**TiTle:**

Structural study of the core complex RC-LH1-PufX from *Rhodobacter sphaeroides*: the rol of Pufx for dimerisation.

**Abstract:**

Reaction center-light harvesting 1 (RC-LH1) complexes are the fundamental units of bacterial photosynthesis, converting solar energy to quinol prior to formation of the proton gradient that drives ATP synthesis. The dimeric RC-LH1-PufX complex of *Rhodobacter sphaeroides* is composed of 64 polypeptides and 128 cofactors, including 56 LH1 bacteriochlorophyll *a* (BChl *a*) molecules that surround and donate energy to the two RCs. The 3-dimensional structure was determined to 8 Å by X-ray crystallography with constraints provided by electron microscopy, nuclear magnetic resonance, mass spectrometry (MS) and site-directed mutagenesis. Each half of the dimer complex consists of a RC surrounded by an array of 14 LH1 αβ subunits, with two BChls sandwiched between each αβ pair of transmembrane helices. The N- and C-terminal extrinsic domains of PufX promote dimerization by interacting with the corresponding domains of an LH1 β polypeptide from the other half of the RC-LH1-PufX complex. Close contacts between PufX, an LH1 αβ subunit and the cytoplasmic domain of the RC-H subunit, prevent the LH1 complex from encircling the RC and create a channel connecting RC QB site to an opening in the LH1 ring, allowing Q/QH2 exchange with the external quinone pool. A channel that connects the two halves of the dimer, potentially forming a long-range pathway for quinone migration along rows of RC-LH1-PufX complexes in the membrane is identified. The structure of the RC-LH1-PufX complex explains the crucial role played by PufX in dimer formation, and it shows how quinone traffic traverses the LH1 complex as it shuttles between the RC and the cytochrome *bc*1 complex.

**Short cv:**

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| 1982-1997 Suzhou university, senior engineer.1997.4-2001.1, **Ph.D.,** Chemistry Department, Kwansei Gakuin University, Japan. |
| 2001- The University of Sheffield, UK, research associate.**Research interesting:**High resolution structure determination of light harvesting core complexes from photosynthetic bacteria using cryo-EM, atomic force microscopy and X-ray crystallography, particularly for 2-D crystal electron crystallography and 3-D single particle EM reconstruction of membrane proteins; new method development for membrane protein purification, 2-D / 3-D crystallizations; structure-function relationship study of pigment proteins; molecular modeling. **Related papers:****1. Pu Qian, C.** Neil Hunter and Per A. Bullough(2008) Three dimensional reconstruction of dimeric core complex and its self assembly in native tubular membrane. ***J. Biol. Chem****.* 283, 14002-14011. *Times cited* ***50\******2. Pu Qian**, C. Neil Hunter & Per A. Bullough (2005) The 8.5Å projection structure of the core RC-LH1-PufX dimer of *Rhodobacter sphaeroides*. ***J. Mol. Biol***. 349, 948-960. *Times cited* ***110***3. Dimitrios Fotiadis, **Pu Qian**, Ansgar Philippsen, Per A. Bullough, Andreas Engel and C. Neil Hunter (2004) Structural analysis of the RC-LH1 photosynthetic core complex of *Rhodospirillum rubrum* using atomic force microscopy and electron microscopy ***J. Biol. Chem****.,* 279: 2063-2068*. Times cited* ***128***4. Stuart J. Jamieson1, Peiyi Wang1, **Pu Qian1**, John Y. Kirkland, Matthew J. Conroy, C. Neil Hunter and Per A. Bullough(2002) Projection structure of the photosynthetic reaction centre- antenna complex of *Rhodospirillum rubrum* at 8.5 Å resolution. ***EMBO J****.* 15, 3927-3935. *Times cited* ***128***1 These authors made equal contribution to the work. 5. C. Alistair Siebert, **Pu Qian**, Dimitrios Fotiadis, Andreas Engel, C. Neil Hunter and Per A Bullough (2**004)** Molecular architecture of photosynthetic membranes in *Rhodobacter* *sphaeroides*: role ofPufX*.* ***EMBO J***., 23: 690-700. *Times cited* ***124*** |
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