signalling, and, as expected, blocking Tsg function results in an expansion of BMP signalling, also seen in *chordino* (chordin) mutants. Furthermore, ventral injections of BMP antagonists in *Xenopus* result in an induction of a secondary dorsal axis, although Tsg achieves this only when co-injected with chordin. Tsg's diffusability might be crucial to its function, because its membrane-tethered form alone can induce an extra axis.

The connection between Tsg and Tld that is seen in flies has not been so clearly established in vertebrates, but the cooperative action between Tsg and Sog (chordin) seems highly conserved. This twisting tale provides an interesting example of how a phenotype can lead the unwary astray.

Magdalena Skipper

References and links

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FURTHER READING Harland, R. M. *et al.* A twist on embryonic signalling. *Nature* **410**, 423–424 (2001)
WEB SITE Daniel Greenspan's lab | Lawrence Marsh's lab | Ali Brivanlou's lab

embryonic tissue. The authors tackle this by proposing that Amn modulates Bmp2 signalling within the VE itself, controlling targets that might themselves directly interact with embryonic tissue. Amn might also act in concert with a Bmp receptor, Alk2, which is present on the VE's apical surface, to modify the activity of other extra-embryonically expressed Bmp molecules, such as Bmp7. Future functional studies should tell if Amn is to join this hotly pursued family of signalling antagonists.

Jane Alfred

References and links

ORIGINAL RESEARCH PAPER Kalantry, S. *et al*. The amnionless gene, essential for mouse gastrulation, encodes a visceral-endoderm-specific protein with an extracellular cysteine-rich domain. *Nature Genet.* **27**, 411–416 (2001)
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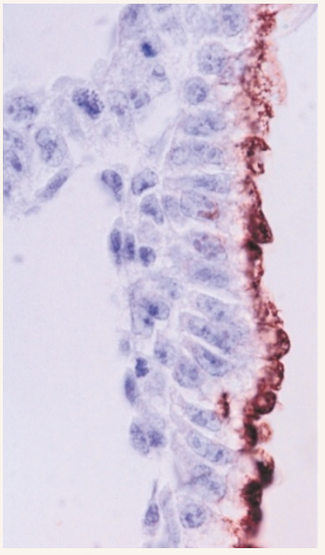
WEB SITE Elizabeth Lacy's lab



A wild-type, E7.5 mouse embryo stained with an anti-Amn antibody. Amn is present only on the apical surface of the visceral endoderm. Courtesy of Sundeep Kalantry and Katia Manova, Memorial Sloan-Kettering Cancer Center, USA.

IN BRIEF

DEVELOPMENTAL BIOLOGY

Male-to-female sex reversal in mice lacking fibroblast growth factor 9.

Colvin, J. S. *et al. Cell* **104**, 875–889 (2001)

Fibroblast-growth-factor (FGF) signalling has been implicated in many aspects of development; and now Colvin *et al.* describe a new function for Fgf9 in testicular embryogenesis. Their analysis of *Fgf9* knockout mice identified a variable gonadal phenotype, ranging from testicular hypoplasia to complete sex reversal. They found that Fgf9 acts early in the commitment to male development and regulates many Sry-dependent processes, including Sertoli-cell differentiation and mesonephric-cell migration. The authors suggest that FGF signalling could induce male development in the absence of Sry — an important finding as many mammals lack Sry — and that *FGF9* mutations might contribute to human sex reversal.

HUMAN GENETICS

An alternative mode of translation permits production of a variant NBS1 protein from the common Nijmegen breakage syndrome allele.

Maser, R. S. *et al. Nature Genet.* **27**, 417–421 (2001)

Around 90% of patients with Nijmegen breakage syndrome (NBS) are homozygous for a small deletion that prematurely truncates the *NBS1* transcript. As loss of *Nbs1* is lethal in mice, the authors investigated whether this truncation allele encodes a hypomorph. Surprisingly, they found two proteins translated from the truncated transcript — $NBS1^{p27}$, the predicted truncated protein, and the larger $NBS1^{p70}$, which lacks the NBS1 amino-terminus. $NBS1^{p70}$ is produced from an internal translation initiation site in *NBS1* messenger RNA that allows an open reading frame from the deletion transcript to be translated. Unlike $NBS1^{p27}$, $NBS1^{p70}$ still associates with the MRE11 DNA-repair complex, possibly diminishing the NBS phenotype.

TECHNIQUES

DNA shuffling method for generating highly recombined genes and evolved genomes.

Coco, W. M. *et al. Nature Biotechnol.* **19**, 354–359 (2001)

DNA shuffling, or chimeragenesis, has been used to evolve gene families *in vitro*. These techniques create gene libraries in which original sequence polymorphisms are recombined at random to generate new sequence combinations. Most strategies achieve approximately four crossover events per gene. Coco *et al.* now report a new approach called RACHITT (random chimeragenesis on transient template), in which single-stranded DNA fragments are hybridized to a transient DNA template, generating 14 crossovers per gene and high recombination frequencies, even between polymorphisms that are less than 10 bases apart in regions of high and low homology. Using RACHITT, the authors created new enzyme combinations for the desulphurization of fossil fuels.