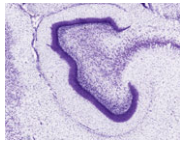
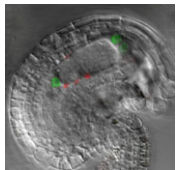


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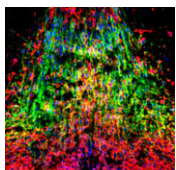
Profiling the mammalian brain

In mammals, adult neurogenesis is highly restricted to the subventricular zone and to the subgranular zone (SGZ) of the hippocampal dentate gyrus. Is neurogenesis in these regions a recapitulation of developmental neural production, or does it involve distinct molecular and cellular processes? And are these processes conserved across mammalian species? To help answer these questions, Ed Lein and colleagues (p. 4633) have performed a detailed expression profiling analysis of the SGZ in adult mice and in developing and adult rhesus macaques. Their datasets suggest that the SGZ niche is highly heterogeneous, with enrichment for markers of various progenitor and differentiated cell types. These results also identify a large set of genes enriched in the SGZ of both species, many of which are also well known to be involved in developmental neurogenesis, suggesting a conserved programme operating during development and in adulthood. Together, these data provide a valuable resource for the community and highlight key factors for neurogenesis in both mice and monkeys.



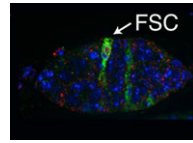
No auxin gradient in the gametophyte

The female gametes of flowering plants are produced within a structure known as the gametophyte, which develops inside the carpel of the flower. The female gametophyte (FG) contains several cell types, and it has been proposed that their fate is specified, according to position, by an internal auxin gradient. Ueli Grossniklaus and co-workers (p. 4544) set out to model this proposed auxin gradient *in silico*, to understand better how it might regulate fate determination. Using physiologically plausible parameters, they found that only very shallow auxin gradients could be maintained, which were unlikely to allow robust patterning of the FG, suggesting that cell fate may not be defined by an auxin gradient. Indeed, more detailed examination of auxin patterns suggested that no such gradient exists in either *Arabidopsis* or maize. Instead, dynamic auxin signals could be observed in surrounding sporophytic tissues, and the authors propose that auxin may act indirectly in the sporophyte rather than directly in the FG to control FG cell fate.



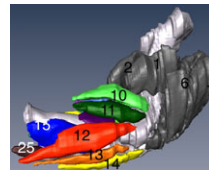
Guiding mDA neurons

Although much is known about the specification and differentiation of midbrain dopaminergic (mDA) neurons, the mechanisms regulating their migration within the ventral midbrain (VM) are poorly understood. Migration of several other neuronal types is under the control of CXCL12/CXCR4 signalling, which has been shown to impact on migration, neuritogenesis and axonal pathfinding. Now, Ernest Arenas and colleagues (p. 4554) set out to investigate whether this chemokine pathway might also regulate mDA neuron migration. They find that *Cxcl12* is expressed in the meninges surrounding the VM, whereas the *Cxcr4* receptor is expressed in the mDA neurons and their precursors. Using both *in vitro* culture and *in vivo* approaches, the authors show that mDA neurons migrate towards the meningeal source of CXCL12, in a *Cxcr4*-dependent manner; importantly, in *Cxcr4* mutant embryos, mDA neurons are misplaced. Moreover, neuritogenesis of these neurons is impaired when CXCL12/CXCR4 signalling is perturbed. Together, these results reveal a key role for this chemokine pathway in the regulation of mDA neuron migration.



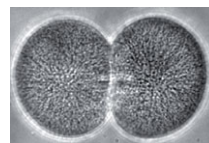
Stem cells need escorts

Stem cell renewal *in vivo* often requires a specialised microenvironment, the stem cell niche. Niche cells provide self-renewal signals as well as structural and spatial cues to regulate stem cell maintenance and differentiation. Here, Pankaj Sahai-Hernandez and Todd Nystul (p. 4490) investigate the follicle stem cell (FSC) niche of the *Drosophila* ovary, providing evidence that the escort cells of the germarium – which surround germline cysts and support their development – are also key for FSC maintenance. Hedgehog (Hh) and Wntless (Wg) pathways are known to promote FSC self-renewal, and the distant terminal filament and cap cells were proposed to be the sources for these signals. However, the authors here show that escort cells are the essential source of Wg for FSC function, whereas Hh is produced from multiple somatic cell types – including escort cells – and acts on both FSCs and their progeny. Moreover, escort cells contact FSCs and likely provide a dynamic niche for their maintenance, revealing a new component of the niche and a new function for escort cells.



A new twist on Hox in the limb

Hox genes provide positional information along both the body's anterior-posterior and the limb's proximal-distal axes. Analysis of Hox gene function in the limb has primarily focussed on their roles in skeletal patterning. Now, Deneen Wellick and co-workers (p. 4574) find that *Hox11* genes are most strongly expressed in the connective tissue of the developing mouse limb, rather than the skeletal elements. Moreover, *Hoxa11/Hoxd11* mutants show severe defects in tendon and muscle patterning in addition to their well-characterised role in patterning the skeleton. All defects are confined to the zeugopod region where *Hox11* is known to function. These phenotypes do not appear to be a consequence of skeletal malformation, as compound mutants with a single functional *Hox11* allele show no defects in the skeleton, but display significant disruption of tendons and muscles. These results define a previously unappreciated function for Hox genes in the limb, and suggest that they may act regionally to coordinate development of the various tissues of the musculoskeletal system.



Egg arrest: a tale of two phosphatases

Before fertilisation, animal eggs are maintained in cell cycle arrest, to prevent parthenogenetic activation. In vertebrates, this is achieved by MAPK- and Emi2-mediated inhibition of the anaphase promoting complex/cyclosome (APC/C). Sperm induce egg activation by calcium-dependent activation of CaMKII, which triggers the destruction of Emi2, activating APC/C. However, invertebrates do not possess an Emi2 homologue, raising the question of how egg activation is achieved in these species. On p. 4583, Alex McDougall and colleagues address this problem in ascidians, the closest relatives to the vertebrates. They find no role for CaMKII, but show that the phosphatase calcineurin (CN) is required, acting to promote APC/C activity. Moreover, basal activity of the phosphatase PP2A is also essential for full APC/C function and egg activation. As CN is involved in egg activation in *Drosophila*, and plays an auxiliary role in *Xenopus*, the authors suggest that this may represent the ancestral mechanism of egg activation, which has been lost in mammals and replaced by a CaMKII-dependent pathway.