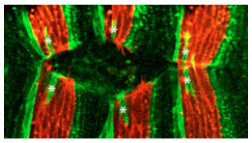
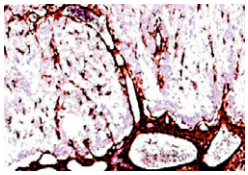


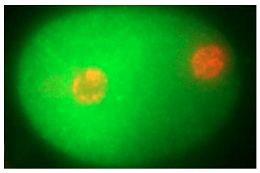
Dorsal closure in the red

The fusion of epithelial sheets – which is vital in development and wound healing – is commonly studied during dorsal closure (DC), when two epithelial sheets sweep over the fly embryo's surface and fuse at the dorsal midline. During DC, each cell must identify and fuse with its matching cell in the opposing sheet to maintain early AP embryonic patterning. On p. 621, Millard and Martin investigate this process by fluorescently labelling in *Drosophila* embryos two epithelial populations: P compartment cells with RFP-Moesin and A compartment cells with GFP-Moesin, expressed under the *engrailed* (*en*) promoter and a *patched* (*ptc*) upstream sequence, respectively. The striped expression patterns of RFP- and GFP-Moesin, the authors report, are maintained throughout DC, leading to perfectly matched red and green stripes, with interactions occurring only between colour-matched filopodia. During both DC and wound repair, filopodia enable cells to find their match and to pull misaligned sheets into alignment. Thus, matching is not limited to leading edge cells, but is likely to involve the adhesion molecules that underpin compartment integrity.



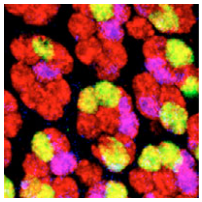
Delivering an angiogenic role for netrin

The netrins are well-known neural guidance cues that can also direct blood vessel growth. But the exact role of netrin 1 signalling in angiogenesis has been under debate, with it being reported to have both anti-angiogenic and angiogenic effects. To help resolve this issue, Dean Li's lab has now conditionally inactivated the netrin receptor gene *Unc5b* specifically in the embryonic endothelium of mice (see p. 659). The only detectable vascular abnormality in *Unc5b* mutant embryos, they report, is a reduced number of placental labyrinthine arterioles, which leads to increased placental resistance and to a fatal reversal of flow in the umbilical artery. This phenotype cannot be rescued by wild-type trophectoderm (from which extra-embryonic placental tissues derive), showing that UNC5B-mediated signalling is a specific component of fetal placental angiogenesis. The knockdown of *Unc5b* in zebrafish revealed a similarly pro-angiogenic role, causing the specific loss of the parachordal blood vessel. From their results, the authors suggest that UNC5B/netrin signalling could be implicated in clinical uteroplacental insufficiency.



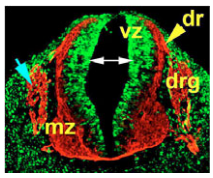
Polo kinase: a polarity player

Polo kinases regulate diverse processes during cell division, including mitotic onset and centrosomal duplication. Rueyling Lin's lab now reports a novel role for the polo kinases PLK-1 and PLK-2 in regulating the polarity of *C. elegans* embryos (see p. 687). In the one-cell *C. elegans* embryo, various proteins, including the PAR proteins and the maternal proteins MEX-5 and MEX-6, asymmetrically localize along the AP axis, determining the position of the first mitotic spindle and thus of the first asymmetric division. PLK-1 and PLK-2, Lin's team report, also asymmetrically localize at this stage, in a MEX-5/6-dependent manner, with which they also co-localize. PLK-1/2 interact with MEX-5/6 via the PLK-1/2 polo box domain and also via an amino acid site (T_{186}) on MEX-5, which is primed for PLK-dependent phosphorylation by another developmentally regulated kinase, MBK-2. This priming by MBK-2, the authors report, allows the interaction between PLK-1/2 and MEX-5/6, and also the onset of MEX-5/6 function, to be temporally regulated during the crucial oocyte to embryo transition.



Stochastic fates tipped by Notch

Although many cell fates are determined by extracellular signals, some fates occur stochastically, potentially to help generate cell-type diversity. Notch (N) signalling, previously implicated in stochastic fate choices, is now shown by Miller et al. to act, somewhat uniquely, by exposing a hidden stochastic fate choice in a photoreceptor cell, which it then tips towards a particular fate (see p. 707). The ommatidia of the *Drosophila* eye each contain eight photoreceptor cells, R1-R8. During development, R1/R6/R7 precursors become R1/R6's unless N is activated in them to specify them as R7. N is believed to promote R7 fate by repressing the orphan nuclear hormone receptor Svp. But Miller et al. report that *svp* mutant R1/R6 precursors adopt – stochastically and with equal likelihood – either an R7 or R8 fate, and express both an R7 and R8 marker (later expressing only one). The authors conclude that mutual negative feedback between the R7/R8 programs results in the stochastic adoption of either fate, but that, in parallel, N represses the R8 marker *sens* to promote the R7 fate.



Neurogenesis gets the cux

During neurogenesis, progenitor proliferation must be carefully balanced with neuronal differentiation to ensure that the right number of progenitors gives rise to the correct neuronal cell types. This complex process requires that cell-cycle exit is integrated with programs of differentiation and is under intensive investigation. On p. 729, Paul Trainor and colleagues provide new insights into these events with their finding that the transcription factor Cux2 regulates cell-cycle progression and also neuroblast formation and cell-fate determination in the mouse spinal cord. Through gain- and loss-of-function approaches, they show that Cux2 initially influences cell-cycle progression in neural progenitors (its loss causes reduced progenitor numbers). It then regulates cell-cycle exit and neuroblast formation and differentiation by binding directly to the promoters of $p27^{Kip1}$ (a G1 cyclin inhibitor) and Neurod (a bHLH protein that promotes neuronal differentiation, partly by activating $p27^{Kip1}$). The future identification of other Cux2-interacting partners should reveal further insights into how Cux2 regulates key aspects of spinal cord neurogenesis.

IN JOURNAL OF CELL SCIENCE

Polarized growth with IQGAP1

During migration, exocytic vesicles fuse with the cell's leading edge to enable directional growth. This polarized secretion is likely to be promoted by the exocyst complex – which tethers vesicles to the plasma membrane – and by septin proteins that associate with the exocyst. However, little is known about how the process is regulated. Now Rittmeyer et al. propose that the actin-modulating protein IQGAP1 activates polarized secretion. They show that the N-terminal region of IQGAP1 binds the exocyst-septin complex directly in pancreatic β-cells. This interaction is disrupted by expression of the GTPase CDC42, which binds the C-terminal region of IQGAP1 and also inhibits IQGAP1-mediated insulin secretion. The authors propose, therefore, that IQGAP1 regulates exocytosis by switching between two conformations: CDC42 bound (secretion off) and exocyst bound (secretion on), indicating, with other results, that IQGAP1 is a major regulator of cell migration and growth.

Rittmeyer, E. N. et al. (2008). A dual role for IQGAP1 in regulating exocytosis. J. Cell Sci. 121, 391-403.