IN BRIEF

MODEL ORGANISMS

Knockout rats via embryo microinjection of zinc-finger nucleases

Geurts, A. M. *et al. Science* **325**, 433 (2009)

Despite its importance as a model organism for the study of physiology and disease, methods for targeted gene disruption in the rat have been lacking. In this study, engineered zinc finger nucleases were introduced into embryos by mRNA microinjection to generate knockout rats. Targeted mutations were introduced at a high success rate into two endogenous rat genes and a GFP transgene, and the authors confirmed full knockout of the transgene. Importantly, the transmission of mutations through the germ line was confirmed, which is important for knockout lines to be established.

COMPLEX DISEASE

Epigenetic inheritance and the missing heritability problem

Slatkin, M. *Genetics* **182**, 845–850 (2009)

Heritable variation in epigenetic modifications potentially contributes to the causality and heritability of complex diseases. This paper presents a model for transgenerational epigenetic inheritance that highlights the persistence time of heritable epialleles as being of central importance in this context. In this model, rapid loss would mean that although epigenetic modifications might contribute substantially to average risk in a population, their contribution to recurrence risk and heritability would be low. With longer persistence times, epialleles would be more likely to be in linkage disequilibrium with SNPs that are genotyped in genome-wide association studies.

MOBILE ELEMENTS

L1 retrotransposition in human neural progenitor cells

Coufal, N. G. *et al. Nature* 6 Aug 2009 (doi:10.1038/nature08248)

Retrotransposition has a significant effect on genome evolution, but whether the activity of retrotransposons, such as LINE-1 (L1) elements, can contribute to somatic mosaicism is unknown. This paper shows not only that human neural progenitors support transposition of an engineered L1 element (as previously shown in rats) but also that, in humans, samples of adult brain tissue have higher copy numbers of endogenous L1 than do samples of other tissues from the same individual, which suggests L1-induced mosaicism. Although endogenous somatic retrotransposition needs to be confirmed, it raises the possibility that retrotransposition might influence development.

EVOLUTION

General rules for optimal codon choice

Hershberg, R. & Petrov, D. A. *PLoS Genet.* **5**, e1000556 (2009)

Different organisms favour different synonymous codons, but the underlying rules of this codon bias have not been resolved. In this study, the authors systematically identified the optimal codons in 675 bacteria, 52 archea and 10 fungi. They found a correlation between the GC content of optimal codons and that of intergenic regions. The authors also outline a model in which shifts in the identity of optimal codons during evolution might not require a temporary weakening of selection for codon bias, which had previously been suggested to be necessary for this process.