

The Botanical World

The background of the cover is a dark, textured surface. A prominent, elongated, reddish-brown structure, possibly a botanical specimen, runs diagonally from the bottom left towards the top right. To the right of this structure, there are bright, out-of-focus streaks of yellow and green light, suggesting a microscopic or high-magnification view of a plant. The overall aesthetic is scientific and artistic.

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The Botanical World

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About the Authors

Professors Northington and Goodin combine 30 years of teaching experience in introductory botany. The introductory botany course at Texas Tech University typically draws 1500 students per year. The students have diverse backgrounds and interests and are enrolled in agriculture, horticulture, plant and soil science, biology, education, business, liberal arts, and home economics programs.

David K. Northington has been at Texas Tech University since 1971. He received his Ph.D. at the University of Texas in systematic botany in 1971. In addition to being on the faculty of the Department of Biological Sciences at Texas Tech, Dr. Northington is also Director of the Texas Tech University Center at Junction and is Curator of the E.L. Reed Herbarium, The Museum, Texas Tech. Dr. Northington is the author of over 20 articles in scientific and popular journals and, with Dr. Goodin, has edited the 724-page *Arid Land Plant Resources*, the proceedings of the 1976 International Arid Lands Conference on Plant Resources. Dr. Northington has traveled professionally in England, Greece, Italy, Egypt, Mexico, and Australia.

J.R. Goodin has been at Texas Tech University since 1970. He received his Ph.D. from UCLA in plant physiology in 1963, after having completed the M.S. degree at Michigan State University in 1958. Prior to coming to Texas Tech, Dr. Goodin was a member of the Department of Plant Sciences, University of California, Riverside, from 1963 to 1970. In addition to being on the faculty of the Department of Biological Sciences, Dr. Goodin is Deputy Director of the International Center for Arid and Semi-Arid Land Studies at Texas Tech. Dr. Goodin has written more than 70 scientific publications, has edited two books, and serves as a consultant to numerous national and international agencies. His professional travel includes Mexico, Egypt, England, Italy, Greece, Australia, Costa Rica, Japan, and India.

Preface



A quick glance at a biologist's bookshelf might give the impression that there are enough botany books available to satisfy all student competency levels and teaching styles. However, many of the words and most of the content in those texts seem to be directed toward those teaching the course and not the students themselves. Furthermore, we have found that those same texts fail to project the excitement and importance of botany in daily life. After a combined 30 years of teaching introductory botany we believe that the subject can and should be taught in an interesting and applied format. Awakening the student to the importance of botany in day-to-day living is an achievable goal.

This text was written for two different types of courses: (1) introductory botany courses in which a wide variety of students from many diverse backgrounds are grouped together (such courses typically include beginning biology, agriculture, and horticulture majors as well as students from other fields of study); (2) botany courses intended for students who are not biology majors and who elect introductory botany to fulfill a science requirement or to satisfy their curiosity about botany.

Students who have chosen biology as a basis for their college education need to receive an appropriately thorough introduction to the principles of form and function of plants. This coverage must include a breadth and depth of information to prepare them for subsequent studies, but it need not exclude applied aspects of the material.

Many biology majors enter health-related or research fields; but the non-biology majors will become business executives, advertising agents, lawyers, government officials, members of the clergy, media personalities, or other professionals who help shape and decide the social values and laws that dictate the applications of biological principles. Those who are involved in policy making need to be biologically literate; therefore it is important to involve all students, majors and nonmajors alike, from the very first day of class and to maintain that involvement.

Approach and Organization

Just as science majors would be intimidated if marched into a voice class and asked to sing something on the first day, many students are apprehensive about speaking about or even listening to lectures on science, biology, or botany. Introductory students appreciate a challenging but manageable menu in a course. Although chapters may be rearranged to tailor a course to the objectives of an instructor, there is much to be said for a front-to-back approach in an introductory course. Such a text is more likely to provide a logical, building sequence for the students as concepts gradually unfold. We have written *The Botanical World* in such a sequence.

We have developed this text based on the approach we have found most successful in teaching introductory botany. That approach

considers three basic elements: organization, balance of information, and depth of coverage.

Organization

Approach the subject from a most familiar to least familiar sequence of subject matter. We have found that students (especially those already apprehensive) can be drawn into the subject best by first covering the material that is most understandable and real to them. We proceed, therefore, from general to specific concepts, introduce ecological and community-related material first, then discuss the whole organism, and finally consider cellular level structure and function and diversity. We conclude by returning to matters of ecological significance.

Balance of Information

Integrate applied information throughout the basic botanical material. We have found that even the most basic and detailed information is more palatable when some measure of applied information and examples is included. Material is also easier to retain when it relates to one's own experiences and to the everyday world.

Depth of Coverage

Present the basic botanical information in appropriate depth and coverage. Even though we include all pertinent information and make a special point of being as accurate and up to date as possible, this text is not intended to be a compendium or an encyclopedic reference of every botanical concept. What to include and what to delete is always a matter of choice, but we approached this chore with the students' needs in mind. The result is a text with more than enough traditional material for majors but without the overabundance of detail found in some books. It is our feeling that an introductory text need not be a reference source for the professor, but rather an educational tool for the student.

Philosophy

The organization of topics, the depth and breadth of coverage, and the incorporation of applied material throughout the book are all aimed at helping the student learn. We have found in our courses that both majors and nonmajors are more successful with this approach than with a hierarchical organization: molecules, cells, tissues, organisms, ecology.

We do not subscribe to the philosophy which states that the capable students will learn the information and our only job is to cover everything thoroughly and carefully. Rather, we feel an obligation to help every student develop an understanding of how plants interact, grow, reproduce, and function. That understanding will promote informed decision making concerning the role of plants in a functional world.

Our goal is to present the basic botanical information in a depth appropriate for beginning majors, while providing enough application to keep the nonmajor interested. We have tried to find a balance of these two components and have an additional section (Chapters 17-20) on plants and society for those wishing to stress the applied aspects

of botany while possibly deleting some of the classic material. Finally, our design is to develop a text that can be covered in a single semester. Instead of providing far more information than could possibly be taught and leaving it to the professor to select what to delete, we have provided a challenging one-semester text that includes extra material from which supplemental information may be drawn.

The overall theme of this book encompasses botany's ecological and applied components. The need for the enlightened management of plant resources is a large part of our message. Another is that humans need to function *within* the natural framework of all biological species.

Distinctive Features

We are very pleased with the production efforts made by our publisher and feel that the design of this text will be a significant part of making the material readable, stimulating, and understandable.

Color The generous use of full-color photographs and second color throughout the text adds significantly to the clarity of the line drawings and provides vivid examples of many of the specific topics discussed. A conscientious effort was made to include full-color photographs that would add instructional value.

Original Drawings All line art in *The Botanical World* is original. Done under the supervision of the authors, each drawing was planned to illustrate specific points in the text. Many of these drawings are unique because the blend of topics in this text differs from most others. In addition, essentially all drawings of plant parts illustrate actual examples of plants and not diagrammatic composites.

Marginal Flagging One of the pedagogical design aids in this text is the flagging in the margin of topics that are discussed more than once. For instance, Chapter 1 is an introductory overview of the importance of studying plants; therefore many of the topics that are covered in more depth in later chapters are first introduced in Chapter 1 and are flagged to indicate where the most thorough discussion of those topics can be located. The intent is to indicate purposeful repetition of certain subjects and to allow the student to turn quickly to another explanation of the topic if desirable.

Key Terms Key terms are printed in **boldface type** the first time they occur in the text and in some cases the first time they occur in any given chapter. Many of these terms can be found in the glossary. The student should use the glossary as often as needed, since not all terms are thoroughly defined the first time they are used. A thorough definition is always provided, however, in the chapter where the most detailed coverage of the topic occurs.

Chapter Summaries At the end of each chapter an enumerated summary of the major topics in the chapter provides a quick review and study aid.

Additional Selected Readings At the end of each chapter we have provided a list of additional resource materials that may be assigned

to or selected by the student desiring more information on the material in the chapter. These references are **annotated** to guide the student in selecting quickly the reference with the most appropriate depth of coverage.

Glossary We have made every effort to develop the most complete and useful glossary of terms possible. Selected words are also provided with a phonetic pronunciation guide to assist students with unfamiliar terms.

Index A complete cross-referenced index refers the student to every page in which a given term, concept, plant, or person is mentioned.

Supplementary Materials

Instructor's Manual We prepared this manual with the intent of making it the most complete and helpful resource available on the market to instructors of botany. A philosophical overview of each chapter presents our rationale for topic organization and emphasis. Major topics to be stressed to the student appear in outline form. *For each chapter a set of conversion tables lists in careful detail the rearrangements instructors will need to make in their lecture notes when converting to The Botanical World from a number of other texts.* Each chapter also contains a test bank with short essay, discussion, and multiple choice questions. A total of about 500 test items is included, averaging about 25 per chapter. A set of transparency masters of line drawings from the text, from which overhead transparencies can be produced, is included in the *Instructor's Manual*. Finally, supplemental information such as career opportunities in botany is also included.

Laboratory Manual *The Botanical World Laboratory Manual* has been prepared by Jerry D. Davis, Ph.D., of the University of Wisconsin, La Crosse. The 17 laboratory exercises included in the manual correspond to the sequence of topics in the text. Each exercise includes objectives, background information, detailed procedures, and review questions. The emphasis of the exercises is practical application of botany for the nonmajor botany student.

Student Study Guide *The Botanical World Study Guide*, also prepared by Jerry D. Davis, is a direct companion to the text. It provides students with the opportunity to reinforce their knowledge and develop a further understanding of botany. Each chapter includes a review of material presented in the text, a practice text composed of multiple choice questions, and application questions.

Acknowledgments

We appreciate the valuable input and patience of a multitude of family, friends, colleagues, reviewers, and especially students. We enjoy teaching the introductory course and feel it should be an important part of any college student's education. We sincerely hope this book will convey the excitement and importance of understanding the botanical world.

We would also like to acknowledge the continued patience and support of the Times Mirror/Mosby College Publishing Co., especially that of our editors, the production staff, and the marketing coordina-

tors. In particular, the incredible patience and encouragement of Diane Bowen and the firm guidance and support of Susan Schapper must be noted. They have been involved in every aspect of bringing this text to fruition, and without them we doubt whether it would ever have been completed.

As is obvious, the talents of our illustrator, Yevonn Wilson-Ramsey, added a great deal to this text. What is not obvious is how delightful an experience it was for us to be able to work with this talented, patient, and dedicated person. We have strived to have our written words deserve her artwork—a lofty goal, indeed.

We would also like to acknowledge the endless hours of our copy editor, Marjorie Sanson. Her care and talent have contributed an immeasurable amount to the style, flow, accuracy, and clarity of the text. If we have slipped a misspelled word or dangling participle through, we apologize to her; she has displayed remarkable patience and boundless talent in keeping us in line.

For more than can be adequately acknowledged, a very special thanks goes to Pat Northington. As a supportive and patient wife of one of us and a close friend of the other, as a source of ideas, materials, and suggestions, as a strong but very constructive critic, and as an unerring proofreader who has been cover to cover through several stages of this book, she lent her love, support, and talent, all of which are more deeply appreciated than she will ever know.

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David K. Northington
J.R. Goodin

Reviewers

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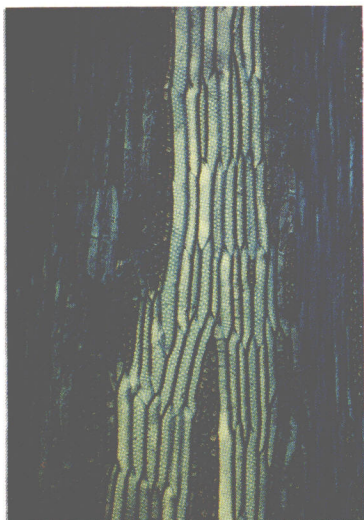
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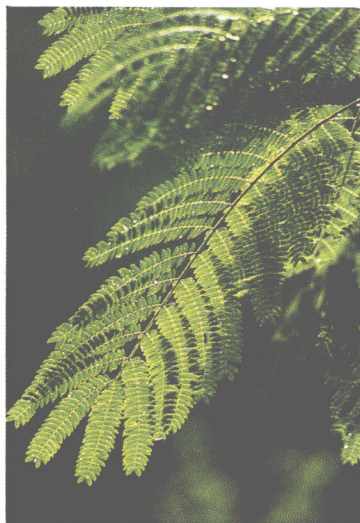
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