

REPORT

European Science Foundation Workshop on Green Bacteria and Heliobacteria

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The workshop was organized by D. Zannoni and held in Urbino, Italy, from 31 August to 4 September 1997. There were five sessions: (1) Taxonomy, diversity, ecology and ecophysiology; (2) Energy capture (chlorosomes); (3) Energy capture and reaction centers (RCs) in heliobacteria; (4) RCs and electron transfer; and (5) Metabolism and molecular genetics.

Session 1: J. Imhoff (Germany) discussed taxonomic considerations of green bacteria, while J. Overmann (Germany) presented new insights into the physiology and ecology of green sulfur bacteria. C. Abella (Spain) talked about the microbial ecology of photosynthetic consortia in freshwater lakes, and L.J. Garcia-Gil (Spain) described changes on the antenna pigment composition in light-limited *Chlorobium* (*Cb.*) *phaeobacterioides*. C.M. Borrego (Spain) told about changes in the antenna pigment composition of brown-colored sulfur bacteria, and V. Gorlenko (Russia) described some novel alcaliphic heliobacteria from east Siberia soda lake environments.

Session 2: A. Vianelli (Italy) showed a poster about pigment composition of chlorosomes and cytoplasmic membranes in *Cb. tepidum* grown at different irradiances. J. Ormerod (Norway) spoke about immunoelectron microscopy of *Chlorobium* and its chlorosomes, and D. Bryant (USA) discussed the chlorosome proteins of *Cb. tepidum*. J. Oelze (Germany) described chlorosome development as well as pigment and polypeptide formation in *Chloroflexus* (*Cf.*) *aurantiacus*, while Z. Fetisova (Russia) talked about exciton dynamics in the antenna. M. Miller (Denmark) discussed pigments and proteins in chlorosomes studied by matrix-assisted laser-desorption-ionization time-of-flight mass spectrometry, and T. Nozawa (Japan) described molecular spectroscopic studies on bacteriochlorophyll (BChl) *c* aggregates in chlorosomes and in various solvents. T. Gilbro (Sweden) spoke about excitation energy transfer and trapping dynamics in the Fenna-Matthews-Olson (FMO)-RC complex of *Cb. tepidum*. J. Psenik (Czech Republic) described femtosecond and hole-burning studies on excitation energy relaxation on BChl *c* in chlorosomes, and J. Aschenbrucher (Sweden) reported the femtosecond kinetics of energy transfer from carotenoids to BChl in chlorosomes from *Cb. phaeobacterioides*. K. Matsuura (Japan) discussed molecular organization and energy transfer regulation in chlorosomes studied with pigment-lipid aggregates in aqueous

suspension. R. Cox (Denmark) then spoke about isoprenoid quinones in chlorosomes, after which A.R. Holzwarth (Germany) compared metallochlorin aggregates to chlorosomes. Holzwarth also presented a poster on the self-assembly of modified zinc chlorins in nonpolar solvents. D.B. Steensgaard (Germany) presented a poster on the effect of growth rate on the distribution of 31 stereomer BChl *c* homologs in chlorosomes from *Cf. aurantiacus* and *Cb. tepidum*, while N.-U. Frigaard (Denmark) showed a poster on redox-dependent energy transfer in chlorosomes from green sulfur bacteria.

Session 3: A. Hoff (The Netherlands) described the structure of the primary cofactors of *Heliobacter (H.) chlorum* studied with absorption-detected magnetic resonance (ADMR), and T. Mattioli (France) described structural features and binding interactions of the primary electron donor from *Heliobacillus (Hb.) mobilis*, after which M. Vos (France) described pathways of energy transfer and primary photochemistry in heliobacteria. U. Liebl (France) spoke about soluble electron transfer proteins in heliobacteria, while S. Itoh (Japan) described light-induced absorbance changes in a PS-1 like RC from the oxygenic prokaryote *Acaryo marina*.

Session 4: J. Amesz (The Netherlands) revealed a new method of preparing RC complexes without FMO protein from green sulfur bacteria, and F. Nowak (The Netherlands) presented a poster dealing with primary processes in isolated core and RC complexes from *Prosthecochloris (P.) aestuarii*. H. Oh-oka (Japan) discussed electron transfer from membrane-bound cytochrome *c* to P840 in the RC of *Cb. tepidum*, while G. Hauska (Germany) dealt with the FeS clusters in the RC. G. Tsiotis (Switzerland) presented electron microscope evidence for the homodimeric nature of the RC complex, and H. Sakurai (Japan) talked about electron transfer from cytochrome to ferredoxin. H. Scheller (Denmark) discussed electron acceptors and reconstitution of the RC complex of *Cb. vibrioforme*, while A. Hochkoeppler (Italy) reported about charge separation in membranes of *Cf. aurantiacus*. A. Van der Est (Germany) showed a poster on electron transfer in green sulfur and heliobacteria studied by transient EPR, and C.A. Van Walree (Germany) showed a poster on lifetime distribution and charge separation kinetics in *Cf. aurantiacus* RCs. A.Y. Mulikidjanian (Germany) presented a theory of the origin of photosynthesis based on sequence analysis of various RCs and antenna proteins.

Session 5: R. Tabita (USA) spoke about regulation of the reductive tricarboxylic acid cycle in *Cb. tepidum*, and R. Sirevåg (Norway) demonstrated a close relationship between the malate dehydrogenase enzymes from distantly related phototrophic bacteria by analysis of N-terminal sequences. W. Vermaas (USA) discussed genetic modification of *Hb. mobilis* by pUC-based plasmid construction, while C. Bauer (USA) presented a genetic and sequence analysis of a photosynthetic gene cluster in the same organism. K. Inoue (Japan) demonstrated functional complementation of photosynthetic mutants of *Rhodobacter capsulatus* with a genomic expression library from *Cb. tepidum*.

Several talks and posters were devoted to the FMO BChl *a*-protein from green sulfur bacteria. J.M. Olson (USA) presented a poster on the orientation of the FMO

trimer in membrane vesicles from *Cb. tepidum*, and W. Struve (USA) talked about excitation dynamics in FMO trimers from the same organism. D. Gulen (Turkey) showed a poster on excited state structure and subpicosecond excitation dynamics in the FMO protein from *P. aestuarii*. S. Neerken (The Netherlands) showed a poster on spectral hole-burning on the FMO and FMO-RC complex of the same organism, while T. Aartsma (The Netherlands) gave an interpretation of the steady state optical spectra of the FMO protein.

Mathis, P. (ed.): **Photosynthesis: from Light to Biosphere. Vol. I, II, III, IV, V.** - Kluwer Academic Publishers, Dordrecht - Boston - London 1995. ISBN 0-7923-3857-X, 0-7923-3858-8, 0-7923-3859-6, 0-7923-3860-X, 0-7923-3861-8; 0-7923-3862-6 (set). XXXIV + 1004, XXII + 988, XXII + 1050, XXI + 954, XXII + 1066 pp. NLG 2 200.00, USD 1 340.00.

With increasing amount of participants the sizes of congress proceedings increase as shown also in the reviewed set of five volumes that represent the Xth International Photosynthesis Congress in Montpellier (France) in August 1995 (for report see *Photosynthetica* **32**: 291-296, 1996). The volumes appeared before the end of the same year which could support early citing of the papers contained. Unfortunately, this did not happen, and references to these proceeding volumes are rare until now. The reason is that scientists prefer to cite papers published in peer reviewed journals to those published in unreviewed proceeding books.

Volume I is devoted to three topics. The first of them is "Antenna systems: structure and function" (91 papers). It contains a review paper on bilin attachment in phycobiliproteins. Other papers deal with various models, *e.g.*, of bacterial chlorosomes and excitation transfer therein, of light-harvesting complexes (LHC) and energy transfer, of the association of two LHCs in purple bacteria, of three-dimensional structures of phycocyanins, of LHC variance induced by mutation, models based on synthetic metallochlorin aggregates and other porphyrin derivatives, and also with carotenoids (Cars) in LHC, protein types and their phosphorylation, changes induced by mutation, bacteriochlorophyll analogues, LHC crystallisation and X-ray analysis of the complexes, *etc.* Schemes of devices for special measurements, such as fluorescence decay or non-linear polarisation in the frequency domain, are also included.