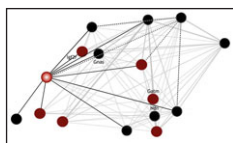
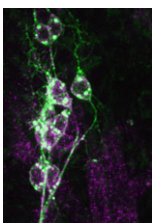


New cues for neurite growth and patterning

The molecules and mechanisms that govern the growth and patterning of neurites (neural processes such as axons or dendrites) are poorly understood. However, two papers in this issue provide important new insights into the control of these essential aspects of nervous system development.

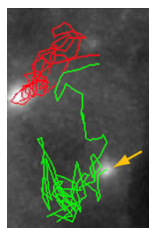
On p. 3405, Alun Davies and colleagues report that the promotion of neurite growth from mouse sensory neurons by brain-derived neurotrophic factor (BDNF) involves an abrupt developmental switch in how nuclear factor kappa-B (NF- κ B) signalling (which promotes neurite growth) is activated. Before birth, the researchers report, BDNF activates the transcription factor NF- κ B by an atypical mechanism that involves tyrosine phosphorylation of the inhibitor I κ B α by Src family kinases and its subsequent dissociation from NF- κ B. At this developmental time, BDNF also dephosphorylates the p65 subunit of NF- κ B at serine 536; activated NF- κ B that is phosphorylated at Ser536 inhibits rather than promotes neurite growth. Immediately after birth, however, BDNF-promoted neurite growth involves BDNF-independent constitutive activation of NF- κ B signalling through serine phosphorylation of I κ B α and constitutive dephosphorylation of p65. These results, the researchers suggest, reveal that a single signalling network can be activated in different ways to generate identical cellular responses to the same extracellular signal during neural development.

On p. 3475, Donald van Meyel and colleagues report that Turtle (Tut1), a conserved immunoglobulin superfamily protein, controls dendrite branching and dendrite self-avoidance in developing *Drosophila* sensory neurons. These neurons form dendritic trees with cell-type-specific patterns of arborisation in which dendrite branches from the same neuron avoid each other. Recognition molecules on the surfaces of dendrites influence arborisation patterns by promoting attractive, repulsive or adhesive responses to specific cues. The researchers report that Tut1, a transmembrane protein, is expressed on developing neurons in the *Drosophila* peripheral nervous system. In *in vivo* loss- and gain-of-function experiments, they show that Tut1 restricts branching in neurons with simple arbors and promotes dendrite self-avoidance in neurons with highly complex arbors. Finally, they show that the cytoplasmic tail of Tut1 is not needed for the control of dendrite branching. Thus, they suggest, Tut1 might influence dendrite arborisation patterns by acting as a ligand or a co-receptor for an unidentified recognition molecule.



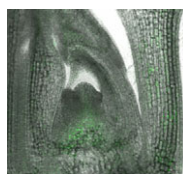
H19 makes an imprint on gene network

During embryogenesis, genomic imprinting ensures that only one parental allele of certain genes is subsequently expressed. One of the first imprinted genes to be identified was the *H19* gene, but the function of the non-coding RNA produced from this gene has remained a mystery. Now, Gabory and colleagues report that *H19* RNA is a trans regulator of the imprinted gene network (IGN), a group of co-expressed genes that includes *H19* and that controls fetal and early postnatal growth in mice (see p. 3413). The researchers report that postnatal growth is reduced in two transgenic mouse lines that overexpress *H19* and that the expression of *Igf2* (also a member of the IGN) is reduced in the transgenic embryos. Conversely, *H19* deletion leads to an upregulation of several members of the IGN that can be reversed by transgenic expression of *H19*. This first *in vivo* evidence for a functional role for *H19* RNA provides new insights into how genomic imprinting helps to control embryonic growth.



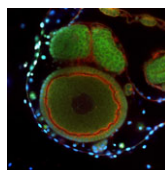
Rotation-free neuroblast spindle alignment

During central nervous system development in *Drosophila*, the asymmetric division that neuroblasts undergo (to produce a differentiating ganglion mother cell and a self-renewing neuroblast) requires spindles to align along the apicobasal polarity axis of the neuroblast. In embryonic neuroblasts, evidence suggests that their spindles assemble orthogonal to the polarity axis and then rotate later to align with it; in larval neuroblasts, the spindles assemble aligned with the axis. So, when does the switch from rotational to predetermined spindle alignment occur? On p. 3393, Rebollo and co-workers report that predetermined spindle alignment occurs in all but the first cell cycle of embryonic neuroblasts. The researchers use two-photon confocal microscopy to examine cell divisions in embryonic neuroblasts expressing centrosome and microtubule reporters. The switch between the two spindle orientation modes occurs in the second cell cycle of the neuroblasts, they report, the first division after neuroblasts delaminate from the epithelium. This unexpected result suggests that neuroblasts remain polarised during interphase, but how their polarity is maintained is unclear at present.



Rice flowering network blooms

Successful sexual reproduction in flowering plants depends on the accurate timing of flowering. One environmental signal that controls flowering is day length. Short-day plants like rice promote flowering by detecting short-day photoperiods. Yet, at the northern extremes of its cultivation, rice experiences long-day photoperiods, which makes long-day flowering agronomically important in these regions. Now, Komiya and co-workers reveal a gene network that regulates long-day flowering in rice (see p. 3443). The researchers investigated flowering times in plants with mutations in the homologues of genes that control flowering time in *Arabidopsis* (a long-day plant) and assayed the expression of rice genes involved in flowering in these mutant rice plants. From their findings, the researchers propose that regulators of the flowering-promoting hormone *RICE FLOWERING LOCUS T 1* (*RFT1*) – both positive (such as *Ehd1*, a rice-specific floral inducer, and *OsMADS50*, a homologue of *Arabidopsis* *SOC1*, which functions upstream of *Ehd1*) and negative (e.g. *phyB*, a plant photoreceptor gene) – form a gene network that regulates long-day flowering in rice.



Ascidian vasa-llates over (a)sexual development

In most metazoans, germline precursors irreversibly segregate from somatic lineages during embryonic development. However, in animals that propagate asexually, germline precursors can originate in adults. Anthony De Tomaso and colleagues have been studying germline specification in *Botryllus schlosseri*, an emerging model of development and regeneration that propagates both sexually and asexually. They now report that self-renewing, lineage-restricted germline progenitors are embryonically specified in this colonial ascidian (see p. 3485). *B. schlosseri* begin life as free-living larvae that metamorphose into sedentary, colonial filter-feeders. *B. schlosseri* colonies grow by asexual reproduction, regenerating their entire bodies, including their germline tissues, every week. The researchers show that, as in many metazoans, the expression of *vasa* (which encodes an ATP-dependent RNA helicase) marks a population of embryonically specified, long-lived germline progenitors in *B. schlosseri*. Interestingly, however, transient *vasa* knockdown disrupts somatic growth in the colony, which suggests that *vasa* might play a role in the asexual, as well as the sexual, development of this intriguing organism.

Jane Bradbury