

CONTENTS

CONTRIBUTORS TO VOLUME 52	xi
PREFACE	xvii
CONTENTS OF VOLUMES 35-51	xxi

Oxidation of Proteins in Plants—Mechanisms and Consequences

LEE J. SWEETLOVE AND IAN M. MØLLER

I. Introduction	2
II. The Formation of ROS and RNS	2
III. Mechanisms of Oxidation of Proteins	5
IV. Methods for Measuring Protein Oxidation	7
V. Which Proteins, Which Oxidations?	11
VI. Does Protein Oxidation Mean Protein Dysfunction?	14
VII. Removal and Processing of Oxidized Proteins	16
VIII. The Cost of Protein Oxidation	17
IX. Summary	18
References	18

Reactive Oxygen Species: Regulation of Plant Growth and Development

HYUN-SOON KIM, YOON-SIK KIM, KYU-WOONG HAHN,
HYOUK JOUNG AND JAE-HEUNG JEON

I. Introduction	26
II. Redox Regulation	28
III. Plant Hormones and ROS	30
IV. Polarized Cell Growth and Development	37
Acknowledgments	41
References	41

Ultraviolet-B Induced Changes in Gene Expression and Antioxidants in Plants

S. B. AGRAWAL, SURUCHI SINGH AND
MADHOOLIKA AGRAWAL

I. Introduction	48
II. UV-B Perception	49

III. UV-B Induced Signal Transduction	51
IV. Regulation of Gene Expression by UV-B	53
V. Sources of ROS	56
VI. Metabolism of ROS	66
VII. Conclusion	73
References	74

Roles of γ -Glutamyl Transpeptidase and γ -Glutamyl Cyclotransferase in Glutathione and Glutathione-Conjugate Metabolism in Plants

NAOKO OHKAMA-OHTSU, KEIICHI FUKUYAMA
AND DAVID J. OLIVER

I. Introduction	88
II. Characteristics of GGTs	90
III. Physiological Functions of GGT in Animals	90
IV. Physiological Functions of GGTs in Plants	92
V. Three-dimensional Structures of GGTs from Bacteria and <i>Arabidopsis</i>	98
VI. GGT-like Proteins in other Plants than <i>Arabidopsis</i>	103
VII. The Pathway for GSH Degradation in the Cytosol in Plants	104
VIII. Differences in the GSH Degradation Pathways between Animals and Plants	106
IX. Perspective	107
Acknowledgments	107
References	108

The Redox State, a Referee of the Legume-*Rhizobia* Symbiotic Game

DANIEL MARINO, CHIARA PUCCIARIELLO, ALAIN PUPPO
AND PIERRE FRENDU

I. Introduction	116
II. Production of Reactive Oxygen Species During Legume- <i>Rhizobia</i> Symbiosis	116
III. Involvement of Antioxidant Systems in the Legume- <i>Rhizobium</i> Symbiosis	123
IV. Redox Control of NFS Under Environmental Stresses	133
V. Conclusions and Perspectives	137
Acknowledgments	139
References	139

Reactive Oxygen Species in *Phanerochaete chrysosporium*: Relationship Between Extracellular Oxidative and Intracellular Antioxidant Systems

MÉLANIE MOREL, ANDREW A. NGADIN, JEAN-PIERRE JACQUOT AND ERIC GELHAYE

I. Extracellular Reactive Oxygen Species (ROS) Formation	154
II. Intracellular ROS Formation	159
III. How to Deal with Intracellular ROS?	164
IV. Relationship Between Intracellular ROS and Lignin Degradation	176
References	178

Physiological Impact of Thioredoxin- and Glutaredoxin-Mediated Redox Regulation in Cyanobacteria

YOSHITAKA NISHIYAMA AND TORU HISABORI

I. Introduction: The Redox-Balancing System in Cyanobacteria	188
II. Synchronization Between Redox Equilibrium and Photosynthesis	189
III. Physiological Phenomena Controlled by Redox: Gene Expression	191
IV. Physiological Phenomena Controlled by Redox: Protein Synthesis	192
V. The Proteomic Approach Reveals a Variety of Trx Target Proteins	194
VI. Perspectives	200
Acknowledgments	201
References	201

Use of Transgenic Plants to Uncover Strategies for Maintenance of Redox Homeostasis During Photosynthesis

GUY T. HANKE, SIMONE HOLTGREFE, NICOLAS KÖNIG, INGA STRODTKÖTTER, INGO VOSS AND RENATE SCHEIBE

I. Introduction: Studying Control of Redox Networks	209
II. Balancing Redox Networks Within PET	213
III. Buffering of Redox Poise by Coordinated and Compensatory Pathways	219
IV. Changes in Redox State are Translated into Signaling Cascades to Adjust Metabolism	228
V. Conclusions	235
Acknowledgments	239
References	239