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ANNOUNCEMENT

Advances in Photosynthesis and Respiration, Volume 23: Structure and Function of Plastids

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I am delighted to announce the publication, in *Advances in Photosynthesis and Respiration* (AIPH) Series, of *The Structure and Function of Plastids*, a book covering the central role of plastids for life on earth. It deals with both the structure and the function of these unique organelles, particularly of chloroplasts. Two distinguished authorities have edited this volume: Robert R. Wise of the University of Wisconsin at Oshkosh, Wisconsin, and J. Kenneth Hoober of the Arizona State University, Tempe, Arizona. Two of the earlier AIPH volumes have included descriptions of plastids: Volume 7 (The Molecular Biology of Chloroplasts and Mitochondria in *Chlamydomonas*, edited by Jean-David Rochaix, Michel Goldschmidt-Clermont and Sabeeha Merchant); and Volume 14 (Photosynthesis in Algae, edited by Anthony Larkum, Susan Douglas, and John Raven). The current volume follows the 22 volumes listed below.

Published Volumes (1994–2006)

[For a link to description of volumes 1–18, see http://www.life.uiuc.edu/govindjee/newbook/Vol1–18.html, and for a link to description of volumes 19–22, see http://www.life.uiuc.edu/govindjee/newbook/Vol19–25.html]

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Volume1: Molecular Biology of Cyanobacteria (28 Chapters; 881 pages; 1994; edited by Donald A. Bryant, from USA; ISBN: 0-7923-3222-9);

Volume 2: Anoxygenic Photosynthetic Bacteria (62 Chapters; 1331 pages; 1995; edited by Robert E. Blankenship, Michael T. Madigan, and Carl E. Bauer, from USA; ISBN: 0-7923-3682-8);

Volume 3: Biophysical Techniques in Photosynthesis (24 Chapters; 411 pages; 1996; edited by the late Jan Amesz and the late Arnold J. Hoff, from The Netherlands; ISBN: 0-7923-3642-9);

Volume 4: Oxygenic Photosynthesis: The Light Reactions (34 Chapters; 682 pages; 1996; edited by Donald R. Ort and Charles F. Yocum, from USA; ISBN: 0-7923-3683-6);

Volume 5: Photosynthesis and the Environment (20 Chapters; 491 pages; 1996; edited by Neil R. Baker, from UK; ISBN: 0-7923-4316-6);

Volume 6: Lipids in Photosynthesis: Structure, Function, and Genetics (15 Chapters; 321 pages; 1998; edited by Paul-André Siegenthaler and Norio Murata, from Switzerland and Japan; ISBN: 0-7923-5173-8);

Volume 7: The Molecular Biology of Chloroplasts and Mitochondria in Chlamydomonas (36 Chapters; 733 pages; 1998; edited by Jean-David Rochaix, Michel Goldschmidt-Clermont, and Sabeeha Merchant, from Switzerland and USA; ISBN: 0-7923-5174-6);

Volume 8: The Photochemistry of Carotenoids (20 Chapters; 399 pages; 1999; edited by Harry A. Frank, Andrew J. Young, George Britton, and Richard J. Cogdell, from USA and UK; ISBN: 0-7923-5942-9);

Volume 9: Photosynthesis: Physiology and Metabolism (24 Chapters; 624 pages; 2000; edited by Richard C. Leegood, Thomas D. Sharkey, and Susanne von

Caemmerer, from UK, USA, and Australia; ISBN: 0-7923-6143-1);

Volume 10: Photosynthesis: Photobiochemistry and Photobiophysics (36 Chapters; 763 pages; 2001; authored by Bacon Ke, from USA; ISBN: 0-7923-6334-5);

Volume 11: Regulation of Photosynthesis (32 Chapters; 613 pages; 2001; edited by Eva-Mari Arov and Bertil Andersson, from Finland and Sweden; ISBN: 0-7923-6332-9);

Volume 12: Photosynthetic Nitrogen Assimilation and Associated Carbon and Respiratory Metabolism (16 Chapters; 284 pages; 2002; edited by Christine Foyer and Graham Noctor, from UK and France; ISBN: 0-7923-6336-1);

Volume 13: Light Harvesting Antennas (17 Chapters; 513 pages; 2003; edited by Beverley Green and William Parson, from Canada and USA; ISBN: 0-7923-6335-3);

Volume 14: Photosynthesis in Algae (19 Chapters; 479 pages; 2003; edited by Anthony Larkum, Susan Douglas, and John Raven, from Australia, Canada, and UK; ISBN: 0-7923-6333-7);

Volume 15: Respiration in Archaea and Bacteria: Diversity of Prokaryotic Electron Transport Carriers (13 Chapters; 326 pages; 2004; edited by Davide Zannoni, from Italy; ISBN: 1-4020-2001-5);

Volume 16: Respiration in Archaea and Bacteria 2: Diversity of Prokaryotic Respiratory Systems (13 Chapters; 310 pages; 2004; edited by Davide Zannoni, from Italy; ISBN: 1-4020-2002-3);

Volume 17: Plant Mitochondria: From Genome to Function (14 Chapters; 325 pages; 2004; edited by David A. Day, A. Harvey Millar, and James Whelan, from Australia; ISBN: 1-4020-2339-5);

Volume 18: Plant Respiration: From Cell to Ecosystem (13 Chapters; 250 pages; 2005; edited by Hans Lambers and Miquel Ribas-Carbo; from Australia and Spain; ISBN: 1-4020-3588-8);

Volume 19: Chlorophyll a Fluorescence: A Signature of Photosynthesis (31 Chapters; 818 pages; 2004; edited by George C. Papageorgiou and Govindjee, from Greece and USA; ISBN: 1-4020-3217-X);

Volume 20: Discoveries in Photosynthesis (111 Chapters; 1210 pages; 2005; edited by Govindjee, J. Thomas Beatty, Howard Gest, and John F. Allen, from USA, Canada, and Sweden (& UK); ISBN: 1-4020-3323-0);

Volume 21: Photoprotection, Photoinhibition, Gene Regulation, and Environment (21 Chapters; 380 pages; 2006; edited by Barbara Demmig-Adams, William W. Adams III, and Autar K. Mattoo, from USA; ISBN: 1-4020-3323-0); and

Volume 22: Photosystem II: The Light-Driven Water: Plastoquinone Oxidoreductase (34 Chapters; 786 pages; 2005; edited by Thomas J. Wydrzynski and Kimiyuki Satoh, from Australia and Japan; ISBN: 1-4020-4249-3).

Comments on the AIPH Series by Robert Blankenship are at: http://www.life.uiuc.edu/govindjee/newbook/Quotation.html, and by Susan Golden at: http://www.life.uiuc.edu/govindjee/newbook/Quotation-s.html.

Further information on these books and ordering instructions can be found at http://www.springeronline.com under the Book Series ''Advances in Photosynthesis and Respiration.'' Special discounts are available to members of the International Society of Photosynthesis Research, ISPR (http://www. photosynthesisresearch.org/).

Structure and Function of Plastids

The Structure and Function of Plastids, Volume 23 in the *Advances in Photosynthesis and Respiration* Series, provides a comprehensive look at the biology of plastids, the multifunctional biosynthetic factories that are unique to plants and algae. A total of 59 international experts, from 11 countries, have contributed an excellent ''Dedication'' and 27 Chapters that cover all aspects of this large and diverse family of plant and algal organelles. The book is divided into five sections: (I) *Plastid Origin and Development* (5 Chapters); (II) *The Plastid Genome and Its Interaction with the Nuclear Genome* (5 Chapters); (III) *Photosynthetic Metabolism in Plastids* (4 Chapters); (IV) *Non-Photosynthetic Metabolism in Plastids* (6 Chapters); and (V) *Plastid Differentiation and Response to Environmental Factors* (7 Chapters). Each chapter includes an integrated view of plant biology from the standpoint of the plastid. The book is intended for a wide audience, but is specifically designed for advanced undergraduate and graduate students and scientists in the fields of photosynthesis, biochemistry, molecular biology, physiology, and plant biology. This book, edited by Bob Wise and Ken Hoober, is a very important addition to the already published books in the AIPH Series.

The Structure and Function of Plastids begins with *a dedication*, by Brian Gunning (of Australia), Friederike Koenig (of Germany) and Govindjee (USA), to the early pioneers. This dedication ends by honoring Wilhelm Menke, who had coined the word ''thylakoids'' in 1961. I provide below some of the names mentioned in this dedication (arranged here by the year of birth of those mentioned):

- Anthony van Leewenhoeck (1632–1723) described chloroplasts without naming them;

- Nehemiah Grew (1641–1712) may have indeed seen chloroplasts;
- Franz Julius Ferdinand Meyen (1804–1840) described ''chlorophyll granules'' (or ''corpuscules'');
- Hugo von Mohl (1805–1872) provided detailed description of ''chlorophyll granules'' (''Chlorophyll körner'');
- Nathanael Pringsheim (1823–1894) used the term ''Stroma'' for the non-green part of ''Chlorophyll körner'';
- Eduard Strasburger (1844–1912) used the word ''Chloroplast'' for chloroplast;
- Arthur Meyer (1850–1922) used the term ''Grana'' and distinguished between ''Autoplasten'' (what we call chloroplasts); ''Chromoplasten'' (chromoplasts); ''Trophoplasten'' (reserve storing plastids); and ''Anaplasten'' (leucoplasts);
- Constantin Sergeevich Mereschkowsky* (1855–1921) provided a detailed hypothesis of endosymbiosis (* also spelled as Konstantin Sergejewicz Mereschkovsky); and
- Andreas Franz Schimper (1856–1901) described three types of plastids (''Chloroplastiden'', ''Leukoplastiden'', and ''Chromoplastiden''); stated that ''Chloroplastiden'' resembled cyanobacteria.

The 27 chapters, in order of appearance, are (authors names are in parentheses):

(1) The Diversity of Plastid Form and Function (Robert R. Wise, USA);

(2) Chloroplast Development: Whence and Whither (J. Kenneth Hoober, USA);

(3) Protein Import into Plastids: Who, When, and How? (Ute C. Vothknecht and Jürgen Soll, both from Germany);

(4) Origin and Evolution of Plastids: Genomic View on the Unification and Diversity of Plastids (Naoki Sato, Japan);

(5) The Mechanism of Plastid Division: The Structure and Origin of The Plastid Division Apparatus (Shin-ya Miyagishima and Tsuneyoshi Kuroiwa, USA and Japan);

(6) Expression, Prediction, and Function of the Thylakoid Proteome in Higher Plants and Green Algae (Klaas van Wijk, USA);

(7) The Role of Nucleus- and Chloroplast-Encoded Factors in the Synthesis of the Photosynthetic Apparatus (Jean-David Rochaix, Switzerland);

(8) Plastid Transcription: Competition, Regulation, and Promotion by Plastid- and Nuclear- Encoded Polymerases (A. Bruce Cahoon, Yutaka Komine, and David B. Stern, all from USA);

(9) Plastid-to-Nucleus Signaling (Åsa Strand, Tatjana Kleine and Joanne Chory, from Sweden and USA);

(10) Trace Metal Utilization in Chloroplasts (Sabeeha Merchant, USA);

(11) Light/Dark Regulation of Chloroplast Metabolism (Shaodong Dai, Kenth Johansson, Peter Schürmann, and Hans Eklund, of USA, Switzerland, and Sweden);

(12) Chlororespiratory Pathways and their Physiological Significance (Peter J. Nixon and Peter R. Rich, both from UK);

(13) CO_2 Concentrating Mechanisms (Sue G. Bartlett, Mautusi Mitra, and James V. Moroney, all from USA);

(14) Synthesis, Export, and Partitioning of the End Products of Photosynthesis (Andreas P.M. Weber, USA);

(15) Chlorophyll Synthesis (Robert D. Willows, Australia);

(16) Carotenoids (Abby J. Cuttriss, Joanna L. Mimica, Barry J. Pogson, and Crispin A. Howitt, all from Australia);

(17) Lipid Synthesis, Metabolism, and Transport (Peter Dörmann, Germany);

(18) Amino Acid Synthesis in Plastids (Muriel Lancien, Peter J. Lea, and Ricardo A. Azevedo, from UK and Brazil);

(19) Sulfur Metabolism in Plastids (Elizabeth A.H. Pilon-Smits and Marinus Pilon, both from USA);

(20) Regulation and Role of Calcium Fluxes in Chloroplasts (Carl Hirschie Johnson, Richard Shingles, and William F. Ettinger, all from USA);

(21) The Role of Plastids in Ripening Fruits (Florence Bouvier and Bilal Camara, both from France);

(22) Fate and Activities of Plastids During Senescence (Karin Krupinska, Germany);

(23) The Kleptoplast (Mary E. Rumpho, Farahad P.Dastoor, James R. Manhart, and Jungho Lee, from USA and Korea);

(24) The Apicoplast (Soledad Funes, Xochitl Pérez-Martínez, Adrián Reyes-Prieto, and Diego González-Halphen, all from Mexico);

(25) The Role of Plastids in Gravitropism (Maria Palmieri and John Z. Kiss, both from USA);

(26) Plastid Movements in Response to Environmental Signals (Yoshikatsu Sato and Akeo Kadota, both from Japan); and

(27) Oxygen Metabolism and Stress Physiology (Barry A. Logan, USA).

A List of Selected Books

Volume 20 of the AIPH Series (Discoveries in Photosynthesis, edited by Govindjee, J.T. Beatty, H. Gest, and J.F. Allen) contains a recently published time-line on oxygenic photosynthesis covering its many aspects, including research on the functional work on chloroplasts (see Govindjee and D. Krogmann (2004) ''Discoveries in oxygenic photosynthesis (1727–2003): a perspective''. Photosynth Res 80: 15–57). In addition, this book contains a historical perspective by Andrew Staehelin: ''Chloroplast structure: from chlorophyll granules to supra-molecular architecture of thylakoid membranes'' (Photosynth Res 76: 185–196, 2003).

Plastids have been at the heart of plant biology and several books have been written on them. Bob Wise, Ken Hoober, and I have selected to list some of these books that have influenced research in the field of *plastids*. They are listed below chronologically.

- T.W. Goodwin (ed.) (1966) Biochemistry of Chloroplasts, Volume 1. Proceedings of a NATO Advanced Study Institute held at Aberystwyth, UK, August, 1965. Academic Press, London and New York;
- T.W. Goodwin (ed.) (1967) Biochemistry of Chloroplasts, Volume 2. Proceedings of a NATO Advanced Study Institute held at Aberystwyth, UK, August, 1965. Academic Press, London and New York;
- J.T.O. Kirk and R.A.E. Tilney-Bassett (1967) The Plastids, their Chemistry, Structure, Growth, and Inheritance. WH Freeman and Co., London;
- B.E.S. Gunning and M.W. Steer (1975) Ultrastructure and the Biology of Plant Cells. Edward Arnold, London;
- J. Barber (ed.) (1976) The Intact Chloroplast (Topics in Photosynthesis, Vol. 1) Elsevier Scientific Pub. Co., Amsterdam and New York;
- G. Akoyunoglou and J-H. Argyroudi-Akoyunoglou (ed.) (1978) Chloroplast Development: Proceedings of the International Symposium on Chloroplast Development held on the Island of Spetsai, Greece, July 9–15, 1978. Elsevier/North-Holland Biomedical Press, Amsterdam and New York;
- J.T.O. Kirk and R.A.E. Tilney-Bassett (1978) The Plastids, their Chemistry, Structure, Growth, and Inheritance, 2nd edition. Elsevier/North Holland Biomedical Press, Amsterdam and New York;
- J. Reinert (1980) Chloroplasts (in *Results and Problems in Cell Differentiation*, Vol. 10). Springer-Verlag, Berlin;
- J.A. Schiff and H. Lyman (eds.) (1982) On the Origins of Chloroplasts. Elsevier/North-Holland, Amsterdam, and New York;
- M.A. Tribe and P. Whittaker (1982) Chloroplasts and Mitochondria (Institute of Biology's Studies in Biology, No. 31), 2nd edition. Edward Arnold, London;
- N.R. Baker and J. Barber (eds.) (1984) Chloroplast Biogenesis. Elsevier Science Pub. Co., Amsterdam;
- B. Halliwell (1984) Chloroplast Metabolism: The Structure and Function of Chloroplasts in Green Plants. Clarendon Press, New York and Oxford University Press, Oxford;
- J.K. Hoober (1984) Chloroplasts. Plenum Press, New York;
- J.R. Ellis (ed.) (1984) Chloroplast Biogenesis (Seminar Series/Society for Experimental Biology, No. 21) Cambridge University Press, Cambridge and New York;
- J.H. Argyroudi-Akoyunoglou (ed.) (1992) Regulation of Chloroplast Development: Proceedings of a NATO Advanced Research Workshop held on Crete, Greece, July 28–August 3, 1991. Plenum Press, New York;
- A.S. Raghavendra (ed.) (1998) Photosynthesis: A Comprehensive Treatise. Cambridge University Press, UK;
- J.H. Argyroudi-Akoyunoglou and H. Senger (ed.) (1999) The Chloroplast: From Molecular Biology to Biotechnology. Kluwer Academic Publishers (now Springer), Dordrecht;
- U.C. Biswal, B. Biswal, and M.K. Raval (2003) Chloroplast Biogenesis from Proplastid to Gerontoplast. Kluwer Academic Publishers (now Springer), Dordrecht; and
- S.G. Møller (ed.) (2004) Plastids (in Annual PlantReviews, Vol. 13). Blackwell Publishing, Oxford, UK.
- From the students' point of view, the book by J.K. Hoober (1984), and by U.C. Biswal, B. Biswal and M.K. Raval (2003) are most suitable in providing a basic background of the field of plastids.

A Useful Compact Disc (CD)

A very useful CD that should be helpful to students of ''Plastids'' is*: Plant Cell Biology on CD, Part 1* (ISBN 0-9751682-0-7). It was produced by Brian Gunning of the Research School of Biological Sciences, Australian National University, Canberra, Australia. It is a two-CD set containing more than 1000 images covering an introduction to plant cells, mitochondria, plastids, and peroxisomes, designed as a source of information for students and a resource for teachers. It is probably the largest collection of images of plastids ever assembled for these purposes, including most kinds of light and

electron microscopy, diagrams and numerous time-lapse movies, organized in a user-friendly menu-driven interface. Further details are available at: www.plant-cellbiologyonCD.com.

Future AIPH Books

The readers of the current series are encouraged to watch for the publication of the forthcoming books (not necessarily arranged in the order of future appearance):

Photosystem I: The Light-Driven Plastocyanin: Ferredoxin Oxidoreductase (Editor: John Golbeck; volume 24, 2006);

Chlorophylls and Bacteriochlorophylls: Biochemistry, Biophysics, Functions and Applications (Editors: Bernhard Grimm, Robert J. Porra, Wolfhart Rüdiger, and Hugo Scheer; volume 25, 2006);

Biophysical Techniques in Photosynthesis. II (Editors: Thijs J. Aartsma and Jörg Matysik);

Photosynthesis: A Comprehensive Treatise; Physiology, Biochemistry, Biophysics and Molecular Biology, Part 1 (Editors: Julian Eaton-Rye and Baishnab Tripathy); and

Photosynthesis: A Comprehensive Treatise; Physiology, Biochemistry, Biophysics and Molecular Biology, Part 2 (Editors: Baishnab Tripathy and Julian Eaton-Rye).

In addition to these contracted books, we are already in touch with prospective Editors for books on the following topics:

Anoxygenic Photosynthetic Bacteria. II
Sulfur Metabolism in Photosynthetic Systems
Abiotic Stress Adaptation in Plants: Physiological, Molecular and Genomic Foundation
C-4 photosynthesis and Related
CO_2 Concentrating Mechanisms
Chloroplast Bioengineering
Molecular Biology of Cyanobacteria. II
Protonation and ATP Synthases
Genomics and Proteomics
Global Aspects of Photosynthesis and Respiration
Artificial Photosynthesis

Readers are encouraged to send their suggestions for future volumes (topics, names of future editors, and of future authors) to me by E-mail (gov@uiuc.edu) or fax (1-217-244-7246).

In view of the interdisciplinary character of research in photosynthesis and respiration, it is my earnest hope that this series of books will be used in educating students and researchers not only in Plant Sciences, Molecular and Cell Biology, Integrative Biology, Biotechnology, Agricultural Sciences, Microbiology, Biochemistry and Biophysics, but also in Bioengineering, Chemistry, and Physics.

Acknowledgments I take this opportunity to thank Ken Hoober and Bob Wise for their outstanding and painstaking editorial work for this volume. I also thank Brian Gunning and Friederike Koenig for their excellent contributions to the ''Dedication,'' and most importantly to all other 55 authors of volume 23: without their authoritative chapters, there would be no such volume. I owe special thanks to Jacco Flipsen, Noeline Gibson and André Tournois (of Springer) and Arvind Sohal (of Techbooks, New Delhi, India) for their friendly working relation with us that led to the production of this book. Thanks are also due to Jeff Haas (Director of Information Technology, Life Sciences, University of Illinois at Urbana–Champaign, UIUC) and Evan De Lucia (Head, Department of Plant Biology, UIUC) for their support. Larry Orr constantly provides us with guidance regarding the rules and the format of our Series that started in 1994. All the members of my immediate family (my wife Rajni Govindjee; our daughter Anita, her husband Morten Christiansen, and our granddaughter Sunita; our son Sanjay, his wife Marilyn, and our grandsons Arjun and Rajiv) have been very supportive during the preparation of this and other books in the AIPH Series.