TOOLS IN BRIEF

MICROSCOPY

Special delivery for live-cell imaging

Fluorescent dyes often have properties desirable for microscopy, including high brightness and photostability. However, many are not cell permeable and are thus challenging to use in live-cell imaging. Teng *et al.* sought to bypass cell permeability and develop a general strategy for labeling proteins in mammalian cells with exogenous fluorophores. To do so, they used a pore-forming enzyme called Streptolysin O to poke holes into mammalian cells, allowing various reagents to enter. The holes were then repaired by the cells, which remained largely viable. Using this strategy, the team delivered a range of probes, including fluorescently labeled antibodies, into cells. They were also able to deliver oxygen scavengers into cells for prolonged imaging, as well as glutathione, a reagent that enables fluorophore blinking for single-molecule localization-based super-resolution imaging.

Teng, K.W. *et al. eLife* **5**, e20378 (2016).

NEUROSCIENCE

Stretchable multichannel wireless implants

Implantable devices facilitate optogenetics experiments in freely moving mice, but so far they have only been designed for single-region, single-wavelength experiments. Park *et al.* now report multichannel devices that can be remotely powered via their on-board stretchable antennae. Power is provided through an array of transmitter antennae that emit radio frequency waves depending on the position of the animals within the behavioral arena, thereby optimizing overall power dissemination. This technology allows independent control of up to three light sources in the implants, making it possible to independently illuminate different optogenetic actuators or different brain regions. The researchers use the implantable devices and the associated transmitter antenna array to independently activate neurons in the dorsal or ventral nucleus accumbens in order to decipher the role of these regions in reward and aversion behavior within the same animals.

Park, S.I. *et al. Proc. Natl. Acad. Sci. USA* **113**, E8169–E8177 (2016).

MICROBIOLOGY

Many models of microbial metabolism

Human health is inextricably linked to the metabolism of our resident gut bacteria. Magnúsdóttir *et al.* have embarked on an ambitious effort to generate genome-scale metabolic models of large numbers of bacteria for which some experimental data on function exist. The researchers generated metabolic models using constraint-based reconstruction and analysis (COBRA) and developed a comparative metabolic reconstruction method that makes it possible to propagate manual changes in individual models to other models. Using this framework, assembly of gut organisms through reconstruction and analysis (AGORA), the authors produced curated models for 773 human gut microbes representing 205 distinct genera. The resource will be useful to better understand microbial metabolism and to study host–microbe interactions that affect human health and disease.

Magnúsdóttir, S. *et al. Nat. Biotechnol.* http://dx.doi.org/10.1038/nbt.3703 (2016).

NANOBIOTECHNOLOGY

Nanopore-based protein fingerprinting

Simple methods to detect and quantify mixtures of proteins in solution without any chemical modification steps would be useful in routine protein analysis, in proteomics research, and for diagnostics purposes. Yusko *et al.* describe such an approach based on the use of bilayer-coated solid-state nanopores, which could be further developed for practical protein fingerprinting of complex mixtures. They report theory describing how the rotational dynamics of single proteins cause changes to ionic current as proteins pass through the electric field inside the nanopore. This enables them to simultaneously measure protein shape, volume, charge, rotational diffusion coefficient, and dipole moment. The authors suggest that the method could replace routine 2D gel electrophoresis by providing improved quantification and throughput.

Yusko, E.C. *et al. Nat. Nanotechnol.* http://dx.doi.org/10.1038/nnano.2016.267 (2016).