

Preface

Recently a botanical colleague of mine was contacted by the police to see if she could help them solve a crime. A young woman had disappeared and there was reason to suspect foul play involving a male acquaintance of hers. The police had found tiny bits of plant material in the man's car, and asked if my colleague could identify them. She was able not only to identify two or three different plants, but also knew where that particular association of plants grew. She took the police to the area, and within 20 minutes they found the woman's body. The man was subsequently charged with and convicted of murder.

The field of forensics sometimes uses microscopic bits of plant material to help solve crimes, but in addition to forensics, botany today plays a special role in many interests of both major and nonmajor students. For example, in this text topics such as global warming, ozone layer depletion, acid rain, genetic engineering, organic gardening, Native American and pioneer uses of plants, pollution and recycling, houseplants, backyard vegetable gardening, natural dye plants, poisonous and hallucinogenic plants, nutritional values of edible plants, and many other topics are discussed. To intelligently pursue such topics one needs to understand how plants are constructed, and how they function. To this end the text assumes little prior knowledge of the sciences on the part of the student, but covers basic botany, without excessively resorting to technical terms. The coverage, however, includes sufficient depth to prepare students to go farther in the field, should they choose to do so.

The text is arranged so that certain sections can be omitted in shorter courses. Such sections may include topics such as, "Soils," "Molecular Genetics," Phylum Psilophyta," etc. Because botany instructors vary greatly in their opinions about the depth of coverage needed for photosynthesis and respiration in an introductory botany course open to both majors and nonmajors, the topics are presented at three different levels. Some instructors will find one or two levels sufficient, whereas others will want to include all three.

I have found that both majors in botany and nonmajors who may initially be disinterested in the subject matter of a required course, frequently become engrossed if the material is related repeatedly to their popular interests. This is reflected, as intimated above, in the considerable amount of ecology and ethnobotany included with traditional botany throughout the book.

"I am currently using Stern, and I believe it is far and away the best Introductory Plant Biology text on the market. Stern covers the necessary information in a clear and concise manner. . . I am very happy with the Stern text."

Del William Smith, Modesto Junior College



ORGANIZATION OF THE TEXT

A relatively conventional sequence of botanical subjects is followed. Chapters 1 and 2 cover introductory and background information; Chapters 3 through 11 deal with structure and function; Chapters 12 and 13 introduce meiosis and genetics. Chapter 14 discusses plant propagation and biotechnology; Chapter 15 introduces evolution; Chapter 16 deals with classification; Chapters 17 through 23 stress, in phylogenetic sequence, the diversity of organisms traditionally regarded as plants, and Chapter 24 deals with ethnobotanical aspects and other information of general interest pertaining to sixteen major plant families or groups of families. Chapters 25 and 26 present an overview of the vast topic of ecology, although ecological topics and applied botany are included in the preceding chapters as well. Some of these topics are broached in anecdotes that introduce the chapters, while others are mentioned in the ecological review summaries, in the human and ecological review sections, and in the extensive appendices.

AIDS TO THE READER

A chapter outline, review questions, discussion questions, learning online topics, and additional reading lists are provided for each chapter. New terms are defined as they are introduced, and those used more than once are boldfaced and included in a pronunciation glossary. Although scientific names are given in some instances, their use has been minimized throughout the text. However, a list of the scientific names of all organisms mentioned throughout the text is given in Appendix 1. Appendix 2 deals with biological controls and companion planting. Appendix 3 includes wild edible plants, poisonous plants, medicinal plants, hallucinogenic plants, spices, tropical fruits, and natural dye plants. Appendix 4 gives horticultural information on houseplants, along with brief discussions on how to cultivate vegetables. Nutritional values of the vegetables are included. Appendix 5 covers metric equivalents and conversion tables.

NEW TO THIS EDITION

In addition to updating the content throughout the chapters, the following major changes have been incorporated into the tenth edition:

- ✱ The first major change in this edition has been the development of a new art program. Our goal has been to

maintain the detail and accuracy of the illustrations crafted over many editions, while creating new art that is colorful and dynamic. The new renderings feature shading, dimension, and color that give students a true-to-life representation of plant structures. An added benefit are the electronic versions of the new art available on the Digital Content Manager, which allow you to incorporate and manipulate the figures for lecture presentations and exams.

"The improvements are . . . significant, and taken together present a more appealing presentation. I agree with the artistic changes, which make the text more appealing and in some cases, more clear."

Roger del Moral, University of Washington

- ✱ In Chapter 3, Cells, the section on modern microscopes has been updated to include phase-contrast, fluorescence, and confocal microscopy. The section on plastids has been reorganized to discuss thylakoids prior to stroma, since light reactions precede dark reactions. This sequence of topics is also consistent with the presentation of photosynthesis reactions in Chapter 10, Plant Metabolism.
- ✱ The revisions to Chapter 10, Plant Metabolism, include the rewriting of the water-splitting (photolysis) and photophosphorylation sections to reflect current scientific understanding and to make the sections easier to read. The description of electron transport has been expanded to better clarify how chemiosmosis leads to the production of ATP.
- ✱ Chapter 13, Genetics, has been updated to include a section on the role of nonprotein-coding DNA in gene expression.
- ✱ Chapter 25, Ecology, has been reorganized by first discussing individual plants, then plant populations and plant communities, followed by the impact of humans on plant communities at the global level, and finally at the regional level.
- ✱ Appendix 4, House Plants and Home Gardening, has been augmented to include discussions on pruning and grafting.

"I would give the Stern text a grade of 'A' as a nonmajors botany text based on its many strengths including writing style, readability, attractiveness, and excellent visual aids."

Patricia Rugaber, Coastal Georgia Community College

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most of the "Awareness" boxed readings, and Dr. Manuel Molles, who provided highlighted ecological summaries for each chapter, both enhanced the text with what they wrote. Dr. Gordon Uno reorganized Chapter 25, Ecology, by introducing major ecological concepts prior to discussing the impact of humans. The help of all these gifted individuals has been much appreciated.

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Finally I would like to extend thanks to the following reviewers who provided feedback on the text and the new illustrations. Their help has been invaluable in shaping the tenth edition of *Introductory Plant Biology*. Upon reaching this milestone tenth edition, I would also like to once again extend my gratitude to the reviewers of previous editions, who have provided considerable comments and suggestions. Although too numerous to include here, their contributions have been much appreciated.

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