

principles of human genetics, with plenty of illustrations and tables, and should provide a very adequate introduction to genetics for those new to the subject. The rest of the book consists mainly of 10 chapters (126 pages) on clinical applications of medical genetics. This covers all the main conditions, with useful summaries, where knowledge is available, on their diagnosis, prognosis and genetics and a number of photographs. The scientific aspects of genetic counselling are discussed in some detail. Finally, there is a short and simple statistical appendix, a self-assessment section of about 260 statements to be classified as true or false by the student, with a key; a glossary, a page listing reference text books, and an index.

This book packs a great deal of information into its 280 pages, and should meet its purpose admirably. The price is commendably low, and, in view of the very wide interest in medical genetics, it deserves to find a place on the shelves of many biological libraries. Some readers will regret the lack of more detailed references, and non-geneticists may have difficulty in understanding some of the figures, where more labelling and more extended legends would make it unnecessary to consult the class demonstrator.

Examples are: Fig. 3.9 deserves an arrow to mark the fluorescent (misspelled in legend) Y chromatin, since there are possibly two or more spots visible; Fig. 3.14 leaves one free to deduce that the chromosome pair shown in position 2 contains two pairs of gorilla chromosomes, but these should be labelled and a reference to comparisons with other primate chromosomes would be worth while here. Fig. 4.11 does not show up the Barr body very clearly, and might be replaced by photographs of cells showing one and two Barr bodies, all labelled with arrows. These, along with occasional misprints, are minor points.

It should also be noted that there is nothing in this book of obvious relevance to dental practice (haemophilia, drug sensitivities?), and dental students may feel left out in the cold. The photograph illustrating haemophilia A is not very informative, because of its rather poor quality.

Finally, I must congratulate the authors on their deduction that Noah was a homozygote for generalized albinism (page 71). Whether their quotation from the Book of Enoch really applies to Noah, however, is questionable. Lacking carbon dating of Noah's Ark, we can guess that he probably lived (if an actual person, which is very questionable) 3000 years or more B.C. But the quotation about Noah must have come from either the Ethiopic Book of Enoch, written in the second and first centuries B.C., or the Slavonic Book of Enoch, written between 30 B.C. and 70 A.D.: both books are considered multi-authored, and of doubtful historical reliability. I suggest that one of these many authors saw (or fathered) an albino boy, was struck with his beauty and wrote him into the script. Moreover, on a more literal view of the Bible, Noah and the Ark must have formed a genetic bottle-

neck, so many albino children would have appeared among his descendants and would have been recorded in the Bible.

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The New Genetics and Clinical Practice. By J. WEATHERALL. Oxford: Oxford University Press. 206 pages. 1986. £8.95. ISBN 0 19 261489 4.

This is not just another textbook of medical genetics: it aims rather to alert us to the growing importance of genetically related human disease in the developed countries, and to review the successes, prospects and problems in applying the new techniques of molecular genetics to this major health area. Professor Weatherall expresses a sense of urgency because the rapid advances in human molecular genetics and molecular pathology are having insufficient impact on the clinical services, particularly in Britain. There are, of course, reasons for this lack of enthusiastic response, especially the chronic lack of funds, with too much of what there is being syphoned off into high technology medicine, a generally conservative attitude in the medical profession, and the problems which small overworked clinical departments have in keeping up with the new knowledge.

Weatherall's book makes an admirable attempt to deal with the last of these problems by providing a simply written and very well referenced review of the current state of the applied art of human molecular genetics. Successive chapters discuss 'the frequency and clinical spectrum of genetic diseases', 'how genes work and how they can be examined by the tools of the new genetics', 'the molecular pathology of single gene disorders', 'the molecular pathology of complex gene systems: immunology, cancer and metabolism', 'the prevention of genetic disease', 'the treatment of genetic disease', 'the implications of the new genetics for clinical practice in the future', and 'ethical issues and related problems arising from application of the new genetics to clinical practice'.

The chapter on the prevention of genetic disease points out that prenatal diagnosis, followed where necessary by pregnancy termination, is the only present method of dealing with chromosomal anomalies and single gene disorders. One problem is the relatively late stage of termination made possible by amniocentesis. Chorion villus sampling is a new method of obtaining foetal DNA early enough to make pregnancy termination possible within the first trimester: this has great promise if its good safety record in recent trials, still subject to argument, can be confirmed. Foetal diagnosis can lead to direct recognition of a few single gene disorders where the mutation changes a restriction site pattern, but much broader progress is coming from the discovery of increasing numbers of specific genetic markers in the form of RFLPs (restric-

tion fragment length polymorphisms) on the different chromosomes. Linkage analysis of familial data using RFLPs is making it possible to locate the chromosome segments carrying particular genes in cases where the molecular pathology of the defect is quite unknown – and this is the first essential step in analysis. Recent successes with this approach include Huntingdon's Chorea, Duchenne muscular dystrophy and polycystic disease of the kidney. Oligonucleotide probes have also made it possible to recognise specific gene mutations, e.g. causing sickle cell anaemia, β thalassaemia and $\alpha 1$ antitrypsin deficiency. Rapid development in this area can be expected, and will certainly lead to a demand for much increased laboratory facilities.

The chapter on the treatment of genetic disease is also of particular interest. Current treatments include surgical correction of certain congenital abnormalities, diet control of a few metabolic disorders and replacement therapy for others. Recent attempts to replace missing enzymes, or to replace defective genes by bone marrow transplants, have proved very disappointing so far; but research into possible methods of gene replacement therapy is going ahead very actively. This is the approach which it is popularly assumed will be the natural outcome of genetic engineering, but, as this chapter makes clear, some very difficult problems have to be solved before it can become a reality. Other approaches include attempts to turn on genes which were active earlier in development, such as the foetal haemoglobin genes, but again with little success so far.

Weatherall ends with a very useful discussion of future prospects and ethical problems likely to arise from these developments. To sum up, I strongly recommend this book as essential reading for everyone interested in the prospects and problems of applying genetic knowledge to man, woman, child and foetus. It is very well written, extremely well illustrated, and cheap enough to buy for your private library. As a footnote, I read that a medical team in Tokyo has devised a method of separating X- and Y-bearing human sperm which really works (numerous claims of success during the last thirty years have always remained unsubstantiated). It is claimed to produce a very high success rate for a female child and a slightly lower success rate for a male child. It is being used to prevent the transmission of sex-linked diseases such as haemophilia, and also for women who simply want a daughter. The ethical aspects of an uncontrolled commercial venture of this kind have come under attack.

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Molecular Biology of the Photosynthetic Apparatus.

Edited by K. E. STEINBACK, S. BONITZ, C. J. ARNTZEN AND L. BOGORAD. Cold Spring Harbor, New York: Cold Spring Harbor Laboratory. \$75. ISBN 0 87969 188 3.

The editors of this volume suggest that photosynthesis research has developed in 'eras', as various research approaches have been utilized, and that the last eight years constitutes the era of chloroplast molecular biology. During that time, the application of recombinant DNA technology to help improve our understanding of aspects of chloroplast function and development has certainly had a major impact. The precise and detailed information obtained from analysing genes encoding components of the photosynthetic apparatus has been most valuable to protein biochemists who wish to describe the photosynthetic structures in detail. Cloned DNA sequences have been employed to learn more about the control of synthesis of photosynthetic proteins, and the molecular analysis of photosynthetic mutants has told us much about the structure and function of specific components. These aspects of the photosynthetic apparatus are those which dominate this volume, which is derived from a meeting held at the Cold Spring Harbor Laboratory.

The book begins with an introductory review article by three of the editors, and is then presented in two sections: *Molecular Biology of Energy-Transducing Photosynthetic Membranes*, and *Genes for the Photosynthetic Apparatus*. The first of these sections is comprised of 25 papers dealing with the major macromolecular complexes involved in electron transport, light harvesting and photophosphorylation. The second section is comprised of 21 papers dealing with the chloroplast genome, prokaryotic systems, and nuclear chloroplast interactions. A notable feature of the book is the strong representation given to bacterial photosynthesis, which is most welcome. Increasingly, research dealing with prokaryotic and eukaryotic photosynthesis will overlap, as genes encoding components of the photosynthetic apparatus are transferred between the two groups.

Volumes of this kind often provide authors with the opportunity to present incomplete results or speculative ideas which might not pass the rigours of review in regular journals. This particular volume is no exception, which adds to, rather than detracts from, its value. Also, there is a certain amount of original data, including nucleotide sequences, which will not appear elsewhere. Therefore, the papers in this book will be referred to widely in future publications. Most papers are quite brief, which helps the reader to find the important information in each. It is also helpful to have all references with complete titles. Specific information can also be found by reference to a comprehensive subject index or to the author index. These features, together with the large number of topics covered, will make the book a valuable addition to the bookshelf of teachers and researchers in photo-