Complex metabolic oscillations in plants forced by harmonic irradiance
L. Nedbal and V. Brozina
Biophys. J., 2002, **83**, 2180–2189.

The complex oscillations occurring during metabolic regulation in plants is reported by studying the chlorophyll fluorescence response to harmonically modulated irradiance and it is proposed that the modulation frequency be tuned to resonate with internal regulatory mechanisms ranging from non-photochemical quenching to circadian rhythms. Plants exposed to harmonically modulated irradiance exhibit a complex periodic pattern of chlorophyll fluorescence emission that can be deconvoluted into a steady-state component, and other components varying with the frequency of the irradiance. The upper harmonic can be explained by a nonlinear negative feedback model of regulation of photosynthesis.

Mathematical models of protein kinase signal transduction
R. Heinrich, B. G. Neel and T. A. Rapoport
Mol. Cell, 2002, **9**, 957–970.

The authors focus on three key parameters namely, amplitude of signal output, the signalling time, and the signal duration, to arrive at an analytical explanatory model of the kinetics of protein kinase signalling. To begin with, simplified versions of naturally occurring pathways are used, but higher level of complexities are superimposed later to analyse more complex situations. The system for analysis includes linear kinase-phosphatase cascades as well as systems containing feedback interactions, crosstalk with other signalling pathways and/or scaffolding and G-proteins.

AppA is a blue light photoreceptor that anti-represses photosynthesis gene expression in *Rhodobacter sphaeroides*
S. Masuda and C. E. Bauer
Cell, 2002, **110**, 613–623.

Changes in oxygen tension and light intensity regulate synthesis of photosystem in photosynthetic bacteria. This paper demonstrates that a specific protein–protein interaction of AppA and PpsR modulates the DNA-binding activity of PpsR in a redox and light-dependent manner, thereby regulating photosynthesis gene expression in *Rhodobacter sphaeroides*.

MAP kinase phosphatase as a locus of flexibility in a mitogen-activated protein kinase signaling network
U. S. Bhalla, P. T. Ram and R. Iyengar
Science, 2002, **297**, 1018–1023.

Computational analysis and experiments in the signalling network in mouse NIH-3T3 fibroblasts is carried out to understand mitogen-activated protein kinases. It is shown that the network can operate with one or two stable states.

Negative autoregulation speeds the response times of transcription networks
N. Rosenfield, M. B. Elowitz and U. Alton
J. Mol. Biol., 2002, **323**, 785–793.

A synthetic transcription circuit in *E. coli* containing TetR-GFP fusion proteins is used to analyse a genetic autoregulatory circuit. The mathematical descriptive model is compared to the experimentally observed kinetics of the transcriptional autoregulation and simple transcription.

Bee venom phospholipase inhibits malaria parasite development in transgenic mosquitoes
L. A. Moreira *et al.*
J. Biol. Chem., 2002, **277**, 40839–40843.

Transgenic mosquitoes are now available to reduce transmission of malarial parasite *Plasmodium*. The authors used a gut-specific and blood-inducible promoter to express the bee-venom phospholipase A2 (PLA2) in transgenic mosquito *Anopheles stephensi*. Transient expression of PLA2 protein in the mid-gut epithelial cells of the transgenic mosquitoes reduced *Plasmodium* oocyst formation and impaired transmission of the parasite to mice.

A kinetic framework for a mammalian RNA polymerase *in vivo*
M. Dundr *et al.*
Science, 2002, **298**, 1623–1625.

A kinetic and mechanistic framework is arrived at by investigating the assembly and elongation of the mammalian RNA polymerase I complex in living cells using *in vivo* microscopy. Computational modelling of the imaging data provides for the *in vivo* elongation time and incorporation efficiencies of a GFP fusion protein.

The flux of small near-earth objects colliding with the Earth
P. Brown *et al.*
Nature, 2002, **420**, 294–296.

Observations based on the US space-based systems in geostationary orbits over the past 8.5 years, are in agreement with a power law distribution for small (1–10 m size range) bolides like the larger (> 50 m) ones. Estimates reported here show that Tunguska-like events, as occurred in Siberia in 1908 causing a damage equivalent to 10 megatons of TNT, occur once every 1000 years, whereas hits by an object with 5 kton TNT equivalent energy are as frequent as once a year.

Synthetic peptide epitope-based polymers: controlling size and determining the efficiency of epitope incorporation
K. Sadler, W. Zing and D. C. Jackson
J. Peptide Res., 2002, **60**, 150–158.

Polymeric epitopes, with repetitive peptide units are generated with free-radical polymerization of acryloyl peptides. The peptides are assembled manually using Fmoc chemistry. Success with such approach creates the 'potential for introducing different physical and chemical properties into artificial protein immunogen', leading to design of multi-potent vaccines effective against a number of pathogens.