What's going on in the cell?

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Molecular Cell Biology. By James Darnell, Harvey Lodish and David Baltimore. *W.H. Freeman: 1986. Pp. 1,187. Hbk $42.95, £42.95; pbk £19.95.*

ALTHOUGH many of the principles of cell biology were well established a generation or more ago, the sheer volume of molecular data gathered in recent years has transformed the subject. As usual in a rapidly advancing science, the explosion of information has resulted from an interplay between new analytical tools and new ways of thinking. The new tools include sophisticated methods of studying minute amounts of macromolecules — ultracentrifugation, new microscopes, X-ray diffraction, protein and DNA sequencing — as well as radically new ways of using biological materials, such as monoclonal antibodies, viruses, tissue cultures and gene clones. The new framework of thinking comes from an understanding of the basic architecture of biological macromolecules, particularly the nucleic acids and proteins, and their prime role in all cellular processes. The number of these processes about which we now have detailed molecular information is legion — cell motility, transport of molecules across membranes, ligand–receptor interactions, antibody formation, chromosome organization, RNA transcription and processing, protein synthesis, electrical properties of membranes, and energy conversion, to name only the more important ones.

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Pointing the way — Francis Crick and James Watson examining the double-helical model of DNA built in 1952–1953.

Molecular Cell Biology takes the whole gamut of cell structure and function as its subject, and makes forays into developmental biology and evolution at the end. The result is a large book, packed with detailed, up-to-date information and illustrated with numerous excellent diagrams and photographs.

There are 25 chapters, grouped under four major headings ("Introduction: Molecules, Cells, and Experimental Techniques"; "Gene Expression, Structure and Replication"; "Cell Structure and Function"; and "Normal and Abnormal Variations in Cells"). To a certain extent the first three headings include subjects that are usually taught in beginning biochemistry, molecular genetics and cell biology courses; but the authors have successfully blended topics together in order to emphasize how biochemistry and genetics relate to workings at the cell level, both prokaryotic and eukaryotic.

In an enterprise such as this there must be compromise between the demands of comprehensiveness, depth, historical perspective and up-to-the-minute data. In general the authors have opted for as much recent information on as many topics as possible, without getting into the complex questions of how we got here or who did what, when. This is an understandable and reasonable approach, but cell biology, even molecular cell biology, has an interesting intellectual history that is an important ingredient in understanding the current state of affairs. Some topics are covered with this sense of history when they are the special province of one of the authors. For instance the discussion of RNA processing leads one carefully through the logic and development of the field, stopping to consider false starts and problems along the way. It is important for students to learn from such examples how science really proceeds. I would have preferred more of this type of presentation, with some acknowledgment of the people involved.

Within each chapter there are numerous headings (in black type) and subheadings (in red type), to help students identify major topics and manage an otherwise overwhelming volume of information. The red subheadings are in the form of declarative statements, a style increasingly popular in textbooks and in titles of journal articles. Such statements pose two dangers: first, they may overstate what is known; second, their grammatical similarity may obscure differences in logical structure. For instance, the following are all red subheadings in *Molecular Cell Biology:* "Catecholamines are widespread neurotransmitters." "The nuclei of differentiated frog cells can retain complete developmental potential." "The endosymbiotic hypothesis is confirmed by rRNA analysis." These are in no sense equivalent statements; training in any science, not just cell biology, should teach one to distinguish between them and to evaluate the different kinds of evidence and degrees of certainty involved.

The authors say their book is written for use in a one-year course that integrates molecular biology with biochemistry, cell biology and genetics, and applies this coherent insight to the problems of development, immunology and cancer. There is probably too much material in this book for a single undergraduate course. Nevertheless, the level is appropriate, and instructors can pick and choose among the chapters. Advanced students and practising cell biologists will all want to have a copy for reference and for catching up in areas outside their own expertise.

It would be impossible to write this review without comparing *Molecular Cell Biology* with *Molecular Biology of the Cell,* published three years ago by Alberts, Bray, Lewis, Raff, Roberts and Watson. Besides the similar titles, the two books have the same dimensions, are of equal length and each has a shiny black cover featuring a single tissue-culture cell glowing by immunofluorescence (not to mention that each has a Nobel laureate among the authors). The similarity extends even further, including the extensive use of diagrams, the style of writing, the range of topics and the intended audience. There are differences — the Alberts book has a bit more on development and a special chapter on plant cells, while Darnell and his colleagues devote chapters to cancer and the evolution of cells. But the similarities far outweigh the differences. Three years ago in a review of *Molecular Biology of the Cell* (*Nature* **302,** 637, 1983) I stated that it would be a long time before you could find a better buy. Now I can say that you have the choice between two excellent, comprehensive and up-to-date texts, and you will have to make up your own mind between them. Better still, get them both. □

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