

The Cell

A MOLECULAR APPROACH

by Geoffrey M. Cooper

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Geoffrey Cooper's *The Cell* is an ambitious text aimed primarily at undergraduates taking an introductory course in cell and molecular biology. Defying recent trends in textbook writing, this book is the product of a single author — a welcome change that helps to impart cohesiveness and consistency of style and approach. Many established scientists fondly remember the era in which introductory texts on molecular biology were routinely authored by one or two individuals, who generally imparted not only the essentials of the field but also a strong sense of its history and evolution. Those books often considered pivotal experiments in some detail and took pains to discuss the development of the key concepts in the field. Certainly, such an approach was made more feasible by the fact that what was then called molecular biology was a much smaller field than it is now. Today, such a book would require an enormous amount of effort — perhaps this is why the last book of this magnificent genre, Stent and Calendar's *Molecular Biology*, has not been updated since 1978, and, for example, Watson's great *Molecular Biology of the Gene*, has become the responsibility of a large panel of authors.

In this context, the present volume is remarkable for its enormous scope — in addition to molecular biology it seeks to cover most of contemporary cell biology. Like its predecessors, it also seeks to provide some historical insight into the development of important advances and the personalities behind them (here, through the use of sidebars on "Key Experiments").

The book begins with considerations of protein structure, enzymatic catalysis and intermediary metabolism, then proceeds over the vast expanse of DNA, the structure and function of subcellular or-

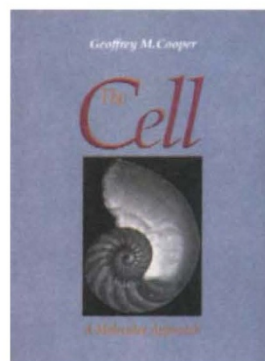
ganelles, protein sorting and transport, the cytoskeleton and cellular motility. It concludes with a large and well-done section on signal transduction, cell cycle control and oncogenesis. By any standard, this is a big meal. But on the whole, Cooper has served it up in a highly digestible, even appetizing, fashion. The order of topics is logical, if fairly standard, and like most texts nowadays the book is extremely well-illustrated with multicolored figures that complement and expand upon the text rather than simply parrot it — another legacy of Watson's classic book. Given its broad scope, it is not surprising that the text often cannot devote to each topic the kind of detail that some might wish. In general, this serves to enhance clarity and readability, though of course reductions in detail can also result in lost opportunities to explore the richness and complexities of a subject.

Perhaps a more important limitation of the text is that its sections on molecular biology significantly under-represent contributions from bacterial and phage genetics. For example, the pivotal role of studies of lambda lysogeny in the development of the repressor concept is not mentioned; in fact, lysogeny appears only in a brief cameo role in the context of site-specific recombination. The roles of T-even phages in the understanding of mutation and complementation are not discussed — indeed, I searched in vain for a formal discussion of complementation anywhere in the text.

This, in turn, reflects a larger shortcoming of the book, which is a bias toward biochemical rather than genetic experimentation. Surely no introduction to molecular biology is complete without a formal consideration of mutation, selection, recombination and complementation. Yet, wherever they are considered at all, these subjects are dealt with only briefly and in exclusively biochemical terms. Even if one is not interested in the history of the subject, much of bacterial genetic formalism continues to live in yeast genetics (for example, in the use of auxotrophic markers, drug-resistance selection schemes, assignment of complementation groups and so on) and needs to be part of undergraduate instruction.

Predictably, the book does much better in areas like cell motility, organelle structure and function, protein trafficking and signal transduction, where biochemical approaches have been the dominant historical forces. These sections are absorbing and fresh, and the sidebars on key recent experiments in these fields are lively and engaging. The same applies to the concluding chapters on cell cycle control and oncogenesis.

The book has one new structural innovation that is to be applauded: sidebars on "Molecular Medicine", in which disease states relevant to the biochemistry under discussion are briefly highlighted. This is an appealing device that not only exploits the didactic value of diseases as experiments of nature, but also gives beginning students a sense of the immense reach of current biology into the practical world of medicine. Some of the examples chosen by Cooper work marvelously well:



for example, those on colon cancer and DNA repair, Gaucher's disease and lysosome function, and promyelocytic leukemia and retinoic acid. Unfortunately, the selection of examples isn't always successful: the brief page devoted to HIV and AIDS provides only a bare-bones description and imparts no particular biological lesson. Similarly, the discussion of systemic lupus revolves primarily

around the fact that lupus sera contain autoantibodies to nuclear components that are useful to cell biologists — not uninteresting, but there is no deeper biological lesson here. The discussion of cystic fibrosis includes the mandatory paeans to the potential of gene therapy without considering the real problems of targeting, persistence and immune responses to the vectors that complicate this approach; brief exposition of these matters would enrich and enliven the discussion.

All in all, though, the book is a fine effort that spans an immense amount of material in a logical and readable way. Its shortcomings are more of omission than of commission and are readily remediable — for now, by instructors supplementing the text with other materials, and in the future by modest and focused revisions. In the end, what has been gained in clarity and coherence by single authorship greatly outweighs what is lost in variety and perspective from the absence of multiple contributors.