological chapters contain suggestions for further reading, but the physical ones do not.

The book reads well and gives little sign of having been written by four authors, two with a medical background and two physical scientists. Although the quirky individuality of McDonald's *Blood Flow in Arteries* (its major competitor) is missing, this new work covers more ground and in greater depth, and deserves to become a standard text. Much has been learnt in this field over the past 20 years, and further progress is likely to be slower and tougher. This is a good time therefore, to take stock and those who want to know what has been achieved will find here a good summary. Although the authors address their text principally to biologists and physicians, my own feeling is that it might be of rather greater interest to those approaching the subject from the other side. Although not intended as a research text, I would have welcomed some references and more suggestions for further reading, especially in the first part. The book is well produced, the illustrations are clear and to the point, but at £22 few will be able to afford their own copy; however, I would want to place it in undergraduate and hospital libraries.

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