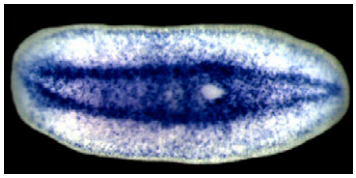
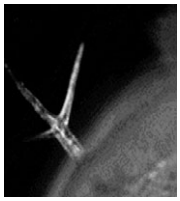


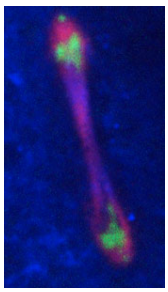
Nervous about regeneration

Cut a planarian in half and it forms two new flatworms, a remarkable feat of regeneration. But what controls pattern formation in the newly formed tissues? According to Cebrià and Newmark, during anterior regeneration in the planarian *Schmidtea mediterranea*, the answer may involve the nervous system (see p. 833). The proper rewiring of the nervous system is a crucial event in regeneration, so the researchers began their study by identifying a planarian ortholog of the axon-guidance receptor *roundabout* (*Smed-roboA*). Unexpectedly, RNAi knockdown of *Smed-roboA* led to the development of an extra pharynx (the worm's feeding organ) and to ectopic head structures during anterior regeneration. The researchers report that the regenerating brain in these animals did not re-establish proper connections with the ventral nerve cords and that this defect preceded the development of ectopic structures. They therefore propose that, as in annelids and amphibians, the nervous system may be an important source of the signals needed for proper morphogenesis during planarian regeneration.



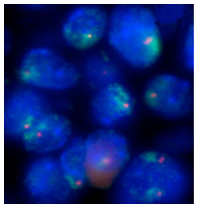
New interactions WAVE plants along

In plants and animals, the shape of many cells is controlled by the actin-nucleating ARP2-ARP3 complex, which itself is regulated by a multimeric complex that includes SCAR/WAVE (suppressor of cAMP receptor/Wiskott-Aldrich syndrome protein-family verproline-homologous protein). Now, on p. 967, Martin Hülskamp and colleagues provide new details about cell-shape control in plants. In *Arabidopsis*, they report, SCAR proteins seem to be direct effectors of small Rac-like GTPases called ROPs (Rho proteins of plants); by contrast, in animal cells, SCAR activity is indirectly regulated by RAC1. The researchers show that AtSCAR2 (one of five *Arabidopsis* SCAR homologues) activates the ARP2-ARP3 complex in vitro and that plants mutant for *AtSCAR2* have a similar phenotype to those mutant for *ARP2* or *ARP3*. They then used yeast two-hybrid analysis and bimolecular fluorescence complementation to construct a protein-interaction network between the ROPs, the SCAR/WAVE complex and the ARP2-ARP3 complex. This network confirms many of the protein interactions previously identified in animals, but, note the researchers, it also reveals several new interactions.



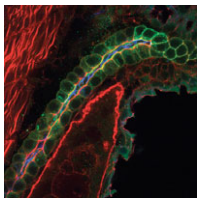
APC doubles up to regulate female meiosis

Meiosis, the specialised two-stage cell division that produces eggs and sperm, involves a significant reorganisation of the canonical cell-cycle machinery. Swan and Schüpbach have been studying this important developmental change to this machinery and now report that two anaphase-promoting complexes – APC^{Fzy} and APC^{Cort} – cooperate during female meiosis in *Drosophila* (see p. 891). During mitosis, the E3 ubiquitin ligase APC and the adaptor protein Fzy target cyclins for destruction during anaphase. By examining various single and double mutants, the researchers reveal that Cort, a diverged Fzy homologue expressed in the female germline of *Drosophila*, functions with Fzy to drive anaphase in meiosis I and II. Both adaptors, they show, control global cyclin destruction but also the local destruction of spindle-associated cyclin B during meiosis II. The researchers suggest, therefore, that during female meiosis in *Drosophila*, the germline-specific APC^{Cort} cooperates with the more general APC^{Fzy} to target cyclins for destruction and allow progression through the two meiotic divisions.



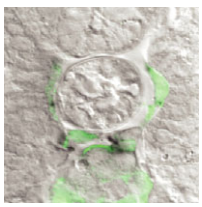
Looping the loop with Hoxd

The relocalisation of gene loci outside chromosome territories and chromatin decondensation are generally regarded as linked facets of gene activation. Now, however, Wendy Bickmore and co-workers reveal that these processes can occur separately during activation of the *Hoxd* gene cluster (see p. 909). The researchers analysed the nuclear organisation of the mouse *Hoxd* cluster in differentiating embryonic stem (ES) cells and embryonic day 9.5 mouse embryos. The *Hoxd* cluster, they report, like the *Hoxb* cluster, looped out from its chromosome territory and unfolded after its activation in ES cells and in the embryonic tailbud. But, in the limb bud (another site of *Hoxd* activation), the chromatin unfolded without looping out. Furthermore, during ES cell differentiation, parts of the *Hoxd* cluster looped out before their chromatin visibly decondensed. Thus, although the chromosome remodelling mechanisms that underlie Hox gene activation predate the duplication of mammalian Hox loci, the exact mode of regulation of the *Hoxd* cluster depends on its developmental context.



New developmental roles for RhoGEFs?

By activating Rho family GTPases in response to regulatory signals, Rho guanine nucleotide exchange factors (RhoGEFs) often link extracellular signals to intracellular responses. They are, therefore, likely to be important during development. Panizzi and colleagues provide an example of this on p. 921 by revealing essential functions for one vertebrate RhoGEF in ciliated epithelia during development. Human ARHGEF11 activates Rho and promotes the reorganization of the actin cytoskeleton in cultured cells; its *Drosophila* homologue controls cell shape changes during gastrulation. To study its role in vertebrate development, the researchers used chromosomal deletion and antisense morpholino oligonucleotides to produce zebrafish embryos that lacked functional Arhgef11 (the zebrafish homolog of ARHGEF11). These embryos showed phenotypes often associated with defective ciliated epithelia, including ventrally curved axes, altered left-right patterning, abnormal kidney development and disrupted intracellular distribution of polarised proteins. How Arhgef11 affects the function of ciliated epithelia remains to be elucidated, but these results clearly identify unanticipated roles for this RhoGEF in ciliated epithelia during vertebrate development.



Notch: an angiogenesis off switch

Notch signalling through the ligand Delta-like 4 (Dll4) is essential for normal vascular development, but which aspect of endothelial cell behaviour does this signalling pathway control? Leslie et al. now show for the first time that, in zebrafish embryos, Dll4-Notch signalling tells endothelial cells to stop migrating and proliferating (behaviours that form new sprouts on existing vessels) once a vascular circuit has been completed (see p. 839). The researchers report that, although blood vessel formation starts normally in embryos in which Dll4 production has been blocked with a morpholino antisense oligonucleotide, the embryos develop a network of aberrant interconnected branches unless vascular endothelial growth factor (VEGF) signalling is also blocked. Ectopic activation of Notch, by contrast, prevents endothelial sprouts forming. The researchers conclude that Notch signalling acts as an angiogenic 'off' switch in endothelial cells exposed to VEGF. Thus, given the recent demonstration that Dll4 blockade decreases tumour growth in mice by promoting non-productive angiogenesis, targeting Dll4 could provide a new way to treat cancer.

Jane Bradbury