TOOLS IN BRIEF

SENSORS AND PROBES

Voltage sensors for *in vivo* applications

Imaging voltage changes in single neurons *in vivo* has so far required averaging over multiple trials. Gong *et al*. now report a genetically encoded voltage indicator (GEVI) that is bright enough to enable single-trial imaging of voltage changes in living mice and flies. This GEVI consists of a rhodopsin from *Acetabularia acetabulum* (Ace) and the fluorescent protein mNeon-Green, which together act as a fluorescence resonance energy transfer (FRET) pair. With sixfold faster kinetics and a 50% increase in brightness compared to existing GEVIs of similar design, Ace-mNeon sensors support high-fidelity imaging of subthreshold voltage changes, single action potentials and fast spike trains *in vivo*. The researchers demonstrated these capabilities in the visual cortex of both anesthetized and awake mice, as well as in the *Drosophila* olfactory system.

Gong, Y. *et al*. *Science* doi:10.1126/science.aab0810 (19 November 2015).

MICROBIOLOGY

How to prep your metagenomic library

As shotgun metagenomic sequencing becomes more widespread, there is an increasing need to understand biases across different technologies and to determine whether studies based on different platforms are comparable. Jones *et al*. used a synthetic mixture, or mock community, of microbial sequences to benchmark library preparation using PCR-free Illumina Nextera XT and TruSeq DNA kits as well as the KAPA Biosystems Hyper Prep PCR and PCR-free kits. The authors found that a high GC base content can inflate biases in error profile, duplication rate and read loss, and they recommend using PCR-free kits to reduce bias and cell spike-in controls for more accurate quantification. They also studied the effects of the different library-preparation methods on human stool samples.

Jones, M.B. *et al*. *Proc. Natl. Acad. Sci. USA* **112**, 14024–14029 (2015).

SYNTHETIC BIOLOGY

SCRaMbLE put to the test

The Synthetic Yeast Genome Project (Sc2.0), an ongoing effort to synthesize the genome of *Saccharomyces cerevisiae*, addresses fundamental questions about genome function. To generate phenotypic diversity, Jeff Boeke and his collaborators at Sc2.0 developed SCRaMbLE (synthetic chromosome rearrangement and modification by *loxP*-mediated evolution) by systematically introducing *loxP* sites—which undergo recombination in the presence of Cre—in certain chromosomal regions. Although the method was promising, concerns about specificity and decreased diversity remained. Recently Shen *et al*. tested 64 strains with *loxP* sites in one arm of chromosome IX. Recombination produced complex structural variants that covered the entire arm. Each strain was unique, and there was no evidence of rearrangement with other nuclear or mitochondrial sites, indicating that SCRaMbLE can be used to target multiple synthetic chromosomes simultaneously.

Shen, Y. *et al*. *Genome Res*. doi:10.1101/gr.193433.115 (13 November 2015).

NEUROSCIENCE

Wireless optogenetics

Optogenetic manipulation of neural activity has become a workhorse in neurobiology, but standard optical illumination via cables and external light sources can interfere with normal behaviors in freely moving animals. Wirelessly powered devices can overcome this limitation. Montgomery *et al*. reported an implantable light-emitting diode (LED) device that is controlled and powered with a radio-frequency power source. Park *et al*. developed a soft, stretchable LED device that works similarly. Although the latter device is probably more compatible with chronic experiments because it causes less tissue damage, the former device is easier to build. Both research groups have used the devices to stimulate pain circuitry in the peripheral nervous system and in the spinal cord of freely behaving mice.

Montgomery, K. *et al*. *Nat. Methods* **12**, 969–974 (2015).

Park, S.I. *et al*. *Nat. Biotechnol*. doi:10.1038/nbt.3415 (9 November 2015).