IN BRIEF

GENOMICS

Retrosequence formation restructures the yeast genome.

Maxwell, P. H. & Curcio, M. J. *Genes Dev.* **21**, 3308–3318 (2007)

The yeast Ty*1* retrotransposon is a major source of reverse transcriptase in *Saccharomyces cerevisiae*. These authors show that this reverse transcriptase activity is responsible for generating retrosequences that are mainly derived from single-copy genes. Although these retrosequences occasionally fuse with other mRNAs, they most frequently fuse to Ty*1* sequences. Ty*1*-associated retrosequences are present at breakpoint junctions of chromosomes that are undergoing rearrangements, indicating that reverse transcripts promote such rearrangements.

EPIGENETICS

RAG2 PHD finger couples histone H3 lysine 4 trimethylation with V(D)J recombination.

Mathews, A. G. W. & Kuo, A. J. *et al. Nature* 21 November 2007 (doi:10.1038/nature06431)

These authors show that, like transcription, recombination is regulated by an interaction between regulatory proteins and specific histone modifications. They show that RAG2, a component of RAG1/2 V(D)J recombinase, contains a plant homeodomain finger that recognizes trimethylated histone H3 lysine 4 (H3K4me3). Mutations that prevent this interaction decrease V(D)J recombination in mice, as does a reduction of H3K4me3 levels. Moreover, in humans, specific mutations that abrogate the interaction are associated with immunodeficiency syndromes, providing the first example of the involvement of the histone code in human inherited disease.

RNA WORLD

Switching from repression to activation: microRNAs can up-regulate translation.

Vasudevan, S., Tong, Y. & Steitz, J. A. *Science* 29 November 2007 (doi:10.1126/science.1149460)

In addition to their role in downregulating gene expression, these authors demonstrate that microRNAs can upregulate translation. Using a series of complementary mutations that affect the base pairing between the upstream region of the tumour-necrosis factor α (TNFα) transcript and a complementary microRNA, they show that this interaction, and the resulting recruitment of Argonaute and other factors, is responsible for increasing TNFα translation upon cell-cycle arrest. They show a similar effect with two other microRNAs and their targets.

DEVELOPMENT

Mutation of RNA Pol III subunit rpc2/polr3b leads to deficiency of subunit Rpc11 and disrupts zebrafish digestive development.

Yee, N. S. *et al. PLoS Biol.* **5**, e312 (2007)

The multi-subunit enzyme RNA polymerase III (Pol III) is deregulated in most cancers. The authors show that the zebrafish mutant *slim jim* — which has growth defects only in proliferating tissues — is caused by a mutation in the Pol III subunit Polr3b. Genetic studies in fission yeast show that the defects are due to faulty interactions between mutant Polr3b and another Pol III subunit. The conservation in Pol III function suggests that Pol III inhibitors could be developed to target cancer cells.