Comparative genome and proteome analysis of *Anopheles gambiae* and *Drosophila melanogaster*
Evgeny M. Zdobnov *et al.*
Science, 2002, **298**, 149–159.

The fruitfly *Drosophila* and malaria vector *Anopheles* are similar in general body plan and dipteran lifecycle, but differ in habitat, food habit and genome size. The complete genomes of these two insects, that diverged about 250 million years ago, are compared in this paper. 12,981 proteins from *Anopheles* when compared to 13,885 proteins from *Drosophila* give rise to 6089 protein pairs as orthologs that can be considered the conserved core of proteins between the two similar organisms. It is possible that the two insects diverged faster than the vertebrates and intron alterations occurred at a rate of about one per gene per 125 million years. Inter-arm transfers as well as inter-arm shuffling are visible in the chromosomes of the two organisms. The mosquito genome being about twice in size in comparison to the fruit fly, the former genome is likely to contain a large number of genes associated with distinctive functions in mosquito, especially hematophagy and hosting of *Plasmodium*.

Analysis of the *Plasmodium falciparum* proteome by high-accuracy mass spectrometry
Edwin Lasonder *et al.*
Nature, 2002, **419**, 537–542.

Post-genomic analysis of the malarial parasite *P. falciparum* proteome should facilitate discovery of potential vaccines against the disease. To obtain purified proteome preparations, malarial parasites are cultivated, and their three stages – asexual blood stages, gametophytes, and gametes – are extracted by freeze thawing and centrifugation. Tryptic peptides from such preparations, analysed with a time-of-flight mass spectrometer (nano-LC-MS/MS), yielded a total of 1289 unique parasite proteins, of which the three stages – asexual, gametocyte and gamete – corresponded to 714, 913, and 645 proteins respectively, suggesting stage-specific expression and localization of *Plasmodium* proteins.

Rapid diversification of the cotton genus (*Gossypium*: Malvaceae) revealed by analysis of sixteen nuclear and chloroplast genes
Richard C. Cronn *et al.*
Am. J. Bot., 2002, **89**, 707–725.

Diploid cottons are native to the entire globe except the continents of Europe and Antarctica. In this paper PCR-amplified DNA fragments from nuclear genome, chloroplast genome and ribosomal DNA were used to understand the phylogenetic radiations among the major cotton lineages. Chloroplast and nuclear phylogenetic inferences significantly differ. Results indicate that nuclear (n) DNA evolved approximately 2.5 fold more rapidly than chloroplast (cp) DNA in diploid cottons. 'One in four variable cpDNA sites are phylogenetically informative, while for mDNA this ratio is closer to one in nine.' Though it is generally believed *Gossypium* is ancient, originating in the Cretaceous period, this work suggests a relatively recent origin, 2–13 million years ago.

Smaller is better – but not too small: A physical scale for the design of the mammalian pulmonary acinus
Bernard Sapoval, M. Filoche and E. R. Weibel
Proc. Natl. Acad. Sci. USA, 2002, **99**, 10411–10416.

Various mammals (mouse, rat, rabbit, and human) are studied to demonstrate that the alveolar gas-exchange in acinus during transfer of oxygen in air to blood in the lung fulfills the prediction of physics on the constraint of sizes, that is 'the small mammals being more efficient than the large ones both at rest and in exercise'.

Effects of high pressure on the viability, morphology, lysis and cell wall hydrolase activity of *Lactococcus lactis* subsp. *cremoris*

A. S. Malone, T. H. Shellhammaer and P. D. Courtney
Appl. Environ. Microbiol., 2002, **68**, 4357–4363.

Life under high pressure is a subject of curiosity among many marine biologists, but industrial microbiologists believe that pressure dependent autolysis of lactococcal strains plays a major role in cheese maturation. This study reports the viability, morphology, and lysis of *Lactococcus* species subjected to a pressure range of 100 to 800 MPa for 5 min at 30°C. Pressure-induced lysis is strain-dependent. Transmission electron microscopy and gel electrophoresis confirm the extent of cell lysis after pressure treatment. Significant inactivation occurs above 400 MPa.

Mushroom bodies are not required for courtship behaviour by normal and sexually mosaic *Drosophila*
Asami Kido and Kei Ito
J. Neurobiol., 2002, **52**, 302–311.

Drosophila males can be 'feminized' by specifically expressing the female form of 'transformer' (*tra*) gene. These flies appear 'bisexual' in some respects. Such an experimental system is convenient for screening suppression of male-specific behaviour, e.g. courtship behaviour. Through extensive screening and subsequent genetic analysis of ectopic expression of *tar* gene in specific subsets of brain cells, and hydroxy-urea ablation of mushroom bodies, the authors conclude that mushroom bodies are not required for the control of courtship, contradicting a previous well-held belief.

Electrically conductive phospho-olivines as lithium storage electrodes
S. Y. Chung, J. T. Bloking and Y. M. Chiang
Nature Materials, 2002, **1**, 123–128.

Olivines, the class of poly-anionic compounds containing one or more atoms of P, S, As, Mo and other metal ions, occur as a chief constituent of the earth's mantle and are also used as electrolytes in solid state electrochemical devices. The authors here report doping of lithium-based phospho-olivines, to improve conductivity of the material. Solid state reactions of Li_2CO_3, $NH_4H_2PO_4$ and $FeC_2O_4.2H_2O$ with the dopants are used to synthesize powders and incorporation of the dopants in the solid solution monitored by XRD and TEM. Results demonstrate an increase in electronic conductivity by a factor of 10^8 by controlled doping of $LiFePO_4$ with Zr, Ti, Nb, Mg, Al, W and other metals, raising the possibility of using the doped phospho-olivines in lithium batteries.