

# Announcement

## Advances in Photosynthesis and Respiration, Volume 25 (Chlorophylls and Bacteriochlorophylls)

I am delighted to announce, in Advances in Photosynthesis and Respiration (AIPH) Series, the publication of Volume 25 (Chlorophylls and Bacteriochlorophylls: Biochemistry, Biophysics, Functions and Applications); it discusses in detail the key pigments that play many crucial roles at the heart of Photosystem I (Volume 24), Photosystem II (Volume 22) and anoxygenic photosynthesis (Volume 2 and a forthcoming volume). Volume 25 was edited by four distinguished authorities: Bernhard Grimm (Berlin, Germany), Robert (Bob) Porra, (Canberra, Australia), Wolfhart Rüdiger (Munich, Germany) and Hugo Scheer (Munich, Germany).

This book on *Chlorophylls & Bacteriochlorophylls* follows 24 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).
- *Volume 24: Photosystem I: The Light-Driven Plastocyanin:Ferredoxin Oxidoreductase* (40 Chapters; 2006; edited by John H. Golbeck, 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%2025.html>>>.

## **About Volume 25: Chlorophylls and Bacteriochlorophylls: Biochemistry, Biophysics, Functions and Applications**

In the past, AIPH volumes included, by necessity, functions of chlorophylls and bacteriochlorophylls acting as key components of both antenna and reaction centers, but none of these volumes focused on all the aspects of the properties and of the roles played by these key pigments not only in the natural process of photosynthesis but also in such applications as the photodynamic treatment of cancerous tumors and the detection and measurement of chlorophyll-bearing phytoplankton from satellites in outer space. This book integrates all the knowledge on these pigments essential for life on earth.

Chlorophylls are the most obvious natural pigments on Earth being observable, as they are, from outer space; they also sustain all life on Earth by their involvement in photosynthesis. With 37 concise chapters, this book reviews recent progress and current status of studies of the chemistry, metabolism and spectroscopy of both chlorophylls and chlorophyll protein complexes. Also discussed is the progress on the applications of the chlorophylls as photosensitizers in photodynamic therapy of cancerous tumors, as molecular probes, and reporters on the physiological status of whole plants and ecosystems. The last book dedicated to chlorophylls was published in 1991, and is out of print since 1995; thus this book fills a gap by summarizing the chemical, physical, biological and medical aspects of chlorophyll research and development with a focus on the tremendous progress achieved over the past 15 years. The book is aimed equally at advanced students and both novice and experienced researchers: each of the five sections has an up-to-date introductory overview which is followed by a series of concise well-focused and fully referenced chapters written by relevant specialist chemists, biochemists, biophysicists, photobiologists and pharmacologists.

This book has 37 authoritative chapters written by 70 international authorities from 18 countries (Australia, Austria, Belarus, Czech Republic, Denmark, France, Germany, Indonesia, Israel, Japan, Malaysia, Mexico, The Netherlands, Russia, Spain, Switzerland, United Kingdom and the United States of America). It is, therefore, a truly

international book and the editors deserve our thanks and our congratulations for providing this gift for our future. It was a Herculean task that Hugo Scheer and his co-editors Bernhard Grimm, Bob Porra and Wolfhart Rüdiger have accomplished. I still marvel at the diversity and depth of knowledge provided in this most recent and authoritative text on chlorophylls and bacteriochlorophylls.

*Chlorophylls and Bacteriochlorophylls: Biochemistry, Biophysics, Functions and Applications* is divided into the following topics:

- Structures; chemistry and analysis (9 chapters);
- Metabolism (9 chapters);
- Native environment (9 chapters);
- Functions (4 chapters); and
- Applications (6 chapters).

For Table of Contents of this extraordinary book, see: <http://www.life.uiuc.edu/govindjee/photosynSeries/volume25.pdf>.

I thank each and every author by name (listed in alphabetical order) that reads like a 'Who's Who in chlorophyll and bacteriochlorophyll research':

Thijs J. Aartsma; Machiko Akiyama; James P. Allen; Idan Ashur; Samuel I. Beale; Christoph F. Beck; Robert Blankenship; Alexander S. Brandis; Paula Braun; Donald A. Bryant; Aline G.M. Chew; Ido de Boer; Huub J.M. de Groot; P. Leslie Dutton; Patrick W. Fowler; Niels-Ulrik Frigaard; Ritsuko Fujii; Adela Garcia-Martin; José L. Garrido; Bernhard Grimm; Dirk W. Heinz; Stefan Hörtensteiner; C. Neil Hunter; Dieter Jahn; Shirley W. Jeffrey; Yoshinori Kakitani; Hiromi Kano; Brendan J. Keely; Hideo Kise; Masami Kobayashi; Michal Koblizek; Jürgen Köhler; Yasushi Koyama; Bernhard Kräutler; Frithjof C. Küpper; Hendrik Küpper; Lee-Gyan Kwa; Anthony W.D. Larkum, Dieter Leupold; Leenawaty Limantara; Heiko Lokstein; Julia A. Maresca; Alexander N. Melkozerno ; André Morel; Christopher C. Moser; Jürgen Moser; Mamuro Nango; Ladislav Nedbal; Dror Noy; Harald Paulsen; Robert (Bob) J. Porra; Wolfhart Rüdiger; Claudia Ryppa; Yoram Salomon; Hugo Scheer; Avidgor Scherz; Wolf-Dieter Schubert; Mathias O. Senge, Yuzo Shioi; Martin Spiller; Erich Steiner; Matthias von Jan; Josef Wachtveitl; Tadashi Watanabe; Arno Wiehe; JoAnn C. Williams; Elena Yaronskaya; Roie Yerushalmi; Manuel Zapata; and Wolfgang Zinth.

**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**

### **[1] Discoveries**

- In 1818, two French scientists Pierre Joseph Pelletier (1788–1842) and Joseph Bienaimé Caventou (1795–1877) named the green plant pigment chlorophyll ('green of leaf').
- In 1877, the Russian physiologist Climent A. Timiriazeff (1843–1920) established the red maximum of the absorption spectrum of chlorophyll and showed that red light absorbed by chlorophyll is the most efficient for photosynthesis. On the basis of this experiment, he claimed that chlorophyll is an optical and chemical photosensitizer of photosynthesis. He proposed that light absorption by chlorophyll causes its chemical transformation, which induces further reactions leading to photosynthesis.
- In 1906, the Russian botanist Mikhail Semenovich Tswett (1872–1919) separated the plant pigments (chlorophylls and carotenoids) by passing a solution containing the natural pigment mixture through glass columns packed with finely-divided calcium carbonate, thereby inventing a new technique appropriately called chromatography ('color representation' or 'color writing').
- In 1915, Richard Martin Willstätter (1872–1942), of Munich (Germany), received the Nobel Prize in Chemistry for his detailed chemical investigations on chlorophyll, including its chemical nature; he suggested that chlorophylls play an active role in photosynthesis. Willstätter's close collaborator in these studies was Arthur Stoll (1887–1971) of Switzerland.
- In 1930, Hans Fischer (1881–1945), also of Munich, Germany, received the Nobel Prize in Chemistry: he had made new inroads in to the chemistry of chlorophyll, the structure of which he elucidated in the subsequent 12 years. The award recognized his researches into the constitution of porphyrins, hemins and chlorophylls.
- In 1965, Robert Burns Woodward (1917-1979), of Harvard University, USA, received the Nobel Prize in Chemistry for the synthesis of many organic compounds including chlorophyll, the topic of this book.
- Shortly after, in 1966, the terpenoid specialist Basil C. C. Weedon of Imperial College, London, published a full record of the synthesis of phytol, the esterifying alcohol of most chlorophylls that comprises about 1/3 of their mass.

### **[2] The Books**

The appearance over the past 100 years of several books dedicated to chlorophylls, emphasizes the importance of and continuing interest in the subject.

- In 1913, the first concise account of chlorophyll research was published in a 423 page book *Untersuchungen über Chlorophyll (Investigations on Chlorophyll)* by Richard Willstätter and Arthur Stoll (Verlag Julius Springer, Berlin).

• Between 1934 and 1940, Hans Fischer and Hans Orth published a monumental work *Die Chemie des Pyrrols (The Chemistry of Pyrroles)*, Akademische Verlagsgesellschaft, Leipzig). The 2nd half of volume 2, by Hans Fischer and Adolf Stern, published in 1940, was entirely dedicated to chlorophylls. The relevance of this book is witnessed by its repeated reprinting, first in 1943 (Edwards Brothers, Ann Arbor, Michigan) and again in 1968 (Johnson Reprint Corporation, New York and London).

• In 1966, Leo P. Vernon and Gilbert R. Seely, both from USA, edited a 679 page book *The Chlorophylls* (Academic Press, New York); they had 22 authors, but none appear in the current Grimm et al. book (volume 25).

• In 1991, one of the editors of the current book, Hugo Scheer (from Munich, Germany), edited a 1,257 page detailed and beautiful opus (*Chlorophylls*, CRC Press, Boca Raton). This book had 72 authors and 42 chapters. I am delighted to see that among these 72 authors, 8 (Sam Beale, Masami Kobayashi, Tony Larkum, Bob Porra, Wolfhart Rüdiger, Hugo Scheer, Avigdor Scherz, Yuzo Shioi, and Tadashi Watanabe) are also authors in the current book (volume 25).

For a time-line on oxygenic photosynthesis, see Govindjee and David Krogmann (2004) *Photosynthesis Research* 80: 15–57, and on anoxygenic photosynthesis, see H. Gest and R. E. Blankenship (2004) *Photosynthesis Research* 80: 59–70.

## **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 Matisyck)

• *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.

## **Acknowledgments**

I take this opportunity to thank and congratulate Hugo Scheer (corresponding editor), Robert (Bob) Porra, Bernhard Grimm and Wolfhart Rüdiger. We recognize their outstanding and painstaking editorial work. Further, I thank all the 70 authors of volume 25 of the AIPH Series: without their authoritative chapters, there would be no such volumes. I especially thank Larry Orr for typesetting this volume : his expertise and dedicated cooperation at all stages has been crucial in bringing this book and other books in the series to completion. 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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