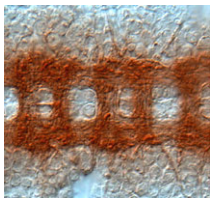
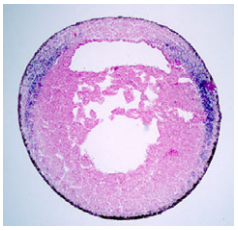
Polarity bowled over by Skittles

During the establishment of cell polarity, a central feature of development, mRNAs and proteins are localized to restricted cellular domains through asymmetric transport along a polarized microtubule cytoskeleton. Interactions between this cytoskeleton and the plasma membrane establish polarized transport, but what regulates these interactions? On p. 3829, Gervais and colleagues identify Skittles (a phosphatidylinositol 4-phosphate 5-kinase) as a regulator of these interactions in *Drosophila* oocytes by showing that Skittles sustains the organization of the microtubule cytoskeleton that asymmetrically localizes several axis-determining mRNAs and thus helps to establish cell polarity. They report that Skittles activity controls phosphatidylinositol 4,5 bisphosphate (PIP2) levels in the oocyte's plasma membrane and that PIP2 synthesis is required to activate Moesin, an adaptor protein that links the plasma membrane to the actin-based cytoskeleton. Furthermore, Skittles activity is needed for the cortical recruitment of several PAR polarity proteins. Thus, by controlling PIP2 synthesis, Skittles may regulate the interactions between the plasma membrane, PAR proteins and the cytoskeleton that are essential for cell polarization.



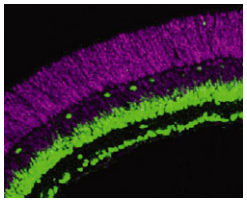
Crossing the midline: what a Dscam!

During central nervous system (CNS) development, attractive and repulsive signals guide growing axons to their targets, with many axons having to cross the CNS midline to establish proper connections. Proteins of the Netrin family provide an attractive signal to neurons at the midline, which is relayed by Frazzled/DCC receptors. Now, Thomas Kidd and colleagues report that the Down syndrome cell adhesion molecule (Dscam), previously described as functioning in neurite repulsion and implicated in the neurological aspects of Down syndrome, also guides axons in response to Netrin (see p. 3839). The authors show that *Netrin* and *Dscam* mutant *Drosophila* larvae have similar axon guidance defects in their photoreceptor organs, and that Dscam and Netrin physically interact in vitro. By using knockout and overexpression approaches, they demonstrate that Dscam promotes axon midline crossing and acts in parallel to Frazzled/DCC, probably by responding to ligands other than Netrin. From their findings, the authors propose that Dscam transduces several different axonal guidance cues, most likely by associating with co-receptors.



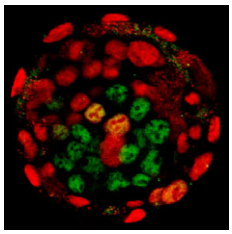
How FGF Wnts the neural crest over

The neural crest (NC) is a population of migratory cells that originates at the edge of the neural plate and differentiates into many cell types, including neurons and pigment cells. NC induction in *Xenopus* depends on signalling through the canonical Wnt and FGF signalling pathways – but do these two pathways interact during NC induction or function independently? On p. 3903, Jean-Pierre Saint-Jeannet and co-workers report that Fgf8a induces the NC indirectly by activating Wnt8. The researchers show that NC induction by Fgf8a requires active canonical Wnt signalling, whereas Wnt8 can induce NC independently of Fgf8a. Moreover, they demonstrate that Fgf8a is a potent inducer of Wnt8 in both explant culture and whole embryos, and is required for the expression of Wnt8 adjacent to the NC-forming region. These findings solve the riddle of the link between Wnt and FGF signalling by showing that they are part of the same NC induction cascade and that their interaction is required for proper NC specification.



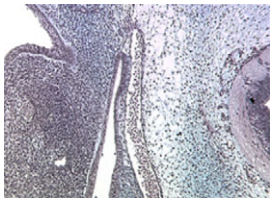
Eyes on alternative splicing in development

An important form of transcriptional gene regulation is alternative splicing (AS), the generation of several proteins from one gene. However, the identity of the RNA-binding proteins that control AS during development remains largely unknown. Now, Constance Cepko and co-workers reveal a temporal requirement for the AS factor Sfrs1, an arginine/serine-rich (SR) protein family member, in the survival of mouse retinal neurons (see p. 3923). They show that *Sfrs1* is expressed in the developing mouse retina and is itself regulated by AS. The loss of *Sfrs1* function during embryonic development, they report, causes the formation of small retinas that degenerate further after birth. Other experiments show that in the absence of *Sfrs1,* early-born retinal neurons are produced and begin differentiation, but then die through apoptosis; by contrast, late-born retinal neurons survive. The authors propose, therefore, that embryonically generated retinal neurons require *Sfrs1*-mediated alternative splicing for their terminal differentiation and/or maintenance, but postnatally generated neurons do not, thus highlighting a dynamic role for AS during development.



News germinal to better reprogramming

More than 12 years since the first animal was cloned from an adult somatic cell, many somatic cell nuclei still have to be transferred into enucleated meiosis II (MII) oocytes to produce even one offspring. In part, this is because the best way to remove the acetyl and methyl groups added to the chromatin of somatic cells during development, and thus return them to a pluripotent state, is unknown. On p. 3935, however, Bui and colleagues claim that 'genomic reprogramming' factors in the cytoplasm of mouse oocytes at the germinal vesicle (GV) stage of maturation could improve cloning efficiency. The researchers show that GV oocyte cytoplasm (but not MII oocyte cytoplasm) completely demethylates histone H3 at lysine 9 in somatic nuclei. Furthermore, exposing somatic nuclei to cytoplasmic lysates of GV oocytes before their microinjection into MII oocytes promotes the production of cloned offspring. The as yet unidentified genomic reprogramming factors in GV oocyte cytoplasm may, therefore, have the potential to improve the efficiency of reproductive cloning.



Neural crest makes a face

The face and jaws are distinctive characteristics of humans and animals, and are evolutionary innovations for vertebrates. The cartilages and bones of the face and jaws are generated from cranial neural crest mesenchyme (NCM), which arises from the dorsal neural tube, but what remains unclear is how these skeletal elements acquire their species-specific differences in size and shape. Now, Eames and Schneider demonstrate, by transplanting neural crest cells from quails into ducks, that the NCM controls both the size and shape of cartilage (see p. 3947). By exploiting the marked differences in maturation rate and jaw anatomy between these two birds, the authors show that quail NCM, when transplanted into ducks, imparts species- and stage-specific information about the rate and time of cartilage formation. The NCM does so by regulating FGF signalling and downstream target expression. Thus, these findings reveal an autonomous function for the NCM in generating cartilage size and shape, and highlight the importance of developmental programs in the process of morphological evolution.