

# Announcement

## Advances in Photosynthesis and Respiration, Volume 24 (Photosystem I)

I am delighted to announce, in Advances in Photosynthesis and Respiration (AIPH) Series, the publication of Volume 24 (Photosystem I: The Light-Driven Plastocyanin:Ferredoxin Oxidoreductase); it integrates the biochemistry, biophysics and molecular biology of Photosystem I, the reaction center that provides the necessary reducing power for carbon fixation in plants, algae and cyanobacteriam; it was edited by a distinguished authority John H. Golbeck (University Park, PA, USA).

This book on *Photosystem I* follows 23 earlier volumes:

### 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>

- *Volume 1: 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); and
- *Volume 23: Structure and Function of the Plastids* (27 Chapters; 2006; edited by Robert Wise and J. Kenneth Hooper, both from USA).

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/>). You may also want to look at: <<http://www.life.uiuc.edu/govindjee/newbook/Vol%2024.html>> for information on volume 24.

## **About Volume 24: Photosystem I: The Light-Driven Plastocyanin:Ferredoxin Oxidoreductase**

This book summarizes, in 40 authoritative chapters, the advances made in the last decade in the biophysics, biochemistry, and molecular biology of the enzyme known as Photosystem I, the light-driven plastocyanin:ferredoxin oxidoreductase. Photosystem I participates along with Photosystem II in harvesting solar energy to supply photosynthetic organisms with stored chemical energy in the form of ATP and stored reducing power in the form of NADPH for metabolism, growth, and reproduction. This volume is unique as it is the first such book on Photosystem I ever produced: it contains chapters that include information on molecular architecture, protein-pigment interactions, excitation and electron transfer dynamics, protein-cofactor interactions, kinetics of electron transfer and bio-assembly of proteins and cofactors. The volume begins with a series of historical perspectives that provide a solid background to the field, and ends with information on modeling of light harvesting and electron transfer reactions, and the evolution of the reaction center. Particular attention is paid to spectroscopy, including the theory of the measurement and the interpretation of the data. The book is a comprehensive and up-to date source of background information on the Photosystem I reaction center for seasoned researchers, those who are just entering the field, Ph.D. students, researchers and undergraduates in the fields of biophysics, biochemistry, microbiology, agriculture, and ecology. I remain in awe at the encyclopedic knowledge provided in this Bible of Photosystem I. It complements “Photosystem II: The Light Driven Water:Plastoquinone Oxidoreductase” edited by Thomas J. Wydrzynski and Kimiyuki Satoh (Volume 22, published in 2005). Electrons are transferred from water to plastoquinone by Photosystem II. Plastoquinol transfers electrons to Photosystem I via the cytochrome  $b_6f$  complex and plastocyanin, and Photosystem I reduces  $\text{NADP}^+$ . The book ‘Photosystem I: The Light-Driven, Plastocyanin: Ferredoxin Oxidoreductase’ is divided into the following topics:

- Historical Perspectives (4 chapters);
- Molecular Architecture (4 chapters);
- Pigment-Protein Interactions (3 chapters);
- Excitation Dynamics and Electron Transfer Processes (2 chapters);
- Modification of the Cofactors and their Environments (2 chapters);
- Spectroscopic Studies of the Cofactors (8 chapters);
- Kinetics of Electron Transfer (6 chapters);

- Biosynthetic Processes (3 chapters);
- Modeling of Photosystem I Reactions (4 chapters);
- Cyclic Photophosphorylation (1 chapter);
- Photoinhibition (1 chapter); and
- Evolution (2 chapters).

For Table of Contents of this extraordinary book, see : <http://www.life.uiuc.edu/govindjee/photosynSeries/volume24.pdf>. This book is written by 80 international authorities from 13 countries (Canada, Denmark, France, Germany, Israel, Italy, Japan, Russia, Spain, Switzerland, The Netherlands, United Kingdom, United States of America); it is, thus, an international book.

I thank each and every author by name (listed in alphabetical order) that reads like a ‘Who’s Who in ‘Photosystem I research’:

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**The Web Site for the Chlorophyll and Bacteriochlorophyll Book.** A unique innovation introduced by the editors for this book has been the construction of a web site that hosts the supplementary material including several colored figures. It is located at <<http://epub.ub.uni-muenchen.de/archive/OOOO07>> Our readers will really appreciate this contribution by the editors.

#### **A Bit of History– From there to here**

Just to give a flavor of history, I list below some discoveries. [For historical perspectives, I refer the readers to chapters 1–4 (Anthony San Pietro; Richard Malkin; Bacon Ke; and Paul Mathis and Kenneth Sauer) in volume 24.

- Discovery of P700, the reaction center of Photosystem I (PS I) in The Netherlands: Bessel Kok (1918–1978; see Kok, *Biochim. Biophys. Acta* 22: 399–401, 1956), while in Wageningen, in The Netherlands, discovered, in several photosynthetic organisms, a light-induced absorbance decrease that had its highest long-wavelength peak at 700 nm (labeled as P700).
- Discovery of the Two-Light Effects in USA in Urbana (IL) and Baltimore (MD); hypothesis in Cambridge, UK: In 1957, Robert Emerson discovered two-light effect in photosynthesis (*Proc. Natl. Acad. Sci., USA*, 43: 133–143, 1957); it was to be later called the Emerson Enhancement effect. In 1959, Bessel Kok (*Plant Physiol.* 34: 184–192, 1959) showed, in cyanobacteria, that red light oxidized P700 and orange light reduced oxidized P700. Robin Hill and Fay Bendall, in UK, published, in 1960, their now famous Z-scheme (*Nature* 186: 136–137, 1960). Bessel Kok and George Hoch, from Baltimore, MD, presented in 1960 (see W.D. McElroy and B. Glass (eds) (1961) *A Symposium on Light, and Life*, pp 397–423. The Johns Hopkins Press, Baltimore, MD, a two-light reaction scheme, based on a multitude of experiments.
- In 1961, Louis N. M. Duysens, Jan Ames and B.M. Kamp (*Nature*, 190: 510–511, 1961) provided the crucial evidence for the two light reaction two-pigment system scheme, working in series. In the red alga *Porphyridium cruentum*, red light absorbed by

chlorophyll a oxidized a cytochrome. When green light, absorbed by phycoerythrin, was superimposed, the oxidized cytochrome became reduced. Duysens called the red light 'light 1,' and the chlorophyll a- containing system, 'system 1.' The other light, they had called 'light 2,' was absorbed by 'system 2.'

- Crystal structure of Photosystem I in Berlin, Germany: P. Jordan et al. (411: 909–917, 1961) were the first to resolve the X-ray crystallographic structure of Photosystem I of a thermophilic cyanobacterium for a 3D structure at 2.5 Å resolution.

## **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):

- Biophysical Techniques in Photosynthesis II (Editors: Thijs J. Aartsma and Jörg Matisyik)
  - Photosynthesis: A Comprehensive Treatise; Biochemistry, Biophysics, Physiology and Molecular Biology, Part 1 (Editors: Julian Eaton-Rye and Baishnab Tripathy); and
  - Photosynthesis: A Comprehensive Treatise; Biochemistry, Biophysics, Physiology and Molecular Biology, Part 2 (Editors: Baishnab Tripathy and Julian Eaton-Rye)

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

- Molecular Biology of Abiotic Stress
- Chloroplast Bioengineering
- Sulfur Metabolism in Photosynthetic Systems
- ATP Synthase
- Molecular Biology of Cyanobacteria II
- Genomics and Proteomics
- Hydrogen Evolution
- Global Aspects of Photosynthesis
- Artificial Photosynthesis

**Readers are encouraged to send their suggestions for future volumes (topics, names of future editors, tentative table of contents, 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.

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I take this opportunity to thank and congratulate John H. Golbeck. We recognize their outstanding and painstaking editorial work. Further, I thank all the 80 authors of volume 24 of the AIPH Series: without their authoritative chapters, there would be no such volumes. I especially thank Larry Orr for his expertise and dedicated cooperation at all stages has been crucial in bringing this book and other books in the series to completion. We are thankful to Seema Koul (of Techbooks, New Delhi, India) for her wonderful work on Volume 24: she communicated wonderfully well with both John Golbeck and myself at every step of the process. We owe thanks to Jacco Flipsen, Noeline Gibson and André Tournois (of Springer) for their friendly working relation with us that led to the production of this book. My personal thanks go to Jeff Haas (Director of Information Technology, Life Sciences, University of Illinois at Urbana-Champaign, UIUC), Evan De Lucia (Head, Department of Plant Biology, UIUC) and my dear wife Rajni Govindjee for their constant support.

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