Preface

Chloroplasts are green plastids found in land plants, algae, and some protists. They are the unique site for the reactions of photosynthesis in such cells, and thus chloroplasts are responsible for much of the world’s primary productivity. As photosynthesis is the only significant mechanism of energy-input into living cells, these organelles are essential for the survival of plants and animals alike. Consequently, agriculture is wholly dependent upon the photosynthesis that takes place in chloroplasts. Moreover, many other important cellular activities occur uniquely inside chloroplasts or in other non-photosynthetic types of plastid. These activities include the production of starch, amino acids, fatty acids, lipids, terpenoids, purine and pyrimidine bases, and colourful pigments in fruits, flowers, and leaves, as well as key aspects of nitrogen and sulphur metabolism. Many products of these biosynthetic processes are vital components of mammalian diets or offer opportunities for industrial exploitation. Advances in our understanding of plastid biogenesis will facilitate the manipulation and exploitation of these processes and aid improvements in the quantity or quality of the various products.

Over the years, chloroplast biology has been studied in a variety of different organisms, based on technical considerations. Such work has undoubtedly led to major advances in the field, but has had the significant disadvantage that findings made using different experimental systems or species are not always directly cross-comparable. The relatively recent adoption of Arabidopsis thaliana as the model organism of choice for plant science research, across the globe, has led to its emergence as a pre-eminent system for research on chloroplasts and other types of plastid. The availability of genomic sequence resources and extensive germplasm collections for Arabidopsis, as well as its amenability to molecular genetic analysis, have all contributed to this change. This book (together with its partner, Volume I) aims to bring together in a single location some of the most important, modern techniques and approaches for chloroplast research, with the unifying theme of Arabidopsis as the model system. Within the confines of this remit, we have produced a book that is relatively broad in its scope, and which many Arabidopsis researchers and biotechnologists with a general interest in chloroplasts, plastids, or related processes might use as an aid to their work. In essence, it is a book for Arabidopsis integrative biologists with a general focus on chloroplast and plastid research. In spite of the central position afforded to Arabidopsis, many of the presented methods can be applied to other experimental organisms with minimal modification.

Leicester, UK

R. Paul Jarvis
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Contributors

BIRGIT AGNE • Abteilung Pflanzenbiochemie, Martin-Luther-Universität Halle-Wittenberg, Halle, Germany
CHARLES ANDRÉS • Plant Physiology Laboratory, University of Neuchâtel, Neuchâtel, Switzerland
EVA-MARI ARO • Molecular Plant Biology, Department of Biochemistry and Food Chemistry, University of Turku, Turku, Finland
SACHA BAGINSKY • Institut für Biochemie und Biotechnologie, Martin-Luther-Universität Halle-Wittenberg, Halle, Saale, Germany
JOCELYN BÉDARD • Institute for Protein Research, Osaka University, Suita, Osaka, Japan
CELINE BESAGNI • Laboratoire de Physiologie Végétale, Université de Neuchâtel, Neuchâtel, Switzerland
CLAIRE BÉHÉLIN • Laboratoire de Biogenèse Membranaire, UMR 5200, CNRS-Université Victor Segalen Bordeaux 2, Bordeaux, France
MATTHEW D. BROOKS • Department of Plant and Microbial Biology, University of California, Berkeley, CA, USA; Division of Physical Biosciences, Lawrence Berkeley National Laboratory, Berkeley, CA, USA
CÉLIA REGINA CARLINI • Department of Biophysics, Center of Biotechnology, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil
OLAF CZARNECKI • Institute of Biology/Plant Physiology, Humboldt University Berlin, Berlin, Germany
DIOGO RIBEIRO DEMARTINI • Department of Biophysics, Center of Biotechnology, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil
PETER DÖRMAN • Institute of Molecular Physiology and Molecular Biotechnology of Plants (IMBIO), University of Bonn, Bonn, Germany
ANNE ENDLER • Institut für Biochemie und Biotechnologie, Martin-Luther-Universität Halle-Wittenberg, Halle, Saale, Germany
MYRIAM FERRO • Laboratoire Etude de la Dynamique du Protéome, CEA, INSERM, Université de Grenoble, Grenoble, France
GIULIA FRISO • Department of Plant Biology, Cornell University, Ithaca, NY, USA
PETER GEIGENBERGER • Plant Metabolism, Department Biologie I, Ludwig-Maximilians-Universität München, Planegg-Martinsried, Germany
AEEK K. GRENNA • Department of Plant Biology, University of Illinois, Urbana, IL, USA
BERNHARD GRIMM • Institute of Biology/Plant Physiology, Humboldt University Berlin, Berlin, Germany
MICHAEL HALL • Department of Biological Chemistry, Institute of Chemistry and Umeå Plant Science Centre (UPSC), Umeå University, Umeå, Sweden
GEORG HÖLZL • Institute of Molecular Physiology and Molecular Biotechnology of Plants (IMBIO), University of Bonn, Bonn, Germany
CARMEN HOSTETTLER • Department of Biology, ETH Zurich, Zurich, Switzerland
GILES JOHNSON • Life Sciences, University of Manchester, Manchester, UK
JACQUES JOYARD • Laboratoire de Physiologie Cellulaire Végétale, CNRS, CEA, INRA, Université de Grenoble, Grenoble, France
FELIX KESSLER • Plant Physiology Laboratory, University of Neuchâtel, Neuchâtel, Switzerland
SHINGO KIKUCHI • Institute for Protein Research, Osaka University, Suita, Osaka, Japan
TATJANA KLEINE • Lehrstuhl für Molekularbiologie der Pflanzen (Botanik), Department Biologie I, Ludwig-Maximilians-Universität, Planegg-Martinsried, Germany
KATHARINA KOLLING • Department of Biology, ETH Zurich, Zurich, Switzerland
OLIVER KÖTTING • Department of Biology, ETH Zurich, Zurich, Switzerland
ROBERT L. LAST • Department of Biochemistry and Molecular Biology, and Department of Plant Biology, Michigan State University, East Lansing, MI, USA
DARIO LEISTER • Lehrstuhl für Molekularbiologie der Pflanzen (Botanik), Department Biologie I, Ludwig-Maximilians-Universität, Planegg-Martinsried, Germany
YAN LU • Department of Biological Sciences, Western Michigan University, Kalamazoo, MI, USA
JODI MAPLE • Centre For Organelle Research, Universitetet i Stavanger, Stavanger, Norway
JÖRG MEURER • Department Biologie I, Biozentrum der LMU München, Planegg-Martinsried, Germany
YOGESH MISHRA • Department of Biological Chemistry, Institute of Chemistry and Umeå Plant Science Centre (UPSC), Umeå University, Umeå, Sweden
SIMON G. MÖLLER • Centre For Organelle Research, Universitetet i Stavanger, Stavanger, Norway
LUCAS MOYET • Laboratoire de Physiologie Cellulaire Végétale, CNRS, CEA, INRA, Université de Grenoble, Grenoble, France
ERIK MURCHIE • Division of Plant and Crop Sciences, School of Biosciences, University of Nottingham, Sutton Bonington, UK
MASATO NAKAI • Institute for Protein Research, Osaka University, Suita, Osaka, Japan
KRISHNA K. NIYOGI • Department of Plant and Microbial Biology, University of California, Berkeley, CA, USA; Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA
PAUL DOMINIC B. OLINARES • Department of Plant Biology, and Department of Chemistry and Chemical Biology, Cornell University, Ithaca, NY, USA
DONALD R. ORT • Photosynthesis Research Unit, U.S. Department of Agriculture-Agricultural Research Service, Urbana, IL, USA; Department of Plant Biology, University of Illinois, Institute for Genomic Biology, Urbana, IL, USA
ENRICO PETER • Institute of Biology/Plant Physiology, Humboldt University Berlin, Berlin, Germany
LUCIA EUGENI PILLER • Laboratoire de Physiologie Végétale, Université de Neuchâtel, Neuchâtel, Switzerland
Contributors

Norbert Rolland • Laboratoire de Physiologie Cellulaire Végétale, CNRS, CEA, INRA, Université de Grenoble, Grenoble, France

Daniel Salvi • Laboratoire de Physiologie Cellulaire Végétale, CNRS, CEA, INRA, Université de Grenoble, Grenoble, France

Diana Santelia • Department of Biology, ETH Zurich, Zurich, Switzerland

Linda J. Savage • Department of Biochemistry and Molecular Biology, Michigan State University, East Lansing, MI, USA

Enrico Schleiff • Molecular Cell Biology of Plants, Centre of Membrane Proteomics, Cluster of Excellence Macromolecular Complexes, Goethe-University, Frankfurt, Germany

Wolfgang P. Schröder • Department of Biological Chemistry, Institute of Chemistry and Umeå Plant Science Centre (UPSC), Umeå University, Umeå, Sweden

Daphné Seigneurin-Berny • Laboratoire de Physiologie Cellulaire Végétale, CNRS, CEA, INRA, Université de Grenoble, Grenoble, France

Sari Sirpiö • Molecular Plant Biology, Department of Biochemistry and Food Chemistry, University of Turku, Turku, Finland

Sebastian Streb • Department of Biology, ETH Zurich, Zurich, Switzerland

Marjaana Suorsa • Molecular Plant Biology, Department of Biochemistry and Food Chemistry, University of Turku, Turku, Finland

Jay J. Theelen • Department of Biochemistry and Interdisciplinary Plant Group, Christopher S. Bond Life Sciences Center, University of Missouri, Columbia, MO, USA

Steven M. Theg • Department of Plant Biology, University of California Davis, Davis, CA, USA

Axel Tiessen • Departamento de Ingenieria Genetica, CINVESTAV, Irapuato, Mexico

Curtis Tom • Department of Plant Biology, University of California Davis, Davis, CA, USA

Joanna Tripp • Molecular Cell Biology of Plants, Goethe-University, Frankfurt, Germany

Klaas J. van Wijk • Department of Plant Biology, Cornell University, Ithaca, NY, USA

Kenichi Yamaguchi • Division of Biochemistry, Nagasaki University, Nagasaki, Japan

Anna Maria Zbierzak • Institute of Molecular Physiology and Molecular Biotechnology of Plants (IMBIO), University of Bonn, Bonn, Germany

Samuel C. Zeeman • Department of Biology, ETH Zurich, Zurich, Switzerland