Australian Academy of Science

RUDI LEMBERG LECTURE

PHOTOSYNTHESIS EXPLAINS CYTOPLASMIC INHERITANCE:
A novel ancestral kinase, CSK is the redox messenger

Professor John F Allen
2008/09 Rudi Lemberg Travelling Fellow
Professor of Biochemistry
Queen Mary, University of London

4.00 pm Thursday 26 February 2009
Robertson Lecture Theatre, Building 46
The Research School of Biological Sciences
The Australian National University

Redox chemistry is a key to understanding cell evolution and biological energy transduction. Why do chloroplasts and mitochondria contain distinct genetic systems to express a small but constant sub-set of their own proteins? We propose that redox control of gene expression explains the function of the genomes of chloroplasts and mitochondria and their retention, in evolution, as extra-nuclear genetic systems. This hypothesis is named "CoRR" for "Co-location for Redox Regulation". It proposes that redox regulation of gene expression repays, on its own, the huge cost of maintaining genetic systems in the chloroplast and mitochondria of eukaryotic cells. For animal mitochondria, this cost includes ageing and death of the individual, but "template" mitochondria are rescued by means of anisogametic sex. In plants, Sujith Puthiyaveetil in our laboratory, now found the conserved, ancestral, "bacterial" sensor kinase that couples electron transport to chloroplast gene transcription, and whose existence and properties are predicted by CoRR. Numerous experimental predictions flow from this key discovery.

Professor Allen's research interests include redox regulation of membrane phosphorylation and its regulatory function in chloroplasts and light-harvesting function, especially in photosynthetic prokaryotes; redox signalling and evolution; functional genomics of mitochondria and chloroplasts.

Enquiries:

Professor Jan Anderson
jan.anderson@anu.edu.au or 02 6125 5895

Professor Barry Osmond
barry.osmond@anu.edu.au or 02 6287 1487

THE AUSTRALIAN NATIONAL UNIVERSITY