METHODS IN BRIEF

EPIGENETICS

Following cell-type–specific gene expression

Profiling of gene expression or chromatin marks in specific cell populations usually requires that the cells be isolated physically. Southall *et al.* circumvented this need by modifying the DNA adenine methyltransferase identification (DamID) method, in which a DNA-binding protein is fused to a bacterial methyltransferase. Adenines near binding sites in the genome are methylated by the fusion protein, allowing subsequent enrichment and sequencing. In practice, protein levels must be kept very low to prevent toxicity. Southall *et al.* achieved this by cloning the fusion protein downstream of a protein-coding region, which resulted in weak translational initiation. Their targeted DamID, or 'TaDa', method allows the use of inducible Gal4 drivers for specific cell types rather than constitutive basal promoters. The researchers profiled chromatin-binding proteins and RNA polymerase II to determine epigenetic status and gene expression in neural stem cells in the fruit fly.

Southall, T.D. *et al. Dev. Cell* doi:10.1016/j.devcel.2013.05.020 (20 June 2013).

MICROSCOPY

Dealing with dipoles

Microscopy techniques that rely on the localization of single fluorophores are developing rapidly, and localization algorithms are straining under the demands. One particular concern is that most algorithms assume the fluorophore dipole is freely rotating. If it is not, this assumption can result in large localization errors. Although solutions for fixed dipoles exist, there has been no solution for dipoles that are neither freely moving nor fixed. To address this shortcoming, Zhang *et al.* turned to a computational technique rarely used in optics: an artificial neural network (ANN). They trained an ANN on synthetic images of dipoles based on theoretical point-spread functions and then compared its performance to those of known localization methods using isotropic beads, anisotropic quantum rods and super-resolution imaging of actin and DNA. The ANN was faster and displayed tighter fits than the other methods, thus presenting a promising new tool and avenue for localization microscopy.

Zhang, Y. *et al. Protein Cell* doi:10.1007/s13238-013-3904-1 (7 June 2013).

GENOMICS

Mining for lateral gene transfer

Although the estimated 10^{14} bacterial cells living in the human body serve important functions, Riley *et al.* show that this cohabitation can also lead to genetic transfer between the species, which can negatively affect the genome of somatic human cells. By mining data from the Human Genome Project, the 1000 Genomes Project and The Cancer Genome Atlas for the presence of any of 2,241 bacterial genomes, the researchers found evidence of lateral gene transfer (LGT), which occurred more frequently in tumor samples than in healthy cells. They documented an example in which the integration of a particular species of bacteria into the 5′ and 3′ regulatory regions of proto-oncogenes led to the upregulation of transcription of those genes, supporting the hypothesis that LGT may play a role in carcinogenesis.

Riley, D.R. *et al. PLoS Comput. Biol.* **9**, e1003107 (2013).

CHEMISTRY

Rapid reaction inspection

New organic chemistry reactions are often slow to be incorporated into the chemist's toolbox. This is likely because insufficient information about the tolerance of a reaction to various functional groups and the tolerance of various functional groups to the reaction is given in the first report of a new reaction, write Collins and Glorius. Such information can take years to gather and is usually fragmented across various publications. As a solution to this vexing issue, Collins and Glorius propose a rapid screening method to guide chemists in assessing the functional-group tolerance of a new organic reaction. This simple screen involves using gas chromatography to examine reaction reactivity in the presence of a panel of standard compounds representing various functional groups. Such a systematic analysis should help facilitate the rapid adoption of novel reactions.

Collins, K.D. & Glorius, F. *Nat. Chem.* **5**, 597–601 (2013).

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