

To the Student

The astonishing pace at which new discoveries are being made in the fields of cell and molecular biology can be intimidating. You might ask yourself how the facts you learn in your cell biology course this year will look next year or a few years down the road. Will our understanding of cancer be the same? What new findings in cellular immunology will be made before I graduate from college? The best way to arm yourself against the obsolescence of facts is to construct your knowledge not around the details, but around concepts—the big ideas that form the scaffolding on which to hang the finer points. That way, when the facts grow or change, you will have the tools to integrate those changes into your understanding of the field. No doubt you will need to learn *some* facts, but to build lasting knowledge and become a life-long learner takes much more than memorization. You will need to develop your problem-solving skills using creating thinking; you will need to apply what you learn to novel situations; you will need to assess the value of various kinds of information, and the methods used to obtain it. That is what this workbook can help you to do. This kind of learning is more challenging than memorizing facts, but the extra effort is worth the trouble. The long term results are far more rewarding.

Here are some suggestions about how to get the most from and do well in your cell and molecular biology course: First, commit a certain number of hours each day to the study of cell and molecular biology. Do not let yourself get behind! Read each chapter of the text, then review the content using the outlines in this book called **Reviewing the Chapter**. You can glance only at the major headings in bold type, or allow your eye to take in more detail by reading subheadings. One of my favorite ways of testing my own understanding of a concept is to try explaining it to a friend. Practice explaining each of the **Learning Objectives**, anticipating questions. Can you answer them? If not, go back to the book or to the outline in **Reviewing the Chapter**.

Next, glance through the list of **Key Terms and Phrases**. They are arranged roughly in the order in which they appear in the chapters, so related terms will be close together. Do the terms conjure up mental images or ideas? If not, better check the text again, or **Reviewing the Chapter**.

Each chapter's **Key Figure** was selected to represent an important concept from the chapter. Use the **Questions for Thought** as a catalyst for discussion with a classmate, your professor, or teaching assistant, or just to ponder on your own.

Now get out your calculator and sharpen your pencils, you are ready to tackle the **Review Problems**. Try to answer the short answer questions in just a few carefully chosen words or phrases. If you consistently find that your answers take up more than the allotted space, perhaps you need to rethink your approach. Some of the multiple choice questions are simple recall, but others will ask you to take your knowledge one step further. Lastly, the **Problems and Essays** will require you to provide scientific explanations, interpret data, design experiments, or solve problems relating to the concepts in the chapter. Do your calculations right in the book, and don't cheat! Give yourself ample opportunity to work through to the answers on your own before looking in the **Appendix**.

Remember: The best professor, the best textbook, even the best study guide in the world cannot teach you unless you are committed to learning. Be an active participant in your own education.

Acknowledgments

I am privileged to teach cell and molecular biology to some of the finest students in the country, at Colgate University. Many of them have gone on to assume leadership roles in the field, and I hope I have played some small part in their success. I know my students play an important part in keeping me thinking about cell biology in new and productive ways, and I am grateful to them all—past and present.

I am also grateful to Project Editor Geraldine Osnato at John Wiley and Sons, who cheerfully answered my questions and ensured that I had the resources I needed.

A special thanks to my family, Jonathan, Nathan, and Danny, who made time for me when I needed time to work, made room for me to spread the chapters out all over the house, and made everything worthwhile for me in the end.