

# Preface

**W**e have designed this laboratory manual for an introductory biology course with a broad survey of basic laboratory techniques. The experiments and procedures are simple, safe, easy to perform, and especially appropriate for large classes. Few experiments require more than one class meeting to complete the procedure. Each exercise includes many photographs, traditional topics, and experiments that help students learn about life. Procedures within each exercise are numerous and discrete so that an exercise can be tailored to the needs of the students, the style of the instructor, and the facilities available.

## TO THE STUDENT

We hope this manual is an interesting guide to many areas of biology. As you read about these areas, you'll probably spend equal amounts of time observing and experimenting. Don't hesitate to go beyond the observations that we've outlined – your future success as a scientist and an informed citizen depends on your ability to seek and notice things that others may overlook. Now is the time to develop this ability with a mixture of hard work and relaxed observation. Have fun, and learning will come easily. Also, remember that this manual is designed with your instructors in mind as well. Go to them often with questions – their experience is a valuable tool that you should use as you work.

## TO THE INSTRUCTOR

This manual's straightforward approach emphasizes experiments and activities that optimize students' investment of time and your investment of supplies, equipment, and preparation. Simple, safe, and straightforward experiments are most effective if you interpret the work in depth. Most experiments can be done easily by a student in 2 to 3 hours. Terminology, structures, photographs, and concepts are limited to those that the student can readily observe and understand. In each exercise we have included a few activities requiring a greater investment of effort if resources are available, but omitting them will not detract from the objectives.

This manual functions best with an instructor's guidance and is not an autotutorial system. We've tried to guide students from observations to conclusions, to help students

make their own discoveries, and to make the transition from observation to understanding biological principles. But discussions and interactions between student and instructor are major components of a successful laboratory experience. Be sure to examine the "Questions for Further Thought and Study" in each exercise. We hope they will help you expand students' perceptions that each exercise has broad application to their world.

## KEY UPDATES TO THE 10TH EDITION

### MEDIA INTEGRATION



As educators, we recognize that today's students are digital learners. Therefore, a significant new feature of this edition is the integration of various multi-media resources into the content of the exercises.

Virtually every exercise of this manual is now accompanied by tailor-made multi-media resources. Rather than generic images from Internet sources, we have produced a variety of high-definition videos, PowerPoint presentations, and other resources that demonstrate basic techniques, emphasize biological principles, test for understanding, and engage students as they learn biology in the laboratory.

All multi-media resources can be found at [www.mhhe.com/vodopich10e](http://www.mhhe.com/vodopich10e). Students will enjoy viewing these presentations, and instructors will want to assign these resources to help students know what they'll be doing, what principles they'll be investigating, and what concepts they'll need to understand before coming to lab.

### EXERCISE UPDATES

We have also used the comments of a panel of reviewers to improve several other aspects of this manual. These improvements include:

- Rewritten procedures to clarify what you'll do.
- Additional photographs to improve your understanding of what you'll see.
- Additional art to illustrate concepts, procedures, and results.
- New boxed inserts highlighting the relationships of biological processes with health care.

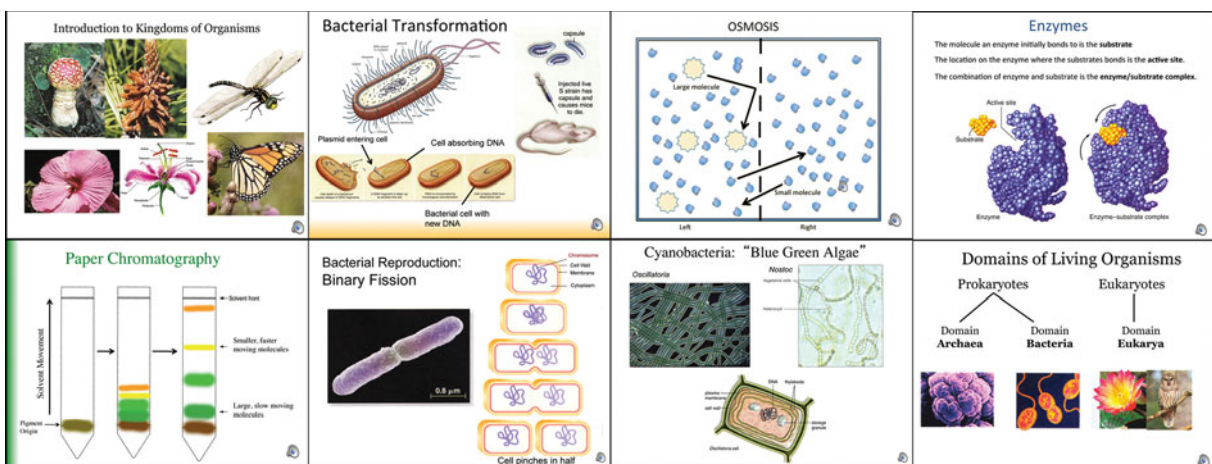
As you examine this manual, you'll see that we've improved several of the most popular and effective features of previous editions:

**Safety First** and **Caution** icons remind you to read the manual to ensure that you are aware of safety issues associated with the exercises. **Learning Objectives** will give you an overview of what you will do and learn in the exercise, and **Writing to Learn Biology** will encourage you to expand on what you have done and learned. **Investigations, Procedures,**

and **Doing Biology Yourself** will require you to *do* biology and apply skills you've learned to develop and answer your own questions about biology. **Questions** throughout each exercise will encourage you to integrate and reflect on what you've done and learned. **Questions for Further Thought and Study** at the end of each exercise will help you apply what you've learned to other topics. As noted previously, we have also tailored a variety of videos, PowerPoint presentations, and other visual materials to help you succeed in the laboratory.



You'll learn from a growing library of high-quality videos that demonstrate basic laboratory techniques. You'll observe these techniques in action before you polish your own skills in the laboratory.



A series of fully narrated PowerPoint presentations review the major concepts associated with each laboratory exercise. You can start and stop, take notes, and listen to these presentations at your own pace. Fully narrated slides expand your experience from information and vocabulary to an integrated lesson about fundamental biological concepts.