IN BRIEF

CIRCADIAN RHYTHMS

Temperature oscillations set peripheral clocks

The circadian rhythm of peripheral cells can be regulated by diverse stimuli, including oscillations in hormones, metabolites and temperature. Saini *et al.* used bioluminescence assays to monitor the influence of physiologically relevant temperature oscillations on circadian gene expression in fibroblasts. Interestingly, 6–30-hour temperature cycles with stable fluctuations as low as 1–4 °C entrained the phases of circadian gene expression, even in cells that were in an opposite circadian phase before treatment. Among the studied temperature-regulated circadian genes, period homologue 2 (*Per2*) was the first to adapt to temperature-entrained phases, indicating that it is involved in the early response to phase transition. Temperature-sensitive genes are also involved in this response, as, for example, deletion of heat shock factor 1 (*Hsf1*) delayed the adaptation of circadian gene expression to temperature cycles.

ORIGINAL RESEARCH PAPER Saini, C. *et al.* Simulated body temperature rhythms reveal the phase/shifting behavior and plasticity of mammalian circadian oscillators. *Genes Dev.* 29 Feb 2012 (doi:10.1101/gad.183251.111)

CELL MIGRATION

Chemotaxis without ARP2/3

The actin-related protein 2/3 (ARP2/3) complex nucleates branched actin filaments and underlies the formation of lamellipodia — sheet-like protrusions found at the leading edge of migrating cells. By generating a mouse embryonic fibroblast cell line depleted of ARP2/3, Wu *et al.* show that ARP2/3 and lamellipodia are essential for migration on surfaces coated with extracellular matrix (ECM) proteins (haptotaxis), but they are dispensable for chemotaxis (migration guided by soluble factors). ARP2/3-depleted cells did not form lamellipodia, had altered focal adhesion dynamics and failed to migrate on various ECM gradients. However, ARP2/3-depleted cells formed more filopodial protrusions and, surprisingly, could still respond to a soluble platelet-derived growth factor gradient, albeit more slowly. The requirement for lamellipodia in haptotaxis but not in chemotaxis suggests that cells use distinct mechanisms to respond to these different directional cues.

ORIGINAL RESEARCH PAPER Wu, C. *et al.* Arp2/3 is critical for lamellipodia and response to extracellular matrix cues but is dispensable for chemotaxis. *Cell* **148**, 973–987 (2012)

MEIOSIS

Homeostatic control of meiotic crossovers

Crossovers form between homologous chromosomes after the generation of double-strand breaks (DSBs) and support accurate chromosome segregation during meiosis. Although DSB frequency varies among meiotic cells, the number of crossovers is tightly regulated to avoid fetal aneuploidy. Here, Cole *et al.* propose a progressive mechanism for homeostatic crossover control in mammals. In mouse spermatocytes, the number of early recombination intermediates at early zygonema varied among meiotic cells and exceeded the number of late recombination intermediates at early pachynema as well as the number of crossovers at mid-pachynema. Unlike the early intermediates, crossover numbers remained constant among spermatocytes, even when DSB frequency was genetically altered. In addition, homeostatic crossover control operated at at least two stages, and the authors propose that it may also be involved in the control of the distance between crossovers on one chromosome.

ORIGINAL RESEARCH PAPER Cole, F. *et al.* Homeostatic control of recombination is implemented progressively in mouse meiosis. *Nature Cell Biol.* 4 Mar 2012 (doi:10.1038/ncb2451)