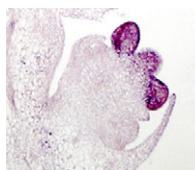


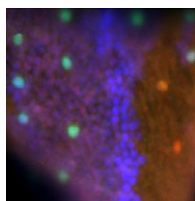
### Neurogenesis from sisters

During vertebrate spinal cord development, specific neuronal subtypes develop from distinct domains of neural progenitor cells. The p2 progenitor domain in the zebrafish ventral spinal cord, for example, produces V2a and V2b interneurons. But are these V2 neurons generated by cell divisions that produce progenitor cells and neurons or by asymmetric cell divisions of 'pair-producing' progenitors? On p. 3001, Kimura and co-workers report that these interneurons form by the latter process via Delta-Notch signalling between sister neurons. Using time-lapse microscopy of a transgenic zebrafish line in which GFP expression begins in the p2 progenitor cells just before their final cell divisions and using neuron-specific markers, the researchers show that virtually all the GFP-labelled progenitors divide once to produce V2a/V2b neuron pairs. However, both paired cells adopt the V2b fate following forced activation of Notch signalling. This mechanism for cell fate determination resembles that seen during *Drosophila* neurogenesis but, the researchers note, unlike in *Drosophila*, the orientation of the division axis in the final asymmetric division in vertebrate neurogenesis is not fixed.



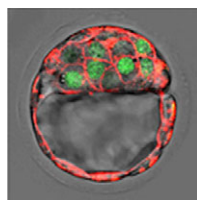
### A-maize-ing meristem regulation

The activity of plant meristems, which form new tissues and organs throughout a plant's life, determines the architecture of different plants. On p. 3013, George Chuck and colleagues reveal how the *APETALA2* (*AP2*)-like genes *indeterminate spikelet1* (*ids1*) and *sister of indeterminate spikelet1* (*sid1*) determine inflorescence (the structure that displays a plant's flowers) architecture in maize. Grass flowers are organised on small branches called spikelets. In maize, the spikelet meristem is determinate – it initiates the formation of one floral meristem and then converts into a second floral meristem. *ids1* controls the timing of this conversion. The authors show that *ids1* functions with *sid1* to control inflorescence meristem branching, floral meristem initiation and spikelet meristem determinacy. *ids1* and *sid1*, they also report, are major targets of the *tasselseed4* microRNA. Furthermore, *ids1* and *sid1*, like *Arabidopsis* *AP2*, repress the expression of *AGAMOUS*-like transcription factors. However, *AP2* mutants in *Arabidopsis* still make flowers, whereas *ids1/sid1* mutants do not, revealing that *AP2* genes have probably adopted different meristem functions during plant evolution.



### Proneural proteins keep mitotic time

Cell specification and division are precisely coordinated during neurogenesis but what controls the timing of mitotic entry? The answer for the neural precursors of the *Drosophila* external sensory organs, report Chang and colleagues, is the negative-feedback regulation of proneural proteins, a process that involves their degradation by the Phyl/Sina E3 ubiquitin ligase complex (see p. 3021). In *Drosophila*, the sensory organ precursors (SOPs) undergo asymmetric cell divisions after being specified by the proneural transcription factors Achaete (*Ac*) and Scute (*Sc*). The timing of the G2–M transition in SOP divisions controls daughter cell fate specification. In *phyl* mutants, the researchers report, *Ac* and *Sc* accumulation delays or blocks SOP division at the G2–M transition; *ac* and *sc* gene dose reduction rescues this defect. Other results indicate that the adaptor Phyl links the proneural proteins to the RING protein Sina. Because *phyl* is a transcriptional target of *Ac* and *Sc*, the researchers propose that, by initiating their own degradation, these proneural proteins control the timing of neural precursor division.



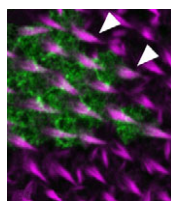
### Primitive endoderm finds its place

One of the first lineages to differentiate during mammalian development is the extra-embryonic primitive endoderm (PrE). Its specification was originally thought to occur in response to positional signals, but a recent model suggests that PrE precursors develop randomly within the inner cell mass before segregating from the pluripotent epiblast (EPI). Now, Plusa and colleagues propose a multi-step process for PrE formation in mouse embryos that includes features of both models (see p. 3081). In their study, which is the first to use live imaging to investigate PrE formation, the researchers express a marker gene under the control of regulatory elements of *Pdgfra* – a novel PrE marker – and analyse lineage-specific markers. Their results suggest that lineage-specific markers are initially expressed in a random, overlapping manner. Then, a gradual progression towards the mutually exclusive expression of PrE and EPI precursors occurs that is partly aided by positional signals, before cell sorting, which involves selective apoptosis and other cell behaviours, completes PrE formation.



### Regenerative Fgfs combat fin wear and tear

Unlike mammals, adult bony fish and some amphibians can regenerate amputated limbs. This 'facultative' regeneration involves the Fgf-dependent formation and maintenance of a blastema, a mass of undifferentiated, proliferative mesenchymal cells. Now, on p. 3063, Wills and co-workers reveal that the developmental machinery that regenerates amputated fins in zebrafish is also involved in homeostatic regeneration, the regular replacement of cells lost through daily wear and tear. They show that transgenic inhibition of Fgf receptors in uninjured zebrafish causes severe fin atrophy within 2 months. Furthermore, markers of blastema-based regeneration are expressed at low levels at the tips of uninjured fins, and mutations in other factors that are crucial for the regeneration of amputated limbs (for example, the kinase *Mps1* and the ligand *Fgf20a*) cause the rapid, progressive loss of fin structures in uninjured fish. The researchers speculate, therefore, that the high facultative regenerative capacity of some organisms may be an evolutionary consequence of a crucial role for homeostatic regeneration in their tissues.



### Cue planar polarisation

Core planar cell polarity (PCP) proteins localised to opposite cell edges co-ordinate epithelial cell planar polarisation during development. Now, on p. 3103, Strutt and Warrington report that PCP proteins control the site of hair production in developing *Drosophila* wings by regulating the localisation of the novel formin homology 3 domain protein Multiple Wing Hairs (*Mwh*). Each cell in the *Drosophila* wing blade has a single, distal hair that develops from an actin-rich prehair. In the absence of *Mwh*, the researchers report, actin bundles 'sprout' across the entire apical surface of the wing cells rather than at the distal edge only, a result which suggests that *Mwh* represses actin filament formation. They also show that the proximally localised PCP protein *Strabismus* acts via the effector proteins *Inturned*, *Fuzzy* and *Fritz* to stabilise *Mwh* in the proximal region of the wing cells, and that the distally localised PCP protein *Frizzled* promotes prehair initiation. Together, these results suggest that both proximal and distal cues control prehair placement in *Drosophila* wings.

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