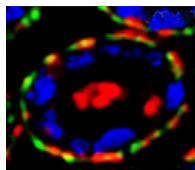


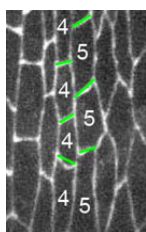
Wnt and neuronal activity signal for dendrite refinements

Neuronal dendrites in the central nervous system undergo cycles of growth and shrinkage (refinement) during development to establish functional neuronal networks, but what regulates these essential reorganisations? For a central serotonergic neuron (CSDn) in *Drosophila*, suggest K. VijayRaghavan and colleagues, the answer to this question is neuronal activity and Wnt signalling (see p. 1351). The dendrites of the CSDn grow extensively in the antennal lobe during early pupal development but then shrink to form the final adult structure. The researchers show that the arrival of sensory neurons at the antennal lobe correlates with the initiation of CSDn dendritic refinement and that sensory input, possibly acting through NMDA-type receptors (glutamate receptors that control synaptic plasticity), is necessary for dendritic refinement. Furthermore, Wnt activity is increased in response to sensory inputs, and increased Wnt signalling stimulates dendritic refinement. Thus, the researchers suggest, neuronal activity and Wnt signalling interact to refine the dendritic pattern of the CSDn to its ultimate functional state.



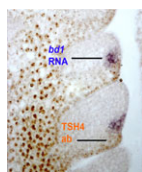
P granules: border police for mRNA export

Germline-specific granules are found in many organisms but their function is poorly understood. Now, Ujwal Sheth, James Priess and co-workers report that *C. elegans* germline-specific granules (P granules) are principal sites of mRNA nuclear export in adult germ cells (see p. 1305). Although P granules are cytoplasmic in oocytes and early embryos, throughout most of the *C. elegans* life cycle they are perinuclear and associate with nuclear pore complexes (NPCs). The researchers show that cytoplasmic and perinuclear P granules have different structures and stabilities. Using immunocytochemistry, they demonstrate that mRNA export factors are highly enriched at P granule-associated NPCs. Other experiments indicate that nascent mRNA traffics directly to the P granules and that perinuclear P granules contain many components with clustered phenylalanine-glycine repeats – motifs that are involved in transport through the NPC. The researchers suggest, therefore, that perinuclear P granules are compartments where newly exported mRNAs are transiently 'held' to ensure that they bind appropriate regulatory molecules before being released into the general cytoplasm.



Polarity proteins help epithelial cells line up

Epithelial cells prefer to pack in a two-dimensional polygonal array that minimizes energy expenditure. However, because the arrangements of cells within tissues are intimately tied to tissue function, epithelial cell rearrangements occur frequently during development. Now, on p. 1385, Robert Simone and Stephen DiNardo begin to unravel how subsets of cells in the ventral epidermis of the *Drosophila* embryo realign into parallel columns that produce denticles, ridge-like projections in the cuticle. Using live imaging, the researchers show that column formation by these subsets of cells involves the alignment of their anteroposterior boundaries, shrinkage of certain cell interfaces, and the conversion of three-cell to four-cell junctions. In addition, they report that non-muscle Myosin II and the polarity proteins Discs large and Bazooka (Par3) exhibit a complex localisation pattern along the cell interfaces and that Myosin II or Discs large depletion disrupts junctional conversion and cell alignment. Together, these results suggest that actomyosin contractility and polarity protein function help to drive fine-scale epithelial cell rearrangements.



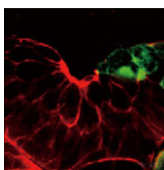
Leaf or meristem: *tsh4* sets the boundaries

Plants are built from repeating units called phytomers, each containing a leaf, a lateral (axillary) meristem (which can produce a flower or branch), and an internode (the stem between adjacent leaves). Boundaries within the phytomer separate these three components but what establishes these boundaries? On p. 1243, George Chuck and co-workers propose that *tasselsheath4* (*tsh4*), a microRNA-targeted SBP-box transcription factor, establishes the boundaries within the maize inflorescence (tassels and ears). They report that *tsh4* mutants have fewer lateral meristems than normal and that ectopic leaves replace these missing meristems. Other genetic experiments indicate that *tsh4* is required for branch meristem initiation and maintenance. Interestingly, however, TSH4 protein is localised adjacent to the lateral meristems rather than within them. Finally, double-labelling experiments suggest that the meristem-specific pattern of miR156, a microRNA that regulates *tsh4*, is complementary to that of TSH4. Together, these results suggest that *tsh4* downregulation by microRNAs plays a major role in defining organ boundaries within phytomers.



Gastrulation movements at a Snai1's pace

During gastrulation, evolutionarily conserved movements form the germ layers and shape the vertebrate body plan. Previous studies have shown that prostaglandin signalling is required for these gastrulation movements. Now, on p. 1327, Lilianna Solnica-Krezel and colleagues reveal that prostaglandin signalling stimulates gastrulation movements in zebrafish embryos by regulating cell adhesion. Prostaglandin E₂ (PGE₂), which signals through GPCRs, is synthesized by cyclooxygenase and prostaglandin synthase. By downregulating these enzymes, the researchers show that strongly reducing PGE₂ synthesis impairs all the gastrulation movements in zebrafish embryos in part by increasing cell-cell adhesion. PGE₂ signalling normally limits cell adhesion and promotes cell protrusive activity during gastrulation, they report, by modulating *E-cadherin* transcription, partly through the stabilisation of Snai1a, a transcriptional repressor. Together, these results suggest that ubiquitously expressed PGE₂ synthesizing enzymes promote Snai1a stability to allow the precise regulation of cell adhesion that is required for gastrulation movements. In addition, these results provide new clues about how PGs promote cancer cell invasiveness.



Nectin and N-cadherin connect to constrict

Neural tube formation, an important step in vertebrate development, begins with the apical constriction of neuroepithelial cells. This cell shape change requires the apical accumulation of F-actin, which occurs via a little-known process. Naoto Ueno and co-workers now shed light on this event with their discovery that the cell adhesion protein nectin-2 is required for apical constriction during neural tube formation in *Xenopus* by associating with N-cadherin to facilitate actin accumulation (see p. 1315). Using RNA interference and overexpression experiments, the authors show that nectin-2 is required for F-actin accumulation and apical constriction during neurulation. This activity, however, does not require the afadin-binding domain of nectin-2, with which it binds to actin. Instead, nectin-2 binds to N-cadherin through its extracellular domain. From their findings, the researchers propose a novel mechanism of neural tube morphogenesis, in which nectin-2 directs N-cadherin to the apical membrane to recruit F-actin, possibly through β -catenin, leading to apical constriction and neural tube closure.