



Alberto Vianelli



UNIVERSITY OF INSUBRIA



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Biography

1988 Degree in Biological Sciences, University of Milan. Thesis: "Quantum efficiency of photosystem I and its regulation by thylakoid protein phosphorylation in spinach". (Advisor: prof. Giorgio Forti).

1988-1990 Research associate, Department of Molecular Biology and Microbiology, Tufts University Medical School, Boston, MA, USA (Prof. Edward B. Goldberg): expression, purification and characterization of morphogenetic proteins from bacteriophage T4.

1990-1991 Research affiliate, Department of Biology, Massachusetts Institute of Technology, Cambridge, MA, USA (Prof. Anna Maria Torriani): Regulation of inorganic phosphate transport in *Escherichia coli*.

1990-1991 Visiting scientist, Department of Molecular Biology and Microbiology, Tufts University Medical School, Boston, MA, USA (Prof. Edward B. Goldberg)

1990-1995. Research associate in Plant Physiology, Department of Biology "Luigi Gorini", University of Milan. Regulation of photosystem II activity by proton gradient in thylakoid membranes (Prof. Giorgio Forti). Light-induced fluorescence emission changes in thylakoids, photosystem II membranes, reaction center and light-harvesting complexes (Prof. Robert C. Jennings). Screening for mutants affected in sensitivity to photoinhibition and photooxidation in *Arabidopsis thaliana* (Prof. Carlo Soave).

1992 Visiting scientist, Biological Research Center, Hungarian Academy of Sciences, Szeged, Hungary, Laboratory of Membrane Energization, prof. Gyözö Garab. Characterization of light-induced circular dichroism changes in aggregated light-harvesting chlorophyll protein II from higher plants.

1996-1998. Research associate in Plant Physiology, Department of Structural and Functional Biology, University of Milan, Varese Campus. Studies on light acclimation in the green photosynthetic bacterium *Chlorobium tepidum* (prof. Paolo Gerola, Varese). Electron Magnetic Resonance of chlorosomes from the green bacteria *Chlorobium*

tepidum and Chloroflexus aurantiacus (prof. Donatella Carbonera, Padua).

1998-present Research associate in Plant Physiology, Department of Structural and Functional Biology, University of Insubria. Comparative studies on antenna structure and function in green photosynthetic bacteria.

2000 Visiting scientist, CNR (National Research Council) Short-term research fellow, Department of Physics, Graduate School of Sciences, Nagoya University, Japan (Prof. Shigeru Itoh). Study of excitation energy transfer in green bacterial photosynthetic apparatus by means of steady-state and time-resolved fluorescence spectroscopy.

Research interests

The investigations are focused on the structural and functional organization of the photosynthetic apparatus in green photosynthetic bacteria. Chlorobium tepidum and Chloroflexus aurantiacus are studied as type-species of the two main phyla in the group. The main interest in studying these anoxygenic photosynthetic organisms stems from their very peculiar photosynthetic apparatus, especially their antenna, whose molecular organization and dimensions make it truly unique in nature. These features have important implications from several points of view: origin of autotrophic life, exobiology and early cellular phylogeny (ancestors of green bacteria are thought to be very primitive bacteria and possible precursors of the plant chloroplast), ecology (they may inhabit environments with extreme conditions of light, redox potential, temperature and/or salinity) and biophysics (the modalities of capturing and transferring the radiant energy). These studies involve anaerobic culturing techniques, biochemical methods for cell components fractionation and purification, spectrophotometric and spectrofluorimetric measurements. The experimental work is integrated with ecological and genetic data in order to obtain a comprehensive description of green bacterial ecophysiology and its implications for basic and applied science. Two main research projects are currently being undertaken:

- 1) characterization of energy dissipation processes, having a potential photoprotective role, in the green bacterial antennas;
- 2) acclimation to light intensity in green bacteria.

The latter study is being pursued both by measurements in the laboratory and by theoretical analysis (in collaboration with prof. Alfredo Porati, DBSF, University of Insubria).

Theoretical biology investigations are also currently underway (in collaboration with Prof. A. Porati) concerning the informational content of biosequences. The informational parameters of several polynucleotidic sequences of viral as well as eukaryotic origin, in which the phenomenon of overlapping genes is present, are being analyzed.

Teaching experience and appointments

Undergraduate Teaching

1991-1999: Teaching Assistant, Experimental Biology Laboratory II Course, Faculty of Sciences, University of Milan (1991-1998) and of Insubria (1999).

1992/1994: Lecturer in Plant Physiology and History of Biology Courses, Faculty of Sciences, University of Milan.

1995-present: Appointed lecturer in Plant Physiology (1995-2000 and 2001-present), Bioindicators (2002-2004), Plant Ecophysiology (2002-2004), Faculty of Sciences, University of Milan (until 1998), University of Insubria (1999-present).

Graduate Teaching:

2003: Organizer and lecturer, Seminar cycle on bioenergetics, Graduate school in Cellular and Molecular Biology, University of Insubria.

Committees:

2002-present: Member, Scientific Advisory Committee, Faculty of Science Library, University of Insubria

2005: Member, examination committee, Plant Biology Ph.D. Graduate School in Biological and Molecular Sciences, Plant Biology, University of Milan (XX Cycle)

Representative publications

Pierce, S., B.Cerabolini and A.Vianelli (2005) From ancient genes to modern communities: the cellular stress response and the evolution of plant strategies. *Functional Ecology* 19: 763-776.

Cseh, Z., A.Vianelli, S.Rajagopal, S.Krumova, L.Kovacs, V.Barzda, R.Jennings and G.Garab (2005) Thermo-optically induced reorganizations in the main light harvesting antenna of plants. I .Non-Arrhenius type of temperature dependence and linear light-intensity dependencies. *Photosynth. Res.* 86:263-273.

Di Valentin, M., D.Malorni, A.L.Maniero, G.Agostini, G.Giacometti, A.Vianelli, A.G.Cattaneo, L.-C.Brunel and D.Carbonera (2002) Structural investigation of oxidized chlorosomes from green bacteria using multifrequency Electron Paramagnetic Resonance up to 330 GHz. *Photosynth.Res.* 71: 33-44.

Bordignon, E., M.Scarzello, G.Agostini, G.Giacometti, A.Vianelli, C.Vannini and D.Carbonera (2002) Optically detected magnetic resonance of intact membranes from *Chloroflexus aurantiacus*. Evidence for exciton interaction between the RC and the B806-866 complex. *Photosynth.Res.* 71: 45-57.

Carbonera, D., E.Bordignon, G.Agostini, A.Vianelli, C.Vannini and G.Giacometti (2001) Fluorescence and absorption detected magnetic resonance of chlorosomes from green bacteria *Chlorobium tepidum* and *Chloroflexus aurantiacus*. A comparative study. *J.Phys.Chem.B* 105, 246-255.

Vianelli, A., G.R.Wang, M.Gingery, R.L.Duda, F.A.Eiserling and E.B.Goldberg (2000) Bacteriophage T4 Self-Assembly: Localization of gp3 and Its Role in Determining Tail Length. *J.Bacteriol.* 182: 680-688.
Wang, G.R., A.Vianelli and E.B.Goldberg (2000) Bacteriophage T4 Self-Assembly: In Vitro Reconstitution of Recombinant gp2 into Infectious Phage. *J.Bacteriol.* 182: 672-679.

Tarantino, D., A.Vianelli, L.Carraro and C.Soave (1999) A nuclear mutant of *Arabidopsis thaliana* selected for enhanced sensitivity to

light-chill stress is altered in PS II electron transport activity.
Physiol.Plant., 107, 361-371.

Vannini, C., M.Granata, M.T.Balsemin, P.D.Gerola and A.Vianelli(1998)
Light intensity acclimation of the photosynthetic apparatus in
Chlorobium tepidum. In: *Photosynthesis: Mechanisms and Effects*
(G.Garab, ed.), Vol.III, 2269-2272. Kluwer Academic Publishers,
Dordrecht, The Netherlands.

Carbonera, D., G.Giacometti, C.Vannini, P.D.Gerola, A.Vianelli,
A.L.Maniero and L.C.Brunel (1998) Electron magnetic resonance of the
chlorosomes from green sulfur bacterium *Chlorobium tepidum*. In:
Photosynthesis: Mechanisms and Effects (G.Garab, ed.), Vol.I, 109-
112.

Kluwer Academic Publishers, Dordrecht, The Netherlands.
Barzda, V., I.Simidjiev, A.Vianelli , R.Jennings and G.Garab (1995)
Light induced reversible structural changes in chirally organized
macroaggregates of purified chlorophyll a/b protein complexes. In:
Photosynthesis: from Light to Biosphere (P.Mathis, ed.), Vol.I, 315-318.

Kluwer Academic Publishers, Dordrecht, The Netherlands.
Finazzi, G., R.Bianchi, A.Vianelli, A.M.Ehrenheim and G.Forti (1995)
Inhibition of photosystem 2 primary photochemistry by photogenerated
protons. *Photosynth.Res.* 46, 379-392.

Jennings, R.C., G.Zucchelli, R.Bassi, A.Vianelli, and F.M.Garlaschi
(1993) The relation between the minor chlorophyll spectral forms and
fluorescence quenching in aggregated light harvesting chlorophyll a/b
complex II. *Biochim. Biophys. Acta*, 1184, 279-283.

Jennings, R.C., F.M.Garlaschi, R.Bassi, G.Zucchelli, A.Vianelli and
P.Dainese (1993) A study of Photosystem II fluorescenc emission in
terms of the antenna chlorophyll-protein complexes. *Biochim. Biophys.*
Acta, 1183, 194-200.

Jennings, R.C., G.Zucchelli, F.M.Garlaschi and A.Vianelli (1992) A
comparison of the light-induced, non-reversible fluorescence quenching
in Photosystem II wth quenching due to open reaction centres in terms
of the chlorophyll emission spectral forms. *Biochim.Biophys.Acta*
1101:79-83.

Ehrenheim, A.M., A.Vianelli, G.Finazzi and G.Forti (1992) Regulation
by localized protons of Photosystem II photochemical efficiency.
Biochim. Biophys. Acta, 1100, 299-302.

Forti, G. and A.Vianelli (1988) Influence of thylakoid protein
phosphorylation on photosystem I photochemistry. *FEBS Lett.*, 231, 95-
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