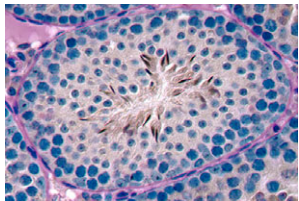


Mesoderm spreads HOW?

During gastrulation in *Drosophila* embryos, mesoderm cells invaginate and then spread evenly over the ectoderm. Even spreading is essential for the patterning of the mesoderm by ectodermal signals but is defective in embryos mutant for the RNA-binding protein Held out wings (HOW). Now, on p. 3473, Toledano-Katchalski and co-workers report that HOW regulates mesoderm spreading in a novel manner – by downregulating several mRNA species. The researchers used microarray screening to identify four mRNAs with increased mesodermal expression in *how* mutant embryos early in development – a time when only the HOW(L) isoform (a post-transcriptional repressor) is expressed. All four mRNAs bind specifically to HOW via their 3'UTRs, an interaction that leads to mRNA degradation. Overexpression of one of the mRNAs – *miple*, the *Drosophila* homolog of midkine and pleiotrophin (vertebrate proteins involved in cell migration) – causes mesoderm spreading defects and scattered activation of MAPK in mesodermal cells. Many tissues express HOW(L) and its vertebrate homolog quaking (QKI) early in development, so repression of specific RNAs might be an important developmental control mechanism.



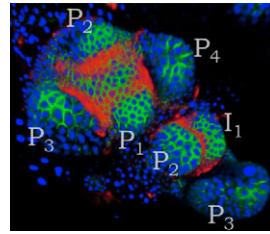
BETs on for spermatogenesis

The conserved bromodomain motif binds to acetylated lysines in histones, but although some bromodomain-containing proteins are implicated in chromatin remodelling, the *in vivo* roles of most are poorly understood. Now, on p. 3507, Shang and colleagues report that Brdt, a testis-specific member of the BET subfamily of double-bromodomain-containing proteins, is essential for male germ cell differentiation. The researchers report that mice homozygous for a mutant allele of *Brdt* that lacks the first bromodomain (*Brdt*^{ΔBD1}) are viable but the males are infertile. The morphologically abnormal sperm that these animals make lack the foci of heterochromatin at the perinuclear envelope seen in elongating wild-type spermatids. Furthermore, the researchers report, there is increased expression of testis-specific histone *H1t* in *Brdt*^{ΔBD1/ΔBD1} testes, and Brdt protein (but not *Brdt*^{ΔBD1} protein) associates with the *H1t* promoter. These results suggest that Brdt is involved in the chromatin condensation that occurs during the late stages of spermatogenesis – interestingly, some infertile but otherwise healthy men have mutations in the human *BRDT* gene.



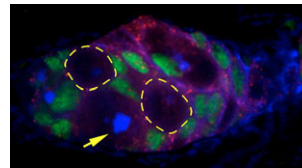
Neural patterning grid unlocked

The ascidian embryo, with its relative morphological simplicity, is an excellent system in which to study cell fate specification. The *Ciona* neural plate, for example, contains six rows and eight columns of aligned cells, each with a unique molecular signature. Hudson and colleagues now report that sequential and combinatorial inputs from Nodal, Delta2/Notch and FGF/MEK/ERK signalling pathways establish this grid-like organization of distinct cell identities (see p. 3527). To study cell fate specification in the posterior-most two rows of the neural plate, the researchers used a combination of morpholino-based gene knockdown, dominant-negative genes and pharmacological inhibitors. They show that Nodal signalling first defines the medial and lateral neural plate domains. Delta2 signalling then subdivides each of these domains to generate four columns of cells. Finally, FGF/MEK/ERK signalling along the anteroposterior axis promotes row I fates and represses row II fates. Future studies, suggest the researchers, have the potential to uncover the gene regulatory networks that control the fate of each and every neural plate cell.



Root to shoot: de novo meristem assembly

Many plants can make an entire new body from a fragment of adult tissue. Cultured root explants of *Arabidopsis*, for example, can produce new shoot meristems, the source of the plant's above-ground organs, when supplied with the hormones auxin and cytokinin in the correct ratio. But how do these hormones control meristem self-organization within regenerating tissue? Gordon and co-workers have used live imaging of fluorescent versions of proteins involved in embryonic meristem patterning and also of reporters for hormone responses to investigate this question (see p. 3539). Their analysis suggests that shoot meristem progenitor cells are induced within specific hormone-response domains in the explant to form a cell mass that is then patterned to form a new shoot meristem. Furthermore, the homeodomain transcription factor WUSCHEL is required for specific steps during this process, as it is during embryonic meristem initiation. The researchers propose, therefore, that de novo meristem induction represents an accessible system in which to study hormone-induced patterning in *Arabidopsis*.



Rabs traffic polarity signals to oocyte

Rab GTPases are regulators of membrane trafficking that play many important developmental roles. In this issue of *Development*, two papers describe their involvement in *Drosophila* oogenesis. In the first paper, Bogard and colleagues report that Rab11 maintains the balance between self-renewal and differentiation of the germline stem cells (GSCs) of the *Drosophila* ovary (see p. 3413). Two or three GSCs lie at the anterior of the germarium and are attached by adherens junctions to niche cap cells, which secrete short-range signals that maintain GSC identity. When a GSC divides, one daughter remains attached to the niche cap cells but the other (the cystoblast) is displaced and consequently differentiates, eventually producing a polarized oocyte and 15 nurse cells. Rab11, Bogard and colleagues report, is strongly expressed in GSCs and cystoblasts in discrete dots. These Rab11-positive recycling endosomes are tightly associated with the fusome, a spectrin-rich structure that controls the axis of GSC division by anchoring the mitotic spindle to the anterior cortex of the GSC. The recycling endosomes also contain the adherens junction component E-cadherin, report the researchers. In clonal inactivation experiments, Bogard et al. show that *rab11*-null GSCs detach from the niche cap cells, contain displaced fusomes and undergo abnormal cell division, all of which leads to GSC loss and early arrest of GSC differentiation. Furthermore, E-cadherin accumulates in reduced amounts on the surface of *rab11*-null GSCs. The researchers propose, therefore, that Rab11 maintains GSC identity through polarized trafficking of E-cadherin during early oogenesis in *Drosophila*. In the second paper, Januschke and colleagues reveal that Rab6-mediated protein secretion helps to establish oocyte polarity later during oogenesis (see p. 3419). The researchers show that Rab6 localizes to Golgi and Golgi-derived membranes and interacts with Bicaudal D, a protein involved in oocyte axis determination. Additional experiments indicate that Rab6 function is also required for other aspects of oocyte polarity determination, such as the correct localization of *oskar* mRNA and of microtubule plus-ends at the posterior of the egg. Together, these two papers establish the importance of Rab-mediated membrane trafficking during oogenesis.



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