TOOLS IN BRIEF

MODEL ORGANISMS

Cis-regulatory annotation in the mouse

The ENCODE and modENCODE projects annotated regulatory elements in human, roundworm and fruit fly but left out other informative model systems. Shen *et al.* now map regulatory elements in the mouse by deep sequencing after chromatin immunoprecipitation against RNA polymerase II and histone 3 lysine 4 trimethylation (active promoter marks); CTCF (which binds insulators); and histone 3 lysine 4 monomethylation and lysine 27 acetylation (which mark enhancers), in 17 tissues and two cell lines. In addition, they sequenced the transcriptomes of these tissues. The maps cover about 11% of the mouse genome and reveal local clustering of coordinately regulated 'enhancer-promoter units'. Comparing mouse and human regulatory elements on a broad scale, they found that enhancers and insulators are rapidly evolving, divergent and tissue specific, whereas promoters are better conserved.

Shen, Y. *et al. Nature* **488**, 116–120 (2012).

LAB-ON-A-CHIP

Functional single-cell screening

High-throughput analysis of single living cells is gaining momentum. It has been previously shown that single, isolated living cells can be manipulated and assayed by combining microfluidics with the encapsulation of single cells into water droplets surrounded by oil—thereby tackling the problems of evaporation and capillary action that characterize microtiter plates. In new work, Debs *et al.* describe a microfluidic platform with the capacity to manipulate droplets by fusion and sort them based on fluorescence. They used the device to rapidly assay and sort hybridoma cells for the release of antibodies inhibiting the hypertension and congestive heart failure drug target angiotensin-converting enzyme 1.

Debs, B.E. *et al. Proc. Natl. Acad. Sci. USA* **109**, 11570–11575 (2012).

STEM CELLS

Rapid neuronal differentiation

The differentiation of human pluripotent stem cells (hPSCs) into neurons in the culture dish is a long, drawn-out process, typically requiring a month or more. This is much longer than is needed for the equivalent process in the mouse system *in vitro* and is thought to reflect the longer *in vivo* developmental time in human. In recently published work, Chambers *et al.* carried out a screen for small molecules that accelerate this process. Starting with the dual SMAD-inhibition culture conditions that they previously developed for differentiation along this lineage, they found that a combination of five signaling inhibitors is optimal for the rapid generation (about 10 days) of neurons from hPSCs. Functional studies and analysis of marker expression identified the resulting cells as nociceptive sensory neurons.

Chambers, S.M. *et al. Nat. Biotechnol.* **30**, 715–720 (2012).

GENOMICS

Enhanced personal genomes

Now that routine personal genome sequencing is in the realm of the possible, the next big question is how to treat and interpret the resulting data. The more information on an individual's health, environment and traits that can be added to sequence data, the more in-depth the interpretation of genomic variation will be. Just how useful additional information is can now be tested with a public resource of ten genomes associated with health information for each participant, organized by Ball *et al.* as part of the Personal Genome Project (PGP). The PGP will also add data on expression, epigenome and microbiome profiling and will generate induced pluripotent stem cells. The ten individuals were selected from a large pool of volunteers and agreed to open consent after being counseled on the risks of loss of privacy.

Ball, M.P. *et al. Proc. Natl. Acad. Sci. USA* **109**, 11920–11927 (2012).