

CONTENTS

Contributors	ix
Preface	ix
Acknowledgements	xiii

Section 1 Evolution

1. Technological Innovations Give Rise to a New Era of Plant Evolutionary Developmental Biology	3
K. Sakakibara	
1. Introduction	4
2. Transcription Factors	7
3. The Evolution of Hormone Signalling	26
4. Future Perspectives in Evolutionary Developmental Biology Research	27
Acknowledgement	27
References	28
2. Coevolution of Organelle RNA Editing and Nuclear Specificity Factors in Early Land Plants	37
M. Schallenberg-Rüdinger and V. Knoop	
1. RNA Editing in Plant Organelles: Introduction and State of the Art	38
2. Pentatricopeptide Repeat Proteins for RNA Recognition: The Binding Code	56
3. <i>Physcomitrella patens</i> : A Particularly Interesting Model to Study RNA Editing	64
4. Evolution of RNA Editing: Gain, Loss and Adaptation Scenarios in Land Plant Phylogeny	70
5. Land Plants and RNA Editing: Open Issues and Future Perspectives	76
References	79

Section 2 Genomes

3. The Genome of the Model Moss <i>Physcomitrella patens</i>	97
D. Lang, N. van Gessel, K.K. Ullrich and R. Reski	
1. Bryophytes at the Forefront of Plant Genetics and Genome Research	98
2. <i>Physcomitrella</i> , the Model Plant	100
3. History and Overview of <i>Physcomitrella</i> Genomics	100
4. Ecology and Phylogenetic Context of <i>Physcomitrella</i>	107

5. Genomic Insights into the Evolution of <i>P. patens</i> , the Funariaceae and Land Plants	110
6. Concluding Remarks and Outlook	130
References	131
4. The <i>Ceratodon purpureus</i> Transcriptome Ushers in the Era of Moss Comparative Genomics	141
S.F. McDaniel, P.-F. Perroud, A.C. Cuming and P. Szövényi	
1. An Introduction to the <i>Ceratodon purpureus</i> Genome Project	142
2. Life Cycle Factors that Influence the Genome Structure of <i>Ceratodon purpureus</i>	143
3. The <i>Ceratodon purpureus</i> Transcriptome	145
4. <i>Ceratodon purpureus</i> has a UV Sex Chromosome System	151
5. Patterns of Polymorphism in <i>Ceratodon purpureus</i>	159
6. Conclusions	161
Acknowledgements	162
References	162
5. The <i>Sphagnum</i> Genome Project: A New Model for Ecological and Evolutionary Genomics	167
A.J. Shaw, J. Schmutz, N. Devos, S. Shu, A.A. Carrell and D.J. Weston	
1. Introduction	168
2. The Sphagnopsida Comprises an Early Diverging Lineage Within the Early Diverging Moss Lineage	168
3. The Sphagnopsida: A Speciose Clade of Mosses	169
4. Ecology and Niche Differentiation Within Sphagnum	170
5. Peat moss and Global Biogeochemistry: Linking Genes to Ecosystem Function	172
6. Life Cycle	173
7. The Genome Project	175
8. Culture and Germplasm Resources	176
9. Challenges and Opportunities With Population and Genomic Resources	177
10. An Evolutionary Genomics Example: Epigenetics and Sphagnum Reproduction	180
11. Synthesis: The Potential for a Genus Level Sequencing Project	183
Acknowledgements	184
References	184

6. The Genome of the Model Species <i>Anthoceros agrestis</i>	189
P. Szövényi	
1. Introduction	190
2. The Organellar Genomes	194
3. The Nuclear Genome	196
4. Conclusions and Future Prospects	207
References	208
 Section 3 Transcriptomes	
7. Evolutionary Genomics of Ferns and Lycophytes	215
E.B. Sessa and J.P. Der	
1. Introduction	216
2. Fern Genomes	223
3. Lycophyte Genomes	235
4. Looking to the Future of Fern and Lycophyte Genomics	237
5. Conclusion	243
References	243
 8. The Genomes of Charophyte Green Algae	255
C.F. Delwiche	
1. Introduction	256
2. Overview of the Charophytes	258
3. Cytology, Chromosome Counts and Polyploidy	261
4. Organellar Genomes; Mapping and Map-Based Sequencing	263
5. PCR and Clone-Based Gene Sequencing	265
6. Nuclear Genomes	266
Acknowledgements	266
References	267
 <i>Subject Index</i>	 271
<i>Author Index</i>	281