METHODS IN BRIEF

IMAGING

Nanodiamonds to track cells *in vivo*

Optical methods to follow the *in vivo* fate of transplanted stem or progenitor cells are of much interest. Wu *et al*. report the use of fluorescent nanodiamonds (FNDs) for this purpose. These probes have several advantages over dyes and fluorescent proteins as *in vivo* reporters: they are stable, can be easily loaded into cells, and emit far-red light with a lifetime distinct from that of tissue autofluorescence. The authors label sorted epithelial stem and progenitor cells from the mouse lung with FNDs, establish that the cells' properties are not affected by the nanoparticles, and then monitor the labeled cells for up to 1 week after intravenous introduction into a recipient mouse. They identify FND-labeled cells in the recipient lung and quantify these cells by FACS analysis of isolated tissue.

Wu, T.J. *et al. Nat. Nanotechnol.* **8**, 682–689 (2013).

GENE EXPRESSION

Binding-site affinities tune promoter output

Teasing apart the contribution of a single variable to the output of a promoter can be tricky because so many factors affect gene expression. Rajkumar *et al*. achieve this by systematically altering two binding-site sequences of the transcription factor Pho4 in the yeast *PHO5* promoter. These altered sites represent a range of binding affinities that were previously determined *in vitro*. Rajkumar *et al*. include the binding sites in a library of 209 synthetic promoters, each fused to the mCherry reporter. Each promoter-reporter fusion is integrated into the yeast genome at the same site, which recapitulates the spacing and nucleosome occupancy of the endogenous promoter, and output is quantified at the single-cell level using a microfluidic setup. The authors show that transcription factor binding affinity can be adjusted to finely tune promoter output.

Rajkumar, A.S. *et al. Nat. Genet.* doi:10.1038/ng.2729 (18 August 2013).

MODEL ORGANISMS

Conditional gene knockouts in worms

Transcription activator–like effector (TALE) proteins fused to the Fok1 endonuclease have been used to make targeted mutations in the genomes of several species. Cheng *et al.* now demonstrate conditional gene editing with these TALE nucleases (TALENs) in *Caenorhabditis elegans*. They generate transgenic worms in which TALENs designed to target genes of interest are under the control of cell type–specific promoters. They thereby determine the focus of action of specific genes (that is, the cells in which the gene product must be mutant to confer a phenotype), and they study the function of essential, embryonic lethal genes in post-embryonic processes. This approach should prove useful for dissecting gene function in the worm.

Cheng, Z. *et al. Nat. Biotechnol.* doi:10.1038/nbt.2674 (18 August 2013).

GENETICS

Allelic effects on translation

A number of sequence features on a transcript can affect how efficiently it is translated into protein, with phenotypic consequences. Yet genetic association and quantitative trait loci studies have been restricted to finding effects of genetic variation on mRNA levels. Li *et al*. examine genome-wide translation by measuring the ratio of ribosome-bound–to–free mRNA levels with polyribosome fractionation, a proxy measure for translational efficiency (transcripts bound by many ribosomes are assumed to be efficiently translated). In a pilot study of 38 immortalized lymphoblastoid cell lines, the authors discovered 29 variants associated with differences in translational efficiency. The effect of a variant in the protein RPS26 was confirmed by western blotting; this variant is tightly linked with a locus associated with type I diabetes risk.

Li, Q. *et al. Nat. Commun.* **4**, 2260 (2013).