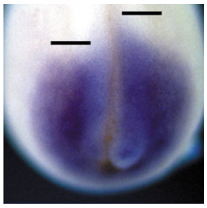
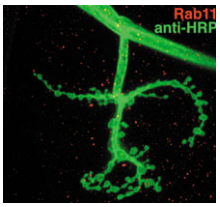


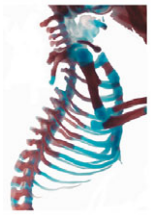
Shisa2: red light to morphogen receptor traffic

Somites form transiently in the presomitic mesoderm (PSM) and organize the segmental pattern of vertebrate embryos. FGF and Wnt gradients that decrease caudorostrally control the maturation of the PSM, and also the position in the embryo where the transition to segmental units occurs (the 'differentiation wavefront'). But what regulates these gradients? On p. 4643, Nagano and co-workers reveal that *Shisa2*, a member of the novel Shisa gene family, regulates FGF and Wnt signals during somitogenesis in *Xenopus*. The researchers show that Shisa2, like its relative Shisa1, encodes an endoplasmic reticulum protein that inhibits signalling by Wnt and FGF by preventing the maturation and cell-surface expression of their receptors. Knockdown of Shisa2, they report, delays PSM maturation and shifts the differentiation wavefront anteriorly, thus reducing somite numbers. This phenotype can only be rescued by inhibiting both Wnt and FGF signals. Thus, the researchers conclude, Shisa2 plays an essential role in establishing the segmental pattern in *Xenopus* embryos by individually inhibiting both these signals.



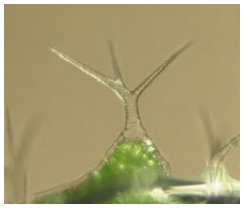
Rab11 goes to (the) BEACH

Vesicle trafficking is essential for many developmental events in *Drosophila*, such as eye and bristle development and synaptic morphogenesis. On p. 4655, Khodosh and colleagues provide new information about the developmental regulation of this process by reporting that the *Drosophila* BEACH protein Blue cheese (Bchs) antagonizes Rab11, a small GTPase that is involved in vesicle trafficking. BEACH proteins (large proteins that contain a 'Beige and Chédiak-Higashi domain') have been implicated in membrane trafficking, but how they regulate this process is a mystery. The researchers show that reductions in *bchs* function suppress the effects of loss-of-function *rab11* mutations in bristle and eye development; they also suppress the changes in synapse morphology at the neuromuscular junction (NMJ) that are caused by reductions in *rab11* function. Consistent with this last effect, Bchs colocalizes with Rab11 at the NMJ in vesicles. The researchers conclude that Bchs antagonizes Rab11 during development and suggest that interactions between other BEACH proteins and small GTPases could also regulate vesicle trafficking during development.



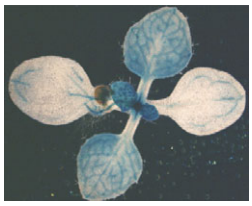
Skeletons reveal that chondrocyte differentiation needs BMPs

Bone morphogenetic protein (BMP) signalling is an essential regulator of chondrogenesis. But although in vitro studies have shown that BMPs promote proliferation in cartilage growth plates, whether they inhibit or stimulate chondrocyte differentiation has remained unclear. Now, Karen Lyons and colleagues report that antagonistic BMP and FGF signalling controls the progression of chondrocytes through the growth plate in vivo (see p. 4667). The researchers characterized the skeletal phenotypes of *Bmpr1a*^{CKO} mice (which lack BMP receptor type IA in chondrocytes) and double *Bmpr1a*^{CKO}; *Bmpr1b*$^{+/-}$ mice (which also lack one BMP receptor type IB gene in their chondrocytes). From these studies, the authors discovered that BMP signalling is essential for multiple aspects of chondrogenesis, including proliferation and the completion of differentiation, and that it both promotes the expression of Indian hedgehog (which co-ordinates chondrocyte proliferation and differentiation) and inhibits FGF signalling (which negatively regulates these processes). Together, these results greatly clarify the complex role that BMP signalling plays in chondrogenesis in vivo.



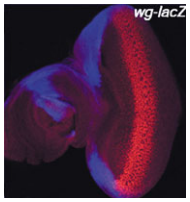
ESCRT pathway to plant cytokinesis

Proteasomal degradation of poly-ubiquitylated proteins plays a crucial role in controlling the cell cycle during development, thus ensuring that adult tissues contain the right number of cells. Recently, an alternative pathway for cell-cycle control, in which mono-ubiquitylated proteins are sorted into lysosomes in animal cells or vacuoles in yeast cells for degradation, was identified. Now, on p. 4679, Spitzer and colleagues report that this pathway is involved in the development of trichomes – hair-like bristles – in *Arabidopsis*. Wild-type trichomes are single polyploid cells with three to four branches. The researchers report that the oddly shaped trichomes seen in *Arabidopsis elc* mutants have multiple nuclei. This indicates that ELC – the *Arabidopsis* homolog of yeast Vps23, a component of the endosomal sorting complex required for transport (ESCRT) – is involved in cytokinesis. Other genetic and biochemical data suggest that ELC regulates cytokinesis through a mono-ubiquitin-dependent protein-sorting pathway, possibly by regulating the microtubule cytoskeleton, thus providing the first evidence that the ESCRT pathway operates in plants.



Targeted chromatin modification flowers

Reproductive success in plants requires careful timing of the developmental transition from leaf to flower production. In *Arabidopsis*, a central regulator of this transition is the floral inhibitor *FLOWERING LOCUS C* (*FLC*). FLC is positively regulated by the *FRIGIDA* (*FRI*) pathway, and is negatively regulated by the autonomous floral-promotion pathway and by vernalization (a period of cold that triggers flowering). Sang Yeol Kim and Scott Michaels now report that *SUPPRESSOR OF FRI 4* (*SUF4*), a zinc-finger-containing transcription factor, is required for delayed flowering in winter-annual *Arabidopsis* – spring-flowering plants that germinate in the autumn (see p. 4699). The authors show that *SUF4* is required for the upregulation of *FLC* expression (but not that of nearby genes) by *FRI*. In *suf4* mutants, they report, histone H3 lysine 4 trimethylation at *FLC* is reduced, which suppresses *FLC* expression through modification of its chromatin structure. Thus, the authors propose, SUF4 is a new factor that specifically recruits chromatin-modifying complexes to the *FLC* locus to control flower development.



Insight into JAK/STAT–Wg connections

During development, uniform populations of cells acquire regional differences to form domains that give rise to distinct organs. *Drosophila* imaginal discs are good systems in which to study the signalling molecules that control this process. On p. 4721, Ekas and co-workers reveal that an unsuspected interaction between JAK/STAT and Wingless (Wg) signalling promotes regional specification in the eye imaginal disc. Wg signalling defines which part of this disc forms head tissue, whereas activation of the *Drosophila* STAT transcription factor Stat92E by the JAK tyrosine kinase Hopscotch is thought to promote disc growth but not patterning. Now, though, the researchers show that tissue lacking *stat92E* is transformed from retinal tissue into head cuticle (a phenotype also caused by ectopic *wg* signalling) and that *wg* expression is repressed in cells expressing hyperactivated Stat92E. They conclude that repression of *wg* expression by the JAK/STAT pathway promotes specification in the *Drosophila* eye imaginal disc and speculate that a similar interaction might control mammalian eye development.

Jane Bradbury