

CONTENTS

Contributors

ix

1. New Insights Into Roles of Ubiquitin Modification in Regulating Plastids and Other Endosymbiotic Organelles	1
W. Broad, Q. Ling, P. Jarvis	
1. Introduction	2
2. Ubiquitin-Proteasome System	4
3. Regulation of Endosymbiotic Organelles by Ubiquitin	8
4. Concluding Remarks	27
Acknowledgments	27
References	27
2. New Insights Into the Role of Ubiquitylation of Proteins	35
G.S. McDowell, A. Philpott	
1. Introduction	36
2. Protein Ubiquitylation	37
3. New Insights Into Noncanonical Ubiquitylation	47
4. New Insights Into Chain Formation and Unconventional Ubiquitin Chains	62
5. Crosstalk Between Ubiquitin and Other Posttranslational Modifications	65
6. New Tools and Developments for Ubiquitylation Studies	69
7. Concluding Remarks	71
Acknowledgments	72
References	72
3. Heterogeneity, Cell Biology and Tissue Mechanics of Pseudostratified Epithelia: Coordination of Cell Divisions and Growth in Tightly Packed Tissues	89
P.J. Strzyz, M. Matejczic, C. Norden	
1. Introduction	90
2. Apical Nuclear Migration in Pseudostratified Epithelia	94
3. Tissue-Wide Properties of PSE	104

4. Conclusions	114
Acknowledgments	114
References	114
4. New Insight Into the Roles of Membrane Microdomains in Physiological Activities of Fungal Cells	119
J. Malinsky, M. Opekarová	
1. Introduction: History of Lateral Microdomains in Fungal Membranes	120
2. Contemporary List of Fungal Membrane Microdomains	121
3. Formation and Maintenance of Membrane Microdomains	144
4. Physiological Relevance of Laterally Segregated Membrane Contents	154
5. Concluding Remarks and Perspectives	167
Acknowledgments	168
References	168
5. Development and Application of Functionalized Protein Binders in Multicellular Organisms	181
D. Bieli, I. Alborelli, S. Harmansa, S. Matsuda, E. Caussin, M. Affolter	
1. Introduction	182
2. Protein Binder Scaffolds	183
3. Use of Protein Binders in Basic Science	188
4. Use of Protein Binders in Multicellular Organisms	191
5. Conclusions and Outlook	203
Acknowledgment	205
References	205
6. Heparan Sulfate: Biosynthesis, Structure, and Function	215
J.-P. Li, M. Kusche-Gullberg	
1. Introduction	216
2. Heparan Sulfate Proteoglycans	217
3. Biosynthesis of Heparan Sulfate	220
4. Genetic Defects in Heparan Sulfate	233
5. Structural Properties of Heparan Sulfate in Interaction With Proteins	239
6. Heparan Sulfate Proteoglycans and Diseases	245
7. Therapeutical Potential	255
8. Concluding Remarks	257
Acknowledgments	258
References	258

7. Functions of Heparan Sulfate Proteoglycans in Development: Insights From *Drosophila* Models 275

H. Nakato, J.-P. Li

1. Introduction	276
2. Glypicans	277
3. Syndecan and Perlecan	286
4. Heparan Sulfate Biosynthesis	287
5. Concluding Remarks	289
References	289

Index 295