

# A Chapter-by-Chapter Sampling of New Content

## **1. Plant Cells**

Completely revised and updated treatment of the endomembrane system, including several new figures

Completely revised and updated treatment of the cytoskeleton

Completely rewritten and updated section on the cell cycle, including a discussion of the role of transvacuolar strands in plant cells; includes several stunning new illustrations

## **2. Genome Structure and Gene Expression**

Chapter 2 is entirely new.

## UNIT I. TRANSPORT AND TRANSLOCATION OF WATER AND SOLUTES

### **3. Water and Plant Cells**

### **4. Water Balance of Plants**

### **5. Mineral Nutrition**

### **6. Solute Transport**

## UNIT II. BIOCHEMISTRY AND METABOLISM

### **7. Photosynthesis: The Light Reactions**

### **8. Photosynthesis: Carbon Reactions**

### **9. Photosynthesis: Physiological and Ecological Considerations**

### **10. Translocation in the Phloem**

### **11. Respiration and Lipid Metabolism**

### **12. Assimilation of Mineral Nutrients**

### **13. Secondary Metabolites and Plant Defense**

New discussion of the jasmonic acid signal transduction pathway

Updated model for the systemin signalling pathway

Expanded coverage of the various antipathogen defenses induced by infection

Revised and updated treatment of systemic acquired resistance (SAR)

New coverage of induced systemic resistance (ISR)

### **UNIT III. GROWTH AND DEVELOPMENT**

#### **14. Signal Transduction**

Chapter 14 is entirely new.

#### **15. Cell Walls: Structure, Biogenesis, and Expansion**

Revised and updated model of primary cell walls

Updated model of pectin domains

Updated model of xyloglucan endotransglucosylase (XET) action

New model for the structure of poplar lignin

New cytochemical evidence showing that microtubules guide the orientation of cellulose microfibrils

#### **16. Growth and Development**

The chapter has been reorganized and streamlined for clarity and conciseness.

New information on the role of auxin and cytokinin in the development of root and shoot apical meristems have been added, illustrated by a set of dazzling new figures.

The concluding section on senescence has been revised and updated, including a new model for the regulation of leaf senescence.

#### **17. Phytochrome and Light Control of Plant Development**

The chapter has been streamlined for clarity and accessibility.

New information on phytochrome protein domains has been incorporated into the model for phytochrome synthesis and assembly.

A new model is presented for the interactions between phytochrome and hormonal signaling during light-regulated growth.

#### **18. Blue-Light Responses: Stomatal Movements and Morphogenesis**

#### **19. Auxin: The Growth Hormone**

The treatment of auxin synthesis has been simplified in the chapter, and a more detailed discussion has been placed in the new appendix on hormone biosynthesis.

The treatment of auxin signaling has been streamlined, with the primary discussion of auxin signal transduction now being covered in the new chapter on Signal Transduction (Chapter 14).

New information, including figures, on the mechanism of polar auxin transport have been added.

The discussion of the biochemical mechanism of auxin-induced “acid growth” has been updated to include recent findings.

## **20. Gibberellins: Regulators of Plant Height**

A simplified and more accessible GA biosynthesis diagram, with the detailed pathway transferred to the new appendix on hormone biosynthesis

A major revision and updating of the GA signal transduction pathway, including new information on the structure and GA-binding of the GID1 soluble receptor

A new model for the GA-induced conformational changes of the GID1 receptor and the DELLA repressor protein

A new model for the GA-induced degradation of the DELLA repressor, mediated by the GID1 receptor

A detailed model for the integration of the signal transduction pathways of GA and light

An updated model for GA-induced  $\alpha$ -amylase in cereal aleurone layers

An expanded discussion of the role of GA in anther development

New material on the role of submergence genes in the GA-mediated response of deep water rice

## **21. Cytokinins: Regulators of Cell Division**

Simplified hormone biosynthesis diagram, with a more detailed pathway in a new hormone biosynthesis appendix

An expanded discussion of the role of hormones—including auxin, cytokinin, and the novel growth regulator strigolactone—in branch formation in shoots

A new section on the manipulation of cytokinins to alter the agricultural traits of crops such as rice

## **22. Ethylene: The Gaseous Hormone**

Simplified hormone biosynthesis diagram, with a more detailed pathway in a new hormone biosynthesis appendix

Reorganization of the sections on signal transduction and physiology for greater clarity

New data on the kinetics of inhibition of hypocotyl elongation in wild type and mutant *Arabidopsis* hypocotyls has been added.

### **23. Absciscic Acid: A Seed Maturation and Antistress Signal**

Simplified hormone biosynthesis diagram, with a more detailed pathway in a new hormone biosynthesis appendix

A discussion has been added covering newly discovered candidates for ABA receptors and their possible mechanisms.

The section on ABA signaling has been completely revised and updated to include the latest findings.

### **24. Brassinosteroids**

Simplified hormone biosynthesis diagram, with a more detailed pathway in a new hormone biosynthesis appendix

Revised and updated section on the brassinosteroid signal transduction pathway

New material on the integration of the auxin and brassinostroid signaling pathways has been added.

### **25. The Control of Flowering**

The model for the photoperiodic induction of flowering has been updated to reflect the role of FT protein as the long distance floral stimulus, florigen.

### **26. Stress Physiology**

**Appendix 1.** Concepts of Bioenergetics

**Appendix 2.** Plant Kinematics

**Appendix 3.** Hormone Biosynthetic Pathways