Preface

When the first edition of this text appeared thirteen years ago, its writing was guided by several of objectives.

- The text should be suited for a semester course for undergraduate students encountering the subject of plant physiology for the first time. It was assumed that the student would have completed a first course in botany or biology with a strong botanical component. The book should provide a broad framework for those interested in pursuing advanced study in plant physiology, but it should also provide the general understanding of plant function necessary for students of ecology or agriculture.
- In keeping with the above objective, the text should focus on fundamental principles of how plants work while attempting to balance the demands of biochemistry and molecular biology on the one hand, and traditional "whole-plant" physiology on the other.
- The text should be interesting and readable. It should include some history so the student appreciates how we arrived at our current understanding. It should also point to future directions and challenges in the field.
- The sheer breadth of plant physiology and the rapidly expanding volume of literature in the field make it impossible to include all of the relevant material in an entry-level text. Consequently, the text must be selective and focused on those topics that form the core of the discipline. At the same time, the student should be introduced to the significance of physiology in the role that plants play in the larger world outside the laboratory.

While we have made every effort to retain the readability and overall approach of previous editions; we have also introduced a number of significant changes in this fourth edition. Those changes include:

- For this edition the illustration program has been completely revised. Some figures have been deleted, others have been revised, and many new figures have been introduced. With the help of the publisher, we have also introduced color into the illustrations. The use of color improves the clarity of the figures, draws attention to important elements in the figure, and helps students visualize the relationships between the figure and the concepts described in the text. At the same time, we are mindful of costs and hope that this has been done in a way that does not add significant cost to the student.
- The number of complex chemical structures in many figures has been reduced and biosynthetic pathways have been simplified in order to provide greater emphasis on fundamental principles.
- We have removed the traditional introductory chapter on Cells, Tissues, and Organs and distributed some of this information in chapters to which it pertains directly.
- The list of references at the end of each chapter has been updated throughout the new edition.
- All life depends on energy and water. Unlike previous editions, the fourth edition begins with four chapters that focus on the properties of water, osmosis, water potential, and plant–water relations, followed by a series of eight chapters dealing with bioenergetics, primary plant metabolism, and plant productivity.
- A major change in this edition is the presence of three new chapters (13, 14, and 15). Using the basic information and concepts developed in chapters 1 to 12, these chapters focus on the inherent plasticity of plants to respond to environmental change on various time scales. This includes a discussion of abiotic and biotic stress, plant acclimation to stress, and finally, long-term, heritable adaptations to environmental stress.
- We have revised the treatment of hormones because many instructors have told us that the separate treatment of each hormone fits their syllabus better. The coverage of each hormone concludes with a general description of the current status of receptors and signal transduction pathways.
- A new chapter focuses on the molecular genetics of flower and fruit development.
- A Glossary has been created for the new edition.

William G. Hopkins
Norman P. A. Hüner
London, Ontario
April 2008

Contents