TOOLS IN BRIEF

GENOMICS

Competing genome assemblers

The Assemblathon 2 competition invited software developers to test their genome assemblers using sequencing reads from a bird, fish and snake genome. 21 teams competed, using data from any combination of three sequencing platforms. The organizers applied metrics such as scaffold and contig length, the presence of conserved genes, and accuracy compared to fosmid clones and optical maps to rank the programs. The snake genome had the highest-scoring assemblies, the fish the lowest, likely because of different levels of heterozygosity and repeat content. Overall the rankings as reported by Bradnam *et al.* showed that no software performed consistently well across all metrics within a species or across the same metric in different species. The take-home messages are that one should not rely on a single software tool for genome assembly and that it is misleading to judge the quality of an assembly based on only one metric.

Bradnam, K.R. et al. *GigaScience* **2**, 10 (2013).

CHEMISTRY

An improved single-molecule fluorophore

Small-molecule fluorophores are invaluable tools for investigating biological processes, in particular for single-molecule studies. But such studies are plagued by fluorophore blinking and photobleaching—which are, respectively, temporary and permanent suspension of light emission. A promising group of reagents, the so-called Keio fluors, based on a BODIPY (boron-dipyrromethene) scaffold, have very high photostability and reduced blinking compared to commonly used fluorophores, but Keio fluors are not water-soluble, precluding their practical use in biological applications. Yang *et al.* modified the Keio fluor scaffold with a large, water-soluble polyglycerol dendrimer (PGD) and showed that the reagent maintained long and stable fluorescence emission. This PGD-BODIPY probe appears promising for single-molecule imaging applications.

Yang, S.K. *et al. Nat. Chem.* **5**, 692–697 (2013).

NEUROSCIENCE

Synapses under the spotlight

Neurons primarily communicate with each other via electrical bursts (action potentials) that are transmitted between cells through the release of chemical signals at synapses. With microbial opsins, researchers can trigger action potentials in neurons in response to light or block action potentials from occurring. But controlling the release of chemicals at specific synapses using light has not yet been possible. Lin *et al.* developed tools for this based on chromophore-assisted light inactivation (CALI), a technique in which illumination of a chromophore triggers the production of singlet oxygen molecules, which inactivate nearby proteins. They fused the CALI agent, miniSOG, to proteins that are important for triggering the release of chemicals by vesicles at presynaptic terminals. As a result, synaptic release of neurotransmitters in cells could be blocked over several hours, allowing dissection of the role of specific axonal projections in worm behavior.

Lin, J.Y. *et al. Neuron* **79**, 241–253 (2013).

SENSORS AND PROBES

Ammonium transport sensors

Ammonium is an important source of nitrogen for bacteria, fungi and plants, and excreted as a waste product by animals. Ammonium transport is regulated by ammonium transporters, but the functions of such proteins have proved difficult to study. De Michele *et al.* now report ammonium transport activity sensors for *Arabidopsis* ('AmTrac') and for yeast ('MepTrac') by engineering a circularly permuted GFP into the middle of an ammonium transporter sequence. When the protein undergoes a conformational change during transport, the fluorescent properties of the GFP are altered and can be read out by fluorescence detection. The concept could be applied to generate activity sensors for a variety of other transporters, receptors and enzymes.

De Michele, R. *et al. eLife* **2**, e00800 (2013).