TOOLS IN BRIEF

CELL BIOLOGY

Single-transcript dynamics in a live mouse

Rather than rely on exogenous reporters to monitor gene expression, a team of researchers has generated a transgenic mouse with fluorescently labeled endogenous mRNA. In 2011, Lionnet *et al.* published a report in *Nature Methods* describing a transgenic mouse that expresses an array of binding sites for the MS2 bacteriophage capsid protein (MCP) in the 3′ untranslated region of the β-actin gene. Park *et al.* have now crossed this mouse with a strain expressing an MCP-GFP fusion, which allowed them to follow MCP-GFP–labeled endogenous β-actin in all mouse tissues. They looked at expression patterns and localization dynamics of β-actin in primary fibroblasts and cultured neurons as well as acute brain slices and saw different modes of localization in the different cell types.

Lionnet, T. *et al. Nat. Methods* **8**, 165–170 (2011).
Park, H.Y. *et al. Science* **343**, 422–424 (2014).

NEUROSCIENCE

Avoiding artifacts in optogenetics studies

Optogenetics tools allow researchers to use light to activate specific neurons expressing a light-sensitive protein, enabling studies of synaptic connectivity and how it relates to animal behavior. The transmembrane channel protein channelrhodopsin-2 (ChR2) in particular has been widely used for this purpose. When ChR2 is hit with blue light, its retinal chromophore absorbs photons, causing the channel to open and allow cations to pass across the cell membrane. Herman *et al.* now deliver a public service message to users of ChR2 technology. They found that shining light onto neurons expressing ChR2 for long durations can actually cause the cells to become silenced, rather than activated, and that interneurons are especially prone to this so-called depolarization block. They recommend that ChR2-technology users carefully empirically evaluate their choice of light-pulse time intervals in order to avoid this effect.

Herman, A.M. *et al. eLife* **3**, e01481 (2014).

MICROBIOLOGY

Microbial population structure served on the web

The field of microbial ecology experienced a boom with the rise of high-throughput methods to sample microbial sequences directly from the environment. The result has been a flood of sequence data and the need for robust analysis tools. Huse *et al.* describe Visualization and Analysis of Microbial Population Structure (VAMPS), a free web tool for visualizing and interpreting marker-gene sequence data (http://vamps.mbl.edu/). Users can upload data and use the VAMPS pipeline to filter, cluster and assign taxonomy to sequences through a point-and-click graphical user interface. The platform incorporates a number of tools and accommodates iterative visualization and analysis, enabling comparisons between data sets for small laboratories or larger collaborations.

Huse, S.M. *et al. BMC Bioinformatics* **15**, 41 (2014).

NANOBIOTECHNOLOGY

Sustainable magnetic nanoparticle synthesis

The synthesis of magnetic nanoparticles, which are important for various applications in biology and medicine, can be challenging. So why not conscript a microorganism to do the job? The magnetotactic bacterium *Magnetospirillum gryphiswaldense* produces uniformly sized magnetite nanocrystals, but cultivating this and other magnetotactic microbes in the laboratory is a challenge. Kolinko *et al.* took 29 genes that they identified as responsible for magnetosome synthesis in *M. gryphiswaldense*, stitched expression cassettes comprising these genes together using recombineering, and transferred the expression cassettes to an easy-to-handle, photosynthetic, nonmagnetic host, *Rhodospirillum rubrum*. With some optimizations, they achieved successful magnetosome synthesis, demonstrating a potential tool for sustainable production of magnetic nanoparticles.

Kolinko, I. *et al. Nat. Nanotechnol.* **9**, 193–197 (2014).