

Contents

Symposium 01 Type I Reaction Centres

Symposium 01_01 Deconvolution Analysis of Photoacoustic Waves of Electron Transfer in Photosystem I of *menG* Null Mutant of *Synechocystis* sp. PCC 6803

Xuejing Hou, Lien-Yang Chou, Harvey JM Hou (3)

Symposium 01_02 Towards Uncovering the Energetics of Secondary Electron Transfer Reactions in Photosystem I

Stefano Santabarbara, Fabrice Rappaport, Kevin Redding (7)

Symposium 01_03 Supercomplex Organizations and Evolution of Photosystems I and II (*Anabaena* sp. PCC 7120, *Cyanophora Paradoxa* and *Cyanidioschyzon Merolae*)

Mai Watanabe, Hisako Kubota, Hajime Wada, Rei Narikawa, Masahiko Ikeuchi (13)

Symposium 01_04 3D Model of PSI-LHCI Supercomplexes from *Chlamydomonas Reinhardtii*

Venkateswarlu Yadavalli, Chandramouli Malleda, Rajagopal Subramanyam (17)

Symposium 01_05 Reaction of A₁-Menaquinone in Type I Reaction Center of *Heliobacterium Modesticaldum* at Cryogenic Temperature

Toru Kondo, Masahiro Matsuoka, Chihiro Azai, Hiroyuki Mino, Hirozo Oh-oka, Shigeru Itoh (21)

Symposium 02 Type II Reaction Centres

Symposium 02_01 Calculation of Connectivity of Photosynthetic Units in Intact Cells of *Rhodobacter Sphaeroides*

Péter Maróti, Emese Asztalos (27)

Symposium 02_02 Oxygen-Dependent Production and Arrangements of the Photosynthetic Pigments in Intact Cells of *Rhodobacter Sphaeroides*

Emese Asztalos, Mariann Kis, Péter Maróti (32)

Symposium 02_03 Electronic Structure Studies of the Spin Density Distribution of the Q_A Plastosemiquinone Free Radical of Photosystem II

Tzu-Jen Lin, Patrick J O'Malley (37)

Symposium 02_04 Spectral Properties of the *Rhodobacter Sphaeroides* Mutant Photo-Reaction Center with Double Amino Acid Substitution I(L177)H+H(L173)L

Tatiana Y Fufina, Lyudmila G Vasilieva, Ravil A Khatypov, Vladimir A Shuvalov (46)

Symposium 02_05 Spectroelectrochemical Determination of the Redox Potentials of Pheophytin *a* and Primary Quinone Q_A in Photosystem II from *Thermosynechococcus Elongatus*

Yuki Kato, Tadao Shibamoto, Akinori Oda, Miwa Sugiura, Tadashi Watanabe (50)

Symposium 02_06 PsbP does Not Require LHCII to Bind the PSII Core

Cristina Pagliano, Fabiana Chimirri, Guido Saracco, James Barber (55)

Symposium 02_07 Compositional and Structural Analyses of the Photosystem II Isolated from the Red Alga *Cyanidioschyzon Merolae*

Joanna Kargul, Marko Boehm, Nina Morgner, Carol V Robinson, Peter J Nixon, James Barber (59)

Symposium 02_08 The Position and Orientation of Active Carotenoid in Photosystem II*Asako Kawamori, Hiroyuki Mino, Jianren Shen (64)***Symposium 02_09 Functional Roles of the Amino- and Carboxyl-Regions of PsbP Protein in Photosystem II***Shusuke Kakiuchi, Kentaro Ifuku, Megumi Tomita, Kunio Ido, Takumi Noguchi, Fumihiko Sato (67)***Symposium 02_10 A New Value for the Redox Potential of Cytochrome c550 in Photosystem II from *Thermosynechococcus Elongatus****Fernando Guerrero, Arezki Sedoud, Diana Kirilovsky,
A William Rutherford, Mercedes Roncel, José M Ortega (71)***Symposium 02_11 The Polyhydroxybutyrate Pathway Promoters Can Drive Foreign Gene Expression under Circadian Rhythm in *Synechocystis* sp. PCC 6803***Ryan E Hill, Julian J Eaton-Rye (75)***Symposium 02_12 Removal of the PsbT Subunit of Photosystem II in *Synechocystis* sp. PCC 6803 Causes Q_A Oxidation to be Blocked by Dimethyl-*p*-Benzoquinone***Robert D Fagerlund, Roger Young, Hao Luo, Fiona K Bentley, Julian J Eaton-Rye (79)***Symposium 02_13 Metal and Serine Proteases in the Crude Photosystem II Particles from a Diatom, *Chaetoceros Gracilis****Ryo Nagao, Eri Noguchi, Tatsuya Tomo, Isao Enami, Masahiko Ikeuchi (83)***Symposium 02_14 Structure-Function Studies of the Photosystem II Extrinsic Subunits PsbQ and PsbP from the Cyanobacterium *Synechocystis* sp. PCC 6803***Simon A Jackson, Robert D Fagerlund, Mark G Hinds, Sigurd M Wilbanks, Julian J Eaton-Rye (86)***Symposium 02_15 Coherent Electron Transfer in Reaction Centers of YM210L and YM210L/HL168L Mutants of *Rba. sphaeroides****Andrei G Yakovlev, Lyudmila G Vasilieva, Tatyana I Khmel'nitskaya,
Valentina A Shkuropatova, Anatoli Ya Shkuropatov, Vladimir A Shuvalov (91)***Symposium 02_16 Coordination Changes of Carboxyl Ligands at the Q_AFeQ_B Triad in Photosynthetic Reaction Centers Studied by Density-Functional Theory***Petko Chernev, Ivelina Zaharieva, Holger Dau, Michael Haumann (95)***Symposium 03 Light Harvesting Anaerobic Systems****Symposium 03_01 Strontium Ions are Functionally Replaceable with Calcium Ions in the Light-Harvesting 1 Reaction Center Core Complex from Thermophilic Purple Sulfur Bacterium *Thermochromatium Tepidum****Yukihiro Kimura, Yuta Inada, Longjiang Yu, Takashi Ohno, Zhengyu Wang (105)***Symposium 03_02 Cell-Free Expression of the Lhcb1 Protein of *Arabidopsis thaliana****Anjali Pandit, Tineke de Ruijter, Riekje Brandsma, Jaap Brouwer,
Huub JM de Groot and, Willem J de Grip (110)***Symposium 03_03 Optimal Mutual Orientational Ordering of Q_Y Transition Dipoles of Adjacent Subantennae Pigments in the Superantenna of the Photosynthetic Green Bacterium *Chloroflexus Aurantiacus*. Theoretical and Experimental Studies***Andrey yakovlev, Vladimir Novoderezhkin, Alexandra Taisova, Anastasiya Zobova, Zoya Fetisova (113)***Symposium 03_04 CsmA Protein is Associated with BChl *a* in the Baseplate Subantenna of Chlorosomes of the Green Photosynthetic Bacterium *Oscillochloris Trichoides* Belonging to the Family *Oscillochloridaceae****Alexandra S Taisova, Anastasiya V Zobova, Eugeney P Lukashev,
Nataliya V Fedorova, Zoya G Fetisova (117)***Symposium 03_05 Effects of Anaerobic Conditions on Photosynthetic Units of *Acaryochloris Marina****Yuankui Lin, Ben Crossett, Min Chen (121)*

Symposium 04 Light Harvesting Aerobic Systems

Symposium 04_01 Closed Reaction Centers of PS1 Still Can Perform the First Steps of Charge Separation. A Mid IR Pump Probe Study with fs Resolution

*Andreas D Stahl, Mariangela Di Donato, Ivo van Stokkum,
Rienk van Grondelle, Marie Louise Groot* (127)

Symposium 04_02 Modulation of Chlorophyll *b* Biosynthesis and Photosynthesis by Overexpression of Chlorophyllide *a* Oxygenase (CAO) in Tobacco

*Ajaya K Biswal, Gopal K Pattanayak, Sadhu Leelavathi, Vanga S Reddy,
Govindjee, Baishnab C Tripathy* (131)

Symposium 04_03 All of α -Carotene and Its Derivatives Have a Sole Chirality?

Shinichi Takaichi, Akio Murakami, Mari Mochimaru (135)

Symposium 04_04 Fluorescence Lifetime Imaging Microscopy of *Synechocystis* WT Cells — Variation in Photosynthetic Performance of Individual Cells in Various Strains of *sp.* PCC 6803

Tünde Tóth, Volha V Chukhutsina, Sashka B Krumova, Zoltan Gombos, Herbert van Amerongen (139)

Symposium 04_05 Isolation of Intact Phycobilisomes in Low Salt: a Novel Method for Purifying Phycobilisomes by Mild Cross-Linking

Liron David, Noam Adir (143)

Symposium 04_06 Differential Association of the Light-Harvesting Proteins (FCPs) with PSI and PSII in the Small Brown Tide Alga *Aureococcus Anophagefferens*

Meriem Alami, Beverley R Green (148)

Symposium 04_07 Non-Linear Spectroscopy of Carotenoid-Chlorophyll Interactions in Photosynthetic Light-Harvesting Complexes

Alexander Betke, Klaus Teuchner, Bernd Voigt, Heiko Lokstein (152)

Symposium 04_08 Three Step Dissociation and Covalent Stabilization of Phycobilisome

Qiang Wang (156)

Symposium 05 Bioenergetics of Photosynthetic Electron Flow

Symposium 05_01 Ferredoxin:NADP⁺ Oxidoreductase Associated with Cytochrome *b₆f* Complex is Highly Active in Plastoquinone Reduction

Renata Szymańska, Jolanta Pierścińska, Ireneusz Ślesak, Jerzy Kruk (169)

Symposium 05_02 The Mutation E242K in the Chloroplast ATP Synthase Gamma Subunit Increases the Inhibitory Binding of the Epsilon Subunit without Changing the Apparent Redox Potential of the Regulatory Dithiol

Kim K Colvert, Fei Gao, Daxin Zheng, Shyam Mehta, Mark L Richter (174)

Symposium 05_03 Analysis of Dark Drops, Dark-Induced Changes in Chlorophyll Fluorescence during the Recording of the OJIP Transient

*Vasilij Goltsev, Maria Gurmanova, Margarita Kouzmanova, Ivan Yordanov, Scheng Qiang,
Alison Pentland, Neil Wilson, Shiguo Chen, Ivelina Zaharieva, Reto Jörg Strasser* (179)

Symposium 05_04 Photosynthetic Measurements with the Idea Spec: an Integrated Diode Emitter Array Spectrophotometer/Fluorometer

Christopher C Hall, Jeffrey Cruz, Magnus Wood, Robert Zegarac, Dustin De Mars, Joel Carpenter, Atsuko Kanazawa, David Kramer (184)

Symposium 05_05 Crystal Structure of Ferredoxin-Nad(P)⁺ Reductase from the Green Sulfur Bacterium *Chlorobaculum Tepidum*

Daisuke Seo, Norifumi Muraki, Tomoo Shiba, Takeshi Sakurai, Genji Kurisu (189)

Symposium 05_06 A Potential Function for the $\gamma 2$ Subunit (atpC2) of the Chloroplast ATP Synthase

Kaori Kohzuma, Cristina Dal Bosco, Atsuko Kanazawa, David M Kramer, Jörg Meurer (193)

Symposium 05_07 The Contribution of Light-Dependent Bicarbonate Uptake in Thylakoid Membrane Energization

Zolotareva EK, Polishchuk OV, Semenikhin AV, Onoiko EB (197)

Symposium 05_08 Activation of Alternative Electron Transfer in PS II by Inhibition of Proton Transfer at the Acceptor Side

Polishchuk OV, Topchiy NM, Podorvanov VV (202)

Symposium 06 Mechanisms of Water Oxidation

Symposium 06_01 Analysis of S_{2,3}-States Decay Processes: Focused on Cyanobacteria

Jiri Jablonsky, Dusan Lazar (209)

Symposium 06_02 Energetics, Kinetics and Mechanism of Oxidative Water Splitting in Photosynthesis

G Renger (213)

Symposium 06_03 Charge Equilibrium Reactions S₂ and S₃ States of Photosystem II with Cyt b₅₅₉ and Tyrosine Y_D

Yashar Feyziyev, Stenbjörn Styring (218)

Symposium 06_04 Molecular Dynamics Simulations of a Putative H⁺ Pathway in Photosystem II

Felix M Ho (222)

Symposium 06_05 Catalytic Cooperativity of Mono-Manganese and Tri-Manganese Clusters for Water-Splitting and Oxygen-Evolving Reaction in Photosystem II: Chemical Mechanistic Insight

Masami Kusunoki (227)

Symposium 06_06 Direct Detection of Oxygen Ligands to the Mn₄Ca Complex in Photosystem II by X-ray Emission Spectroscopy

Jan Kern, Henning Schroeder, Megan Shelby, Yulia Pushkar, Benedikt Lasalle, Pieter Glatzel, Vittal K Yachandra, Uwe Bergmann, Junko Yano (231)

Symposium 06_07 Water Oxidation in Photosystem II: Energetics and Kinetics of Intermediates Formation in the S₂→S₃ and S₃→S₀ Transitions Monitored by Delayed Chlorophyll Fluorescence

Ivelina Zaharieva, Markus Grabolle, Petko Chernev, Holger Dau (234)

Symposium 06_08 An EPR and ENDOR Spectroscopic Investigation of the Ca²⁺-Depleted Oxygen-Evolving Complex of Photosystem II

Thomas Lohmiller, Nicholas Cox, Jihu Su, Johannes Messinger, Wolfgang Lubitz (239)

Symposium 06_09 Role of Protons in Photosynthetic Water Oxidation: pH Influence on the Rate Constants of the S-state Transitions and Hypotheses on the S₂→S₃ Transition

László Gerencsér, Holger Dau (244)

Symposium 06_10 Electronic Structure of the CaMn₄O₅ Cluster in the PSII System Refined to the 1.9 Å X-ray Resolution. Possible Mechanisms of Photosynthetic Water Splitting

S Yamanaka, K Kanda, H Isobe, K Nakata, Y Umena, K Kawakami, JR Shen, N Kamiya, M Okumura, T Takada, H Nakamura, K Yamaguchi (250)

Symposium 07 Mimicking Photosynthetic Catalysis

Symposium 07_01 The Structure of a Water-Oxidizing Cobalt Oxide Film and Comparison to the Photosynthetic Manganese Complex

Marcel Risch, Katharina Klingan, Anna Fischer, Holger Dau (257)

Symposium 07_02 Catalytic Mechanism of a Bioinspired Mn-oxo Oligomer/Tungston Oxide System in Water Splitting and Its Relevance to PS II Water Oxidation

Wanshu He, Lien-Yang Chou, Ndi Geh, Robert Mulkern, Harvey JM Hou (262)

Symposium 07_03 An Artificial Water-Oxidizing Co Electro-Catalyst: Structure and Mechanism by *in Situ* X-Ray Absorption Spectroscopy

Junko Yano, Vittal K Yachandra, Matthew W Kanan, Yogesh Surendranath, Mirca Dinca, Daniel G Nocera (266)

Symposium 08 Regulation of Electron Transfer

Symposium 08_01 Quantification of Cyclic Electron Flow in Spinach Leaf Discs

Jiancun Kou, Shunichi Takahashi, Riichi Oguchi, Murray R Badger, Wah Soon Chow (271)

Symposium 08_02 The Ancient Cyanobacterium *Gloeobacter Violaceus* PCC 7421 is Capable of State Transitions and Blue-Light Induced Fluorescence Quenching

Gábor Bernát, Ulrich Schreiber, Igor N Stadnichuk, Matthias Rögner, Friederike Koenig (275)

Symposium 08_03 Screening of Novel Subunits of Chloroplastic NAD(P)H Dehydrogenase in Arabidopsis

Noriko Ishikawa, Atsushi Takabayashi, Satoshi Ishida, Yasushi Hano, Kentaro Ifuku, Fumihiko Sato, Tsuyoshi Endo (279)

Symposium 08_04 Regulatory Systems that Quantitatively Alter Two Anionic Lipids of Chloroplasts in *Chlamydomonas Reinhardtii* upon Sulfur-Starvation

Koichi Sugimoto, Mikio Tsuzuki, Norihiro Sato (282)

Symposium 08_05 Do State Transitions Control CEF1 in Higher Plants?

Deserah D Strand, Aaron K Livingstonb, David M Kramer (286)

Symposium 08_06 Study on Post-Steady-State Chlorophyll a Fluorescence Kinetics of Plants

Chuanfei Zhong, Xiaoying Wu, Zhikui Gao, Yuntao Zhang, Guixia Wang, Jing Dong, Lina Wang, Linlin Chang, Rongfu Gao (290)

Symposium 08_07 The Ancient Cyanobacterium *Gloeobacter Violaceus* PCC 7421 is Capable of State Transitions and Blue-Light Induced Fluorescence Quenching

Gábor Bernát, Ulrich Schreiber, Igor N Stadnichuk, Matthias Rögner, Friederike Koenig (294)

Symposium 09 Control of the Calvin-Benson Cycle

Symposium 09_01 Relationship between Photosynthesis and Respiration in Leaves Using $^{13}\text{C}/^{12}\text{C}$ Isotope Labelling

Salvador Nogués (301)

Symposium 09_02 Photosynthetic Labeling and Partitioning of Major Sugars and Monoterpenes in Leaves of *Plantago Lanceolata* L

Ildiko Szucs, Mayhery Escobar, Demos Leonardos, Sarah Crain, Bernard Grodzinski (304)

Symposium 10 CO₂ Concentrating Mechanisms

Symposium 10_01 The Periplasmic Carbonic Anhydrase, CAH1, is Absent in the Sequenced *Chlamydomonas reinhardtii* Strain, CC-503

Bratati Mukherjee, Trang T Pham, Yunbing Ma, Tiffany A Simms, James V Moroney (311)

Symposium 10_02 Transcriptional Analysis of the Three Phosphoglycolate Phosphatase Genes in Wild Type and the *pgp1* Mutant of *Chlamydomonas Reinhardtii*

Yunbing Ma, Megan M Hartman, James V Moroney (315)

Symposium 11 C₃, C₄ and CAM and Genetic Engineering

Symposium 11_01 Effects of 1-Butanol, Neomycin, and Calcium on the Photosynthetic Characteristics of *Pepc* Transgenic Rice

Xia Li, Chao Wang, Chenggang Ren (321)

Symposium 11_02 Some Physicochemical Properties of Carbonic Anhydrase in *Mesembryanthemum Crystallinum* Leaves

Bayramov Sh, Orujova T, Babayev H, Guliyev N (324)

Symposium 12 Regulation of Photosynthetic Gene Expression

Symposium 12_01 GTP-Binding Proteins are Potential Messengers for Photosynthetic Transduction in High Plants

Karim Gasimov (331)

Symposium 12_02 Expression of PEPC Gene, Lipid Content and Photosynthesis in *Anabaena* 7120

Lijun Hou, Xiaohui Jia, Dingji Shi, Xuekui Wang (335)

Symposium 12_03 Unique Central Carbon Metabolic Pathways and Novel Enzymes in Phototrophic Bacteria Revealed by Integrative Genomics, ¹³C-Based Metabolomics and Fluxomics

Kuo-Hsiang Tang, Xueyang Feng, Anindita Bandyopadhyay, Himadri B Pakrasi, Yinjie J Tang, Robert E Blankenship (339)

Symposium 12_04 Regulation of the Carbon and Nitrogen Balance by a Plastidic Invertase in *Arabidopsis*

Takanori Maruta, Kumi Otori, Tomoki Tabuchi, Noriaki Tanabe, Masahiro Tamoi, Shigeru Shigeoka (344)

Symposium 12_05 Characterization of a pH-Sensitive Photosystem II Mutant in the Cyanobacterium *Synechocystis* sp. PCC 6803

Tina C Summerfield, Roger Young, Louis A Sherman, Julian J Eaton-Rye (348)

Symposium 12_06 Solar-Powered Production of Biofuels and Other Petroleum Substitutes by Cyanobacteria: Stoichiometries of Reducing Equivalents and Chemical Energy, and Energy Conversion Efficiency

Wim Vermaas (353)

Symposium 12_07 D1'- a New Member of D1 Protein Family in Cyanobacteria

Ciprian Chis, Abdulah Mahboob, Sergey Vassiliev, Adriana Bica, Loredana Peca, Doug Brouce, Eva-Mari Aro, Cosmin Ionel Sicora (358)

Symposium 12_08 Photosynthesis and Expression of Circadian Gene *KaiC* in *Synechococcus*

Xiaohui Jia, Carl H Johnson, Dingji Shi, Xiaoyan Wang, Guisen Du (361)

Symposium 13 Computational Systems Biology

Symposium 13_01 Prediction of *Cis* Regulatory Elements in the Genome of *Synechococcus Elongatus* PCC 6301

P Parvati Sai Arun, M Subhashini, CH Santhosh, P Sankara Krishna, Jogadheni SS Prakash (369)

Symposium 14 Biogenesis of Photosynthetic Apparatus

Symposium 14_01 Chloroplast Biogenesis — Preliminary Structural and Proteomic Study

Lucja Rudowska, Radoslaw Mazur, Maciej Garstka, Agnieszka Mostowska (377)

Symposium 14_02 Protochlorophyllide Forms in Etiolated Seedlings of Photoreceptor Mutants of *Arabidopsis Thaliana* — Is Chlorophyll Biosynthesis Controlled by Cooperation between Phytochromes and Phototropins?

Beata Myśliwa-Kurdziel, Elżbieta Turek, Przemysław Malec (381)

- Symposium 14_03 Blue-Native Page Analysis Validates Heterogeneity in the Thylakoids of *Synechocystis* 6803
Rachna Agarwal, Andrea Matros, Michael Melzer, Hans-Peter Mock, Jayashree Krishna Sainis (385)
- Symposium 14_04 Spatial and Temporal Regulation of Chloroplast Development in Arabidopsis Root
Koichi Kobayashi, Tatsuru Masuda (389)
- Symposium 14_05 The Lattice-Like Structure Observed by Vipp1-GFP in Arabidopsis Chloroplasts
Lingang Zhang, Yusuke Kato, Koji Saigo, Ute C Vothknecht, Wataru Sakamoto (394)
- Symposium 14_06 State Transition Mechanism in *Arabidopsis Thaliana*: Biophysical and Proteomic Studies
Sreedhar Nellaepalli, Ottó Zsiros, László Kovács, Yadavalli Venkateswarlu, Mekala Nageswara Rao, Prasanna Mohanty, Rajagopal Subramanyam (398)

Symposium 15 Assembly of Photosynthetic Protein Complexes

- Symposium 15_01 On the Localization of the Synthesis of Photosynthetic Proteins
James Uniacke, Oussama Rifai, Matthew Peters, Marco Schottkowski, William Zerges (405)
- Symposium 15_02 Function of *sll1906*, a Member of the Bacteriochlorophyll Delivery Family, in the Cyanobacterium *Synechocystis* sp. PCC 6803
Cheng-I Daniel Yao, Wim Vermaas (409)
- Symposium 15_03 Functional Analysis of PsbP-Like Protein 1 (PPL1) in Arabidopsis
Shintaro Matsui, Seiko Ishihara, Kunio Ido, Kentaro Ifuku, Fumihiko Sato (415)
- Symposium 15_04 Insertion of a Rigid Structural Element into the Regulatory Domain of the Chloroplast F1-ATPase Gamma Subunit for Rotational Studies
Stephanie C Bishop, Shyam Mehta, Kim K Colvert, Daxin Zheng, Mark L Richter, Cindy L Berrie, Fei Gao (418)
- Symposium 15_05 Functional Analysis of PsbR in PsbP Binding to Photosystem II
Kunio Ido, Kentaro Ifuku, Fumihiko Sato (423)
- Symposium 15_06 Functional Analysis of the Nitrogenase-Like Protochlorophyllide Reductase Encoded in Chloroplast Genome Using Cyanobacterium *Leptolyngbya Boryana*
Haruki Yamamoto, Shohei Kurumiya, Rie Ohashi, Yuichi Fujita (427)
- Symposium 15_07 Solution Structure and Physiological Requirements for Psb27 in *Synechocystis* sp. PCC 6803
Peter D Mabbitt, Gilles J Ratureau, Catherine L Day, Mark G Hinds, Sigurd M Wilbanks, Julian J Eaton-Rye (432)
- Symposium 15_08 Isolation of Complete Chloroplasts from *Chromera Velia* — the Photosynthetic Relative of Parasitic Apicomplexa
Hao Pan, Jan Šlapeta, Dee Carter, Min Chen (436)

Symposium 16 Photoprotection, Photoinhibition and Dynamics

- Symposium 16_01 Inhibition of Lipid Peroxidation by Plastoquinol and Other Prenyllipids
Jolanta Gruszka, Beatrycze Nowicka, Jerzy Kruk (443)
- Symposium 16_02 Tenuazonic Acid, a Novel Natural PSII Inhibitor, Impacts on Photosynthetic Activity by Occupying the Q_B-Binding Site and Inhibiting Forward Electron Flow
Shiguo Chen, Reto J Strasser, Sheng Qiang, Govindjee (447)
- Symposium 16_03 Yellow Vine Syndrome of American Cranberry: a Mechanistic Assessment
Lien-Yang Chou, Wanshu He, Xuejing Hou, Joy Patel, Aaron Rasposo, Harvey JM Hou (451)
- Symposium 16_04 Light Acclimation of Triple Inactivation Strain of Group 2 Sigma Factors in *Synechocystis* sp. Strain PCC 6803
Susanne Rantamäki, Taina Tyystjärvi (455)

Symposium 16_05 Gradients of Photoinhibition in the Interior of a Leaf Induced by Photoinhibition Lights of Different Colors

Riichi Oguchi, Peter Douwstra, Takashi Fujita, Wah Soon Chow, Ichiro Terashima (459)

Symposium 16_06 Time-Resolved Fluorescence of Photosystem I *in Vivo*: Global and Target Analysis

VV Chukhutsina, L Tian, G Ajlani, H van Amerongen (465)

Symposium 16_07 Estimation of the Relative Sizes of the Two NPQ-Associated Dissipations in Rice

Satoshi Ishida, Fumihiko Sato, Tsuyoshi Endo (469)

Symposium 16_08 Molecular Characterization of Thylakoid Membrane-Bound Ascorbate Peroxidase in *Oryza Sativa* (Rice)

Suqin Zhu, Yanhong Chen, Rong Zhou, Benhua Ji (473)

Symposium 16_09 Effect of Lipids on Violaxanthin and Diadinoxanthin De-Epoxidation

Dariusz Latowski, Susann Schaller, Joanna Grzyb, Reimund Goss, Kazimierz Strzalka (477)

Symposium 16_10 The Electron Transport in psbS-Silenced Rice

Ken-ichi Morita, Satoshi Ishida, Ko Shimamoto, Fumihiko Sato, Tsuyoshi Endo (481)

Symposium 16_11 Photoprotective Function of Foliar Betacyanin in Leaves of *Amaranthus Cruentus* under Drought Stress

T Nakashima, T Araki, O Ueno (485)

Symposium 16_12 Presence of Flexible Non-Photochemical Quenching in Cryptophytes (*Rhodomonas Salina*)

Radek Kaňa, Eva Kotabová, Ondřej Prášil (489)

Symposium 16_13 The Slow S to M Fluorescence Rise is Missing in the RpaC Mutant of *Synechocystis* sp. (PCC 6803)

Radek Kaňa, Ondřej Komárek, Eva Kotabová, George C Papageorgiou, Govindjee, Ondřej Prášil (493)

Symposium 16_14 Significance of Protein Ordering in Grana Thylakoids for Light-Harvesting by Photosystem II and Protein Mobility

Stefanie Tietz, Chris Kinzel, Robert Yarbrough, Helmut Kirchhoff (497)

Symposium 16_15 Moderate Heat Pretreatment Alleviates the Inhibition of Photosystem II Activity Caused by the Response of Cyanobacterial Cells to High Red Light

Zhongxian Lv, Lanzhen Wei, Quanxi Wang, Hualing Mi, Weimin Ma (502)

Symposium 16_16 Ascorbate Alleviates Donor-Side Induced Photoinhibition by Acting as Alternative Electron Donor to Photosystem II

Szilvia Z Tóth, Valéria Nagy, Jos Thomas Puthur, László Kovács, Győző Garab (505)

Symposium 16_17 Involvement of Chlorophyll *a* Fluorescence Analyses for Identification of Sensitiveness of the Photosynthetic Apparatus to High Temperature in Selected Wheat Genotypes

Marian Brestic, Marek Zivcak, Katarina Olsovska, Jana Repkova (510)

Symposium 16_18 Lichens Assist the Drought-Induced Fluorescence Quenching of Their Photobiont Green Algae Through Arabitol

Makiko Kosugi, Akihisa Miyake, Yasuhiro Kasino, Yutaka Shibata, Kazuhiko Satoh, Shigeru Itoh (514)

Symposium 16_19 FLIM (Fluorescence Lifetime Imaging Microscopy) of Avocado Leaves during Slow Fluorescence Transient (the P to S Decline and the S to M rise)

Yichun Chen, Shizue Matsubara, Rosanna Caliendo, Govindjee, Robert M Clegg (518)

Symposium 16_20 Improving the Photosynthetic Productivity and Light Utilization in Algal Biofuel Systems: Metabolic and Physiological Characterization of a Potentially Advantageous Mutant of *Chlamydomonas Reinhardtii*

Y Zhou, LC Schideman, Govindjee, SI Rupassara, MJ Seufferheld (523)

Symposium 17 Perception of Environmental Stress and Acclimation

- Symposium 17_01 Characterization of Energy Transfer Processes and Flash Oxygen Yields of Thylakoid Membranes Isolated from Resurrection Plant *Haberlea Rhodopensis* Subjected to Different Extent of Desiccation
M Velitchkova, D Lazarova, G Mihailova, D Stanoeva, V Dolchinkova, K Georgieva (531)
- Symposium 17_02 Effect of Light on the Photosynthetic Activity during Desiccation of the Resurrection Plant *Haberlea Rhodopensis*
Katya Georgieva, Snejana Doncheva, Gergana Mihailova, Snejana Petkova (536)
- Symposium 17_03 Effect of Desiccation of the Resurrection Plant *Haberlea Rhodopensis* at High Temperature on the Photochemical Activity of PSI and PSII
Gergana Mihailova, Snejana Petkova, Detelin Stefanov, Katya Georgieva (540)
- Symposium 17_04 Chloroplast Structure under High Light Conditions
Radosław Mazur, Łucja Rudowska, Borys Kierdaszuk, Agnieszka Mostowska, Maciej Garstka (544)
- Symposium 17_05 Effect of Salinity on Chlorophyll Content and Activity of Photosystems of Wheat Genotypes
Ibrahim Azizov, Mayaxanum Khanisheva, Ulker Ibrahimova (548)
- Symposium 17_06 Identification of Dreb 1 Genes Involved in Drought Tolerance in Wheat (*Triticum* L.)
Irada M Huseynova, Samira M Rustamova, Alamdar Ch Mammadov (552)
- Symposium 17_07 Detection of Tomato Yellow Leaf Curl Virus in Azerbaijan and Partial Characterization of Biochemical Properties of Naturally Infected Plants
Irada Huseynova, Alamdar Mammadov, Nargiz Sultanova (556)
- Symposium 17_08 Antioxidant Enzymes and Functional State of PS II in Plants Grown under Various Radium (^{226}Ra) Concentrations
Saftar Y Suleymanov, Konul H Bayramova, Samira M Rustamova, Elmira H Maharramova, Irada M Huseynova (560)
- Symposium 17_09 O-J-I-P Fluorescence Rise Kinetics Reveals Differential Cold Acclimation Capability in Sugarcane Varieties Following Exposure to Frost
Philippus DR van Heerden (564)
- Symposium 17_10 Antioxidant Defence System and Chloroplasts Photochemical Characteristics of Wheat Genotypes Subjected to Water Stress
Samira M Rustamova, Hasan H Babayev, Irada M Huseynova (568)
- Symposium 17_11 Phosphorylation of PSII Proteins in Low Light Grown Maize in Response to the Pb Ions
Wasilewska Wioleta, Zienkiewicz Maksymilian, Fristedt Rikard, Vener V Alexander, Romanowska Elzbieta (572)
- Symposium 17_12 A Potential Function for the $\gamma 2$ Subunit (atpC2) of the Chloroplast ATP Synthase
Kaori Kohzuma, Cristina Dal Bosco, Atsuko Kanazawa, David M Kramer, Jörg Meurer (576)
- Symposium 17_13 The Role of *sll1558* and *sll1496* Genes under Acid Stress Conditions in the Cyanobacterium *Synechocystis* sp. PCC 6803
Mamoru Sambe, Shuichi Kitayama, Atsushi Moriyama, Junji Uchiyama, Hisataka Ohta (579)
- Symposium 17_14 Comparative Photosynthetic Analyses of Three Widely Used *Arabidopsis* Ecotypes
Lan Yin, Rikard Fristedt, Alexander V Vener, Cornelia Spetea (583)
- Symposium 17_15 Thallium Induces Morphological Changes in the Photosynthetic Apparatus of *Synechocystis* sp. PCC6803
Motohide Aoki, Hiroe Matsumoto, Tatsuya Takahashi, Kazuya Sato, Hidetoshi Kumata, Kitao Fujiwara (586)
- Symposium 17_16 The Physiological Role of *Arabidopsis* Thylakoid Phosphate Transporter PHT4;1
Patrik M Karlsson, Sonia Irigoyen, Wayne K Versaw, Cornelia Spetea (590)

Symposium 17_17 Involvement of *slr0081*, a Two-component Signal-Transduction System Response Regulator, in Acid Stress Tolerance in *Synechocystis* sp. PCC 6803

Yu Tanaka, Mayuko Kimura, Atsushi Moriyama, Yuko Kubo, Mamoru Sambe,
Junji Uchiyama, Hisataka Ohta (593)

Symposium 17_18 Characterization of the ABC Transporter Gene *slr1045* Involved in Acid-Stress Tolerance of *Synechocystis* sp. PCC 6803

Hiroko Tahara, Sachiko Fukai, Mamoru Sambe, Miho Kobayashi, Junji Uchiyama, Hisataka Ohta (596)

Symposium 17_19 PsbO Degradation by Deg Proteases under Reducing Conditions

Irma N Roberts, Helder Miranda, Lâm Xuân Tâm, Thomas Kieselbach, Christiane Funk (599)

Symposium 17_20 Methylmethionine (Vitamin U) Alleviates Negative Effects of Chemical Stressors on Photosynthesis of the Green Alga *Scenedesmus Opoliensis*

Laszlo Fodorpataki, Zsolt Gy Keresztes, Csaba Bartha, Attila L Marton, Szabolcs Barna (603)

Symposium 17_21 Effect of Ozone on Photosynthesis and Seed Yield of Sensitive (S156) and Resistant (R123) *Phaseolus Vulgaris* L. Genotypes in Open-Top Chambers

Cornelius CW Scheepers, Reto J Strasser, Gert HJ Krüger (608)

Symposium 17_22 SO₂-Drought Interaction on Crop Yield, Photosynthesis and Symbiotic Nitrogen Fixation in Soybean (*Glycine Max*)

Heyneke E, Strauss AJ, Van Heerden PDR, Strasser RJ, Krüger GHJ (612)

Symposium 17_23 UDP-Glucose Pyrophosphorylase Responsible for Sulfolipid Synthesis in a Green Alga *Chlamydomonas Reinhardtii*

Atsushi Sato, Koichi Sugimoto, Mikio Tsuzuki, Norihiro Sato (616)

Symposium 17_24 Essential Role of Digalactosyldiacylglycerol for Photosynthetic Growth in *Synechocystis* sp. PCC 6803 under High-Temperature Stress

Naoki Mizusawa, Shinya Sakata, Isamu Sakurai, Hisako Kubota, Naoki Satō, Hajime Wada (620)

Symposium 17_25 De Novo Biosynthesis of Fatty Acids is Important for Maintenance of Photochemical Activity under Low Temperature Environments in Arabidopsis

Tsuneaki Takami, Masaru Shibata, Yoshichika Kobayashi, Toshiharu Shikanai (625)

Symposium 17_26 Critical Temperature Derived from the Selected Chlorophyll *a* Fluorescence Parameters of Indigenous Vegetable Species of South Africa Treated with High Temperature

Marek Zivcak, Katarina Olsovska, Marian Brestic, Margaretha M Slabbert (628)

Symposium 17_27 Photosynthetic Characteristics of Arctic Plants

Yameng Li, Yuxin Jiao, Qi Zhao (633)

Symposium 17_28 The Evolution of Far-Red Light Perception in *Acaryochloris Marina*, a Chlorophyll *d*-Containing Cyanobacterium

Zane Duxbury, Robert D Willows, Penelope M Smith, Min Chen (638)

Symposium 17_29 Effects of Ultraviolet-B Radiation on Primary Photophysical Process in Photosystem II: a Fluorescence Spectrum Analysis

Liu Xiao, Yue Ming, Ji Qianru, He Junfang (642)

Symposium 17_30 Shape-Changes of the Fast Chlorophyll *a* Fluorescence Transient (OJIP) and Antioxidative Enzymes in High Salt Tolerant Mangrove Trees of *Bruguiera Gymnorhiza*

Ananth Bandhu Das, Reto J Strasser, Girish Kumar Rasineni, Prasanna Mohanty (650)

Symposium 17_31 Knock-Out of Low CO₂-Induced *slr0006* Gene in *Synechocystis* sp. PCC 6803: Consequences on Growth and Proteome

Dalton Carmel, Natalia Battchikova, Maija Holmström, Paula Mulo, Eva Mari Aro (654)

Symposium 17_32 Acid Stress Responsive Genes, *slr0967* and *sll0939*, are Directly Involved in Low-pH Tolerance of Cyanobacterium *Synechocystis* sp. PCC6803

Hisataka Ohta, Yuta Kobayashi, Atsushi Moriyama, Yuko Kubo, Mamoru Sambe, Yousuke Shibata,
Yohei Haseyama, Yuka Yoshino, Junji Uchiyama. (659)

Symposium 17_33 Studies on the Effects of N and P on the Competition of *Flaveria Bidentis* (L.) Kunt and *Chenopodium Album* (L.) Grew

Qing Yang, Xuemin Guan, Yanfang Liu, Aiying Guo, Ru Long, Fengjuan Zhang (663)

Symposium 18 Organelle Communication

Symposium 18_01 A Novel Link between Chloroplast Development and Stress Response Lessoned by Leaf-Variegated Mutant

Wataru Sakamoto, Eiko Miura, Yusuke Kato (669)

Symposium 18_02 The Role of Plant-Specific PPR Proteins in Chloroplast RNA Editing

Kenji Okuda, Toshiharu Shikanai (674)

Symposium 19 Marine Photosynthesis and Global Impact

Symposium 19_01 The Role of tRNAs in Cyanophages

Limor-Waisberg Keren, Carmi Asaf, Scherz Avigdor, Pilpel Yitzhak, Furman Itay (681)

Symposium 19_02 Newly Isolated Chl *d*-Containing Cyanobacteria

Yaqiong Li, Anthony Larkum, Martin Schliep, Michael Köhl, Brett Neilan, Min Chen (686)

Symposium 19_03 How do Enzyme Dynamics Influence Rubisco Activity?

F Grant Pearce (691)

Symposium 20 Crop Yield Improvement

Symposium 20_01 Photosynthesis, Photorespiration and Productivity of Wheat Genotypes (*Triticum* L.)

Jalal A Aliyev (697)

Symposium 20_02 Response of Chlorophyll Fluorescence Parameters of *Illicium Lanceolatum* to Different Light Conditions

Yonghui Cao, Benzhi Zhou, Rumin Zhang, Lianhong Gu (702)

Symposium 20_03 Effects of Elevated Root-Zone CO₂ and Root-Zone Temperature on Productivity and Photosynthesis of Aeroponically Grown Lettuce Plants

Jie He, Lin Qin, Sing Kong Lee (707)

Symposium 20_04 Comparative Nitrogen Allocation and Partitioning of Field-Grown *Gossypium Hirsutum* and *G. Barbadense*

Yali Zhang, Yuanyuan Hu, Honghai Luo, Wangfeng Zhang (712)

Symposium 20_05 Photosynthetic Performance of Maize Subjected to Low Temperatures

Soni S Mulakupadom, Saul Otero, Gary Lanigan, Bruce Osborne (716)

Symposium 20_06 Stereochemical Control of Asymmetric Reduction by Deleting an Alcohol Gehydrogenase Gene of a Cyanobacterium

Hisataka Ohta, Kenjiro Suzuki, Tetsuo Takemura, Kaori Akiyama, Nobuaki Umeno, Yukiko Tamai, Kaoru Nakamura (722)

Symposium 20_07 The Different Photoprotective Mechanisms of Various Green Organs in Cotton (*Gossypium Hirsutum* L.)

Yuanyuan Hu, Yali Zhang, Honghai Luo, Wah Soon Chow, Wangfeng Zhang (726)

Symposium 21 Microbial Derived Biofuels

Symposium 21_01 Functioning of the Bidirectional Hydrogenase in Different Unicellular Cyanobacteria

Eva Kiss, Péter B Kós, Min Chen, Imre Vass (733)

Symposium 21_02 Lessons from Energy Balances for the Production Strategies of Biofuels*Christian Wilhelm, Torsten Jakob, Uwe Langner, Katja Stehfest, Heiko Wagner (737)***Symposium 21_03 Improvement of Nitrogenase-Based Photobiological Hydrogen Production by Cyanobacteria by Gene Engineering — Genetic Engineering and Culture Conditions towards Improved photobiological Hydrogen Production by Cyanobacteria***Hidehiro Sakurai, Masaharu Kitashima, Hajime Masukawa, Kazuhito Inoue (741)***Symposium 21_04 Phycobilisome Antenna Deletion in a Cyanobacterium does Not Improve Photosynthetic Energy Conversion Efficiency or Productivity in a Bench-Scale Photobioreactor System***Lawrence E Page, Michelle Liberton, Hanayo Sato, Himadri B Pakrasi (744)***Symposium 22 Photosynthesis and New Environmental Challenges****Symposium 22_01 Measurement of Mesophyll Conductance in Tobacco, Arabidopsis and Wheat Leaves with Tunable Diode Laser Absorption Spectroscopy***Youshi Tazoe, Susanne von Caemmerer, John R Evans (751)***Symposium 22_02 Influence of Enhanced Ultraviolet-B Radiation on Photosynthesis in Flag Leaves of a Super-High-Yield Hybrid Rice during Senescence***Meiping Zhang, Guoxiang Chen (756)***Symposium 22_03 Effect of Exposure to UVA Radiation on Photosynthesis and Isoprene Emission in *Populus x Euroamericana****Emanuele Pallozzi, Giovanni Marino, Alessio Fortunati, Francesco Loreto, Mauro Centritto (763)***Symposium 22_04 Effects of Salt Stress on Photosystem II Efficiency and CO₂ Assimilation in Two Syrian Barley Landraces***Hazem M Kalaji, Govindjee, Karolina Bosa, Janusz Kościelniak, Krystyna Żuk-Golaszewska (768)***Symposium 22_05 The Effects of Antisense Suppression of δ Subunit of Chloroplast ATP Synthase on the Rates of Chloroplast Electron Transport and CO₂ Assimilation in Transgenic Tobacco***Wataru Yamori, Shunichi Takahashi, Amane Makino, G Dean Price,
Murray R Badger, Susanne von Caemmerer (773)***Symposium 22_06 The Effects of Elevated CO₂ Concentration on Photosynthesis and Photosystem II Photochemistry in a Fast Growing Tree Species, *Gmelina Arborea* Roxb***Girish K Rasineni, Attipalli R Reddy (777)***Symposium 22_07 Influence of Elevated CO₂ Concentration on Photosynthesis and Biomass Yields in a Tree Species, *Gmelina Arborea* Roxb***Girish K Rasineni, Attipalli R Reddy (781)***Symposium 23 Global Photosynthesis and Climate Change****Symposium 23_01 The Effect of Mineral Nutrition on Photosynthetic Activity and Saponin Content of Puncture Vine (*Tribulus Terrestris* L.)***Georgi I Georgiev, Liliana Maslenkova, Antoaneta Ivanova, Luba Evstatieva,
Albena Ivanova, Lozanka Popova (789)***Symposium 23_02 Chlorophyll *d* Production in Crushed Algae in Aqueous Acetone***Shinya Akutsu, Shingo Itoh, Keisuke Aoki, Hayato Furukawa, Hideaki Miyashita,
Koji Iwamoto, Yoshihiro Shiraiwa, Masaaki Okuda, Masami Kobayashi (794)***Symposium 23_03 Conversion of Chl *a* into Chl *d* by Horseradish Peroxidase***Hayato Furukawa, Keisuke Aoki, Shingo Itoh, Yasuhiro Abe, Masataka Nakazato, Koji Iwamoto,
Yoshihiro Shiraiwa, Hideaki Miyashita, Masaaki Okuda, Masami Kobayashi (799)*

Symposium 23_04 Novel Conversion of Chl *a* into Chl *d* Catalyzed by Grated Vegetables

Shingo Itoh, Keisuke Aoki, Masataka Nakazato, Koji Iwamoto, Yoshihiro Shiraiwa, Hideaki Miyashita, Masaaki Okuda, Masami Kobayashi (804)

Symposium 23_05 Nonenzymatic Formation of Chl *d* from Chl *a* with Hydrogen Peroxide

Keisuke Aoki, Shingo Itoh, Hayato Furukawa, Masataka Nakazato, Koji Iwamoto, Yoshihiro Shiraiwa, Hideaki Miyashita, Masaaki Okuda, Masami Kobayashi (808)

Symposium 23_06 Winter Photosynthesis of Evergreen Broadleaf Trees from a Montane Cloud Forest in Subtropical China

Yongjiang Zhang, Kunfang Cao, Guillermo Goldstein (812)

Symposium 23_07 The Photosynthetic Surface Area of Apple Trees

Krzysztof Tokarz, Jan Pilarski, Maciej Kocurek (818)

Symposium 24 Photosynthesis Education

Symposium 24_01 Evolution of the Z-Scheme of Electron Transport in Oxygenic Photosynthesis

Govindjee, Lars Olof Björn, Kärin Nickelsen (827)

Symposium 24_02 The Golden Apples of the Sun: the History of Photosynthesis — so Far

Anthony WD Larkum (834)

Author Index(841)