one would have thought, applied scientists should be taught to avoid.

In all, a useful book bringing a refreshing, if formal, approach to a number of problems.

H. R. THIRSK

Dividing and Developing

The Cell Cycle in Development and Differentiation. Edited by M. Balls and F. S. Billett. Pp. xi+483. (Cambridge Unversity: London, May 1973.) £11.

THIS volume contains twenty-six papers concerned with some biological aspects of cell division and the cell cycle in plants, protozoa, and some species of multicellular animals. The editors state in their preface that the book is intended to complement that of Mitchison (*The Biology of the Cell Cycle*, Cambridge University Press, London, 1971) which summarises what is known of the cell cycle in prokaryotes as well as in synchronous cell populations of eukaryotes and of vertebrates *in vitro*.

There are two general reasons why a knowledge of the cell cycle may be important in the study of cell differentiation. One is that there are cyclic variations in some kinds of nuclear or gene activity, and these are related to stages of the cell cycle. Cyclic variations of this kind have been clearly established for DNA synthesis, histone synthesis, and certain kinds of enzyme activity. It is clear, however, that there is not yet sufficient information to say whether gene activity is in general regulated in this cyclic way. In view of the recent development of sensitive methods of determining the amounts of newly synthesised messenger RNAs of known kinds, it should now be possible to determine for several different genes whether their expression fluctuates consistently within a cell cycle, either at the level of transcription, translation, or post-translational modification. Until much more information of this kind is available it is hard to plan clear-cut experiments designed to analyse the relationship of the cell cycle to gene expression in molecular terms.

The other interesting question relating the cell cycle and cell differentiation concerns the possibility of a connection between a certain phase of the cell cycle such as mitosis or DNA synthesis and the induction of new gene expression. Many authors have suggested within the last 10 years that cells must pass through a phase of DNA synthesis or a mitosis, between the time when a cell is acted upon by an inducer of differentiation (such as erythropoietin) and the time of realisation of that differentiation (in this case haemoglobin synthesis). If true, this relationship could be of great importance in understanding cell differentiation. At present, however, there is no experimental system which is ideally suited to the investigation of this question. In this symposium only the paper of Harrison *et al.* is concerned directly with this potentially important matter.

In view of the lack of information about changes in gene activity during the cell cycle, it is not surprising to find that most contributors have given what amounts to a descriptive account of variations in the frequency or duration of a cell cycle in the developing system of their choice. These include Bennett (plant meiosis), Barlow (plant root meristem), Lynden (plant shoot apex), Biggelaar (mollusc development), Rudkin (insect polytene chromosomes), Chibon (newt embryos), Graham (early mouse development), and Steel (cultured human cells).

Some other contributors have described patterns of RNA synthesis or of enzyme activities which are characteristic of tissues composed of cells mostly at a known stage of the cell cycle. Examples of papers in this category are those of John *et al.* (*Chlorella*), Grant (*Physarum*), Yeoman and Aitchison (cultured plant cells) and Giudice (sea urchin oocytes).

Only a very few authors have attempted a truly experimental analysis of factors which cause cyclic changes in nuclear or gene activity. A shining example of this is the elegant work of Ord, involving nuclear transfers in *Amoeba*. In addition Grant describes attempts to obtain changes in the activity of isolated nuclei.

The volume ends with a few very useful summaries of subjects which are of topical, though sometimes controversial, interest: for example, Harrison *et al.* and Cole and Tarbutt (erythropoiesis), Hardy and Ling (mitotic activation of mammalian lymphocytes), Harris and Olsen (metabolic DNA), and Rytömaa (chalones).

It is principally the thorough review articles with an ample supply of references which justify publication of symposia such as the one under review. Apart from containing a number of such articles, this symposium succeeds well in bringing together work on a wide range of eukaryote organisms. I think it will form a useful addition to the library of those interested in the cell cycle and in some aspects of development.

J. B. GURDON

Rat Adenohypophysis

Ultrastructure of Rat Adenohypophysis: Correlation with Function. By Allen Costoff. Pp. xiii+220. (Academic: New York and London, February 1973.) $14.50.

THE twelve chapters in this book, in addition to an introduction, describe the experimental procedures used by the author; the several types of glandular cells of the pars distalis (a chapter being allocated to each); the pars tuberalis; the pars intermedia; the biochemical properties of isolated granules and the morphological aspects of the secretory process. Extensive bibliographies are provided at the end of each chapter and there are many electron micrographs of varying quality.

It is obviously difficult to write a book of this type; and, in this instance, because of the rigid subdivision of the topics the work lacks coherence. A final chapter giving a critical appraisal of the significance of the numerous observations referred to in the text would have been of great value. The lack of such a critical assessment is, to my mind, a serious defect in a book which, although it provides much information, fails adequately to emphasise what is significant or, indeed, acceptable. An example of this is to be found in the chapter on the adrenocorticotrophic cell, where in the same section, having stated that certain Japanese workers had reported the dimensions of the secretory granules to be about 200 μm in diameter, the author (from his own observations) reports them to be about 106 μm. This discrepancy passes without comment and one therefore wonders whether, in fact, the same kind of cell is being described.

Finally, very little indeed is said about the ultrastructure of the non-glandular components of the pars distalis–interstitial (stellate) cells, the connective tissue and its associated cells, the blood vessels and their perivascular spaces, and basement membranes. These topics do not appear in the index.

In summary, this book is a compilation of observations unaccompanied by any serious attempt at evaluation.

C. L. FOSTER

Radiation

Radiation Chemistry. By A. J. Swallow. Pp. xi+275. (Longman: London, January 1973.) £5.50.

THIS book aims to provide an overall picture of the whole field of radiation chemistry, and is intended not only for radiation chemists but also for readers whose main interests lie in subjects related to radiation chemistry, ranging from nuclear technology and radiation physics through photochemistry and chemical kinetics to polymer science and radiation biology. The encompassing of such a broad field is a considerable task, and the author has kept the length of the book within bounds by the expedient of discussing illustrative examples of typical work rather than presenting a detailed survey of each topic. Thus the book is aimed at the beginner rather than the expert.