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Book Reviews

THE EMBRYOGENESIS OF THE HUMAN SKULL: AN ANATOMIC AND RADIOGRAPHIC ATLAS, R. Shapiro and F. Robinson, Harvard University Press, Cambridge, 1980, 101 pp. $45.00.

This is a beautifully illustrated atlas of the embryogenesis of the human skull. It includes photographs, histological sections, transilluminated Spalteholz preparations, and radiographs. Most of these images are given for ages 9–40 prenatal weeks. The last part of gestation is illustrated at 20, 30, and 40 weeks.

The book consists of a very brief introduction, which gives some data on sequence of ossifications in the skull and the pattern of ossifications, a discussion of the method used for obtaining the various sections, and a list of the specimens that the authors had at their disposal. The remainder of the book is an atlas, consisting of various photographs. The histological sections are accompanied by line drawings with abbreviations rather than names of structures. A list of the abbreviations used in the text is given at the end, which is somewhat inconvenient.

The main weakness of this book is that the authors have not stated how they determined which skulls they picked for their examples of various stages of development and how much effort was made to exclude fetuses that were grossly abnormal. Without this, it is very difficult to be certain that the fetal skulls picked as standards for particular fetal ages are actually valid. Also, there is no information regarding the origin of the various skulls. There could be some difficulties in ossification depending on whether they were from spontaneous abortions or whether they were induced. Another deficit is that the authors use the crown-rump length to determine approximate fetal age. This may be somewhat inaccurate, particularly in the 30–40-week fetuses.

Another problem with the book is that the authors give very few references. For example, the authors do not even refer to their own previous paper (Am. J. Roentgenol., *126:* 1063, 1976).

In summary, this book should be a useful atlas for individuals interested in the skeletal development of the fetus. No such material is presently available. The use of the information from the book has to be applied with care since we know very little about the variability of ossification in the skull.

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GENETIC ENGINEERING: PRINCIPLES AND METHODS, Vol. 2. J.K. Setlow and A. Hollaender, eds. Plenum Press, New York, 1980, 289 pp., $32.50.

The teratologist must look with some amusement at the variety of new techniques which promise answers to age-old problems of morphogenesis. A sphinxlike figure who casts a cynical eye upon these new and noisy workers intruding upon the pyramids comes to mind. Who could blame one for avoiding all the fuss about genetic engineering until clear relevance to development had been established?

Few, of course, have maintained such a cynical view as new concepts of eucaryotic gene structure have surprised even the most ardent proponents of recombinant DNA technology. If one accepts that certain malformations are influenced by genes, then these new insights as to what genes are must be relevant to teratology. In particular, the joining of distant DNA segments to code for a characteristic immunoglobulin protein during plasma cell differentiation is a paradigm for development that cannot be ignored.

If one admits to a general interest in genetic engineering, how rewarding is the new series of monographs edited by Setlow and Hollaender? I believe volume 2 is well-illustrated, clearly written, and covers a suitable range of topics. Despite the rather cheerless print and rough pages, adapted, I presume, for the editors' staged goal of rapid publication, the text is easy to read and free of errors. Most chapters begin with a general introduction but are rather technical and narrow in scope for the acolyte. As summarized below, much of the focus is methodologic rather than speculative, and more tuned to the practitioner than the casual reader.

One achievement of recombinant DNA has been the analysis of multiple copy gene families which consist of similar but nonidentical members. Single repetitive genes can now be picked out and cloned, their family relationships determined, and their chromosomal distribution and organization defined. A nice example of this approach is outlined by Bedbrook and Gerlach in their chapter on cereal plant repeat DNA. After preliminary analysis of the entire cereal genome with a panel of restriction endonucleases, various repetitive DNA fractions were physically enriched and spliced into the plasmid vector pBR 322. The sequence and structure of cloned cereal 5S RNA genes, ribosomal RNA genes, and DNA from the heterochromatic telomeres of cereal chromosomes can then be examined in detail. The most interesting result of these studies is the indication that some cereal repetitive DNAs, like those of higher animals, evolve by linear permutations of simple repeat elements.

A related topic for future volumes is the presence of mobile gene families in higher organisms analogous to transposons in bacteria. These "jumping genes" comprise as much as 5% of the animal genome and may influence recombination, mutation, and expression of their surrounding single-copy sequences in germ-line or somatic tissues. Familiarity with the analysis of repetitive DNA seems well worthwhile for the developmental biologist.

From cereal we go to corn, reading how the several genes for an endosperm storage protein called zein are being cloned, as an example of how gene splicing might be used for crop improvement. Then we encounter genetic engineering at the cellular level in a chapter on monoclonal antibodies. The difficulties and benefits of producing stable myeloma-plasma cell hybrids which secrete pure antibodies to a given antigen are discussed. These techniques are already finding developmental applications in studies of cell-surface antigens.

Except for a chapter describing techniques for measuring messenger RNA concentration, the remaining chapters catalogue the many bacterial and animal virus vectors which can be used to propagate and amplify DNA segments. Here is the gene splicer's Audubon, including bacteriophage lambda, *E. coli* plasmids, the single-stranded phage M13, the phage-plasmid chimaeras called cosmids, SV 40, adenovirus, and even, for variety, a certain plasmid of *B. subtilis*. These chapters are generally well-written and together provide an excellent introduction and review of current DNA cloning methods. The general reader, however, must have sufficient interest to explore nearly 200 pages of occasionally illustrated and exhaustively tabulated description. The article by Hamer on SV 40 stands out for general interest because of its concise introduction to the anatomy, function, and current utility of this important virus in the study of animal gene recombination and expression.

All in all, this sampling of recombinant DNA techniques will be useful to the teratologist as events interest three-dimensional thinkers in these triumphs of linearity. For those engaged in or planning recombinant DNA work, this series is a handy guide to more detailed literature and can be purchased as a continuing order. For the generalist, a glance in the library will probably suffice to keep tabs on these new concepts of gene as they near a rich union with concepts of structure.

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