were busy with their lives rather than waiting for a disaster, and, fortunately, only the relevant scientists were conducting earthquake watches. When the big one comes, watching for it and waiting for it, or even storing water bottles in doorways where they will be safe, are likely to have been irrelevant acts for these millions.

CHARLES PERROW
Department of Sociology,
Yale University,
New Haven, CT 06520

Progenitor Cells

Megakaryocyte Development and Function. RICHARD F. LEVINE, NEIL WILLIAMS, JACK LEVIN, and BRUCE L. EVATT, Eds. Liss, New York, 1986. xviii, 435 pp., illus. $68. Progress in Clinical and Biological Research, vol. 215. From a conference, Woods Hole, MA, Sept. 1985.

In the past two years the availability of cloned recombinant hematopoietic growth factors and considerably better definition of in vitro assays have provided greater insight into the regulation of hematopoiesis. Understanding of megakaryocytopoiesis has lagged far behind. This is not at all surprising considering the rarity of megakaryocyte progenitors, the relative difficulty encountered in the enumeration of megakaryocyte colonies, and, above all, the extraordinary cell biology of platelet production, a complicated process that is simply not modeled in culture conditions in vitro.

Megakaryocytes are normally found plastered against the walls of the endothelial lining of the fronds of marrow tissue that extend into the marrow sinusoids. By a process that is totally obscure, they extend all or part of their cytoplasms through fenestrations in the endothelial lining structure and then shatter into platelets that are swept by the sinusoidal blood into the periphery. The regulation of megakaryocyte production from progenitors, the endoreduplication of the megakaryocyte nucleus, the path of the cell toward the endothelial lining, and the shattering process are all matters that are not understood.

Given the lack of understanding of the system, it is not at all surprising that the growth factor requirements that promote megakaryocytopoiesis are also vague. A variety of factors called thrombopoietin, megakaryocyte colony stimulating factor, megakaryocyte potentiating factor, and thrombopoiesis stimulating factor have operationally defined several different in vitro assay systems. The requirements for megakaryocytic progenitor cells to form recognizable colonies differ so widely that results of different assay systems become impossible to evaluate. As Richard F. Levine, senior editor of this proceedings volume, concludes, "We have become victims of reading and writing too many papers that present neat boxes of distinct cell populations that do not exist in nature."

Levine's opening paper focuses on the early history of the field, including identification of megakaryocytes and the regulation of megakaryocytopoiesis as a function of platelet demand. This overview is followed by some 40 contributions on the kinetics and control of megakaryocytopoiesis, the hormonal regulation of megakaryocytes, megakaryocyte biology, megakaryocytes in human disease, and platelet production from megakaryocytes. The book summarizes the state of the art as of 1985. It will probably be the last book of its kind in this field. In the next five years, as pure growth factors emerge from cloning laboratories and new monoclonal antibodies are developed that purify progenitors, the systems that encourage the development of megakaryocytes from progenitors will surely be defined. Whether we will actually fully understand the cell biology of platelet production from megakaryocytes is another matter.

I recommend this book to students of hematopoiesis as a compendium of what has been and a hope for what will be.

DAVID G. NATHAN
Department of Medicine,
Children's Hospital, Boston, MA 02115

Some Other Books of Interest

Embryogenesis in Angiosperms. A Developmental and Experimental Study. V. RAGHAVAN. Cambridge University Press, New York, 1986. xiv, 303 pp., illus. $39.50. Developmental and Cell Biology Series.

Raghavan's objective in *Embryogenesis in Angiosperms* is "to present an integrated version of the facts about the morphology, ontogeny, biochemistry and genetics of different modes of embryogenesis encountered in angiosperms in a book that would be suitable for a one-semester course on plant embryogenesis" and that would serve as "a review of the current perspectives in the field" for specialists. An opening chapter gives an account of "how the scene has changed" in the study of embryogenesis as new techniques have become available. The next two chapters treat the development of embryos, endosperm, and accessory embryos and cellular and biochemical aspects of embryogenesis. Results of "experimental embryogenesis" (experiments based on perturbation of normal embryogenesis) are then summarized. Further chapters deal with embryogenesis from somatic cells and from pollen grains and with the regulation of gene activity during embryogenesis, a subject about which the author notes relatively little information is available. A final chapter is devoted to applications of experimental embryogenesis, including embryo rescue in inviable hybrids as a way of transferring potentially useful genes. The book includes a bibliography of some 1000 items and author and subject indexes.—K.L.

NMR of Proteins and Nucleic Acids. KURT WÜTHRICH. Wiley-Interscience, New York, 1986. xviii, 292 pp., illus. $49.95. The George Fisher Baker Non-Resident Lectureship in Chemistry at Cornell University.

Noting that the "potentialities and practice" of nuclear magnetic resonance in the study of the structure and function of proteins and nucleic acids have been "decisively changed" in the past few years, Wüthrich in this volume sets out to provide "a comprehensive introduction to the underlying principles and experimental procedures" of such applications of NMR for the benefit of "practicing scientists and students of biochemistry, chemistry, biophysics, and molecular biology." The volume opens with an account of symbols and abbreviations used and an introductory survey of NMR generally. The first main section of the text, headed The Foundations: Structure and NMR of Biopolymers, contains chapters on NMR of amino acid residues and mononucleotides, NMR spectra of proteins and nucleic acids in solution, the NMR assignment problem in biopolymers, two-dimensional NMR with proteins and nucleic acids, and nuclear Overhauser enhancement in biopolymers. Parts 2 and 3, containing seven chapters in all, are devoted to resonance assignments and structure determination in proteins and nucleic acids respectively. The final section of the book, With NMR to Biopolymer Conformation and Beyond, consists of chapters on the conformation of noncrystalline proteins and nucleic acids and NMR studies of intermolecular interactions with biopolymers. A 15-page bibliography and an index conclude the volume.—K.L.

Drosophila. A Practical Approach. D. B. ROBERTS, Ed. IRL Press, McLean, VA, 1986. xx, 295 pp., illus. $47; paper, $30. The Practical Approach Series.

"The aim of this book is to provide the basic set of techniques necessary to exploit *Drosophila* as a research organism," writes