

Preface to the Fourth Edition

In any of the sciences one is involved with a continuing study: new data, or more data, are obtained; interpretations fluctuate; conclusions are revised; new discoveries are made; hypotheses are tested; and changes of various sorts appear with almost dazzling rapidity. It is obvious that a textbook must be revised periodically to keep pace with such changing aspects of its field. In addition colleagues and students make frequent suggestions with regard to improving the presentation of topics, new areas to discuss, and even material to delete. As all these details and considerations accumulate, an author eventually realizes that a "new edition" is advisable, warranted, desirable, and finally required. Thus, I arrived at a fourth edition.

The general purpose and the specific goals of the text are not changed. The book is written for both science and nonscience students. For the former there is a sound basis for further studies in biology, especially in botany. They are exposed to basic biological concepts, with the hope that they will come to understand plant processes and grasp the importance of plants to all life. The interrelationships between structure and function are indicated to facilitate an understanding of what plants do, how they do it, how this influences other organisms, how humans can utilize plants, and, possibly, how humans can manipulate plants. Photosynthesis, respiration, transpiration, growth regulators, and genetics are covered in considerable detail because of their bearing on plant functions, distribution, variations, and utilization. As in previous editions, the functional and ecological aspects of plants are emphasized although structural detail is covered as necessary to clarify the manner in which cells and tissues participate in the various activities of the plant.

Flowering plants are the focus of most discussions because they are not only the dominant plants of most environments but also the plants most utilized by humans. The main groups of the plant kingdom are covered, and selected types are discussed in more detail to emphasize relationships and evolutionary advances. No attempt has been made to survey the plant kingdom completely. There are several fairly recent texts devoted specifically to that feature of botany, and they should be consulted if other groups or more details are desired.

The student who is not a science major finds that plants are responsible for his

existence and for most of his pleasures. He becomes aware of the importance of decision making as it influences plants because other organisms must then also be affected. Highway routes, building constructions, dam sites, forest fires, etc., entail decisions that take on much more meaning. And one hopes that students using this book will take a more sympathetic attitude toward plants in the environment and to the environment itself.

Over the past few years, people have become much more cognizant of their surroundings. The terms "environment" and "ecology" are in common usage, as are "environmentalist" and "ecologist." It is true that the words are frequently misused and there are many misconceptions as to what is entailed by "ecology" or "an ecosystem." But this new awareness presents an opportunity for botanists, especially, because people are really interested. And a course in botany lends itself very well to the teaching of biological concepts of general educational value as well as such items as conservation, erosion, food chains and food supplies, and population problems.

Every portion of the text has been considered carefully; revisions have been made in most areas in an attempt to clarify concepts; and many of the discussions have been expanded by including more recent findings. This is especially true in the chapter on photosynthesis where C_3 , C_4 , and CAM plants are discussed, photorespiration is handled, and comparisons are made with regard to the advantages and disadvantages of these respective pathways. I resisted the temptation to write a chapter entitled "ecology" because this aspect of botanical studies appears in most of the chapters. Throughout the text there is an effort to incorporate environmental effects into the discussion. What is the effect of temperature and light on photosynthesis and respiration? How do soil structure and texture influence plant growth? What about soil types? Rainfall? These are all interwoven—as they are for plants growing in the field. Because of many questions raised by students, there now is a chapter that presents an introduction to the myriad ways that humans utilize plants and plant parts and that serves primarily as a quick reference point.

Although I am responsible for what finally went into the book, there are many individuals who made useful suggestions, contributed illustrations, considered various portions of the text, and sent advice and recommendations. I am especially indebted to Isabelle Greene, who created most of the original line drawings; Peter Jankay for various photographs; and Robert Gill for the more recent photomicrographs and electron micrographs. The following individuals read, discussed, criticized, and suggested changes in various portions of the manuscript: R. G. S. Bidwell, D. W. Bierhorst, Jean Cummings, George W. Burns, William C. Dickison, N. W. Gillham, Joe R. Goodin, M. E. McCully, Katherine Muller, David K. Northington, William Purves, James Sandoval, Jon Sanger. Special thanks are due C. H. Muller, who interested me in new perspectives in botany; M. F. Moseley, after whose morphology courses I patterned the plant kingdom portion of this text; and the late D. G. Clark who encouraged me to enter the teaching profession. But most of all I am indebted to my wife, Veronica, who has not only typed all four versions of my book, proofread all of the editions, put up with me all these years, but also raised our fine family. Both sons (James and John) are now raising their own families and so Jim is no longer proofreading, but our two daughters

(Geri Lee and Debra Joan) have stepped in to help with the proofreading chores. Thus the book is still a family project. My wife's mother, Lillian Champagne, has passed away but was of inestimable help by handling the household during two of the revisions. I also want to thank the editorial and production staffs of the Macmillan Publishing Company, especially Woodrow Chapman and Hurd Hutchins, for their help and patience during the final stages of preparing this book.

Without such individuals, and the students, of course, the book never would have been completed—or probably never even started.

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