IN BRIEF

SUBCELLULAR LOCALIZATION

Survivin exists in immunochemically distinct subcellular pools and is involved in spindle microtubule function.

Fortugno, P. *et al*. *J. Cell Sci*. **115**, 575–585 (2002)

Survivin has been implicated in both apoptosis and in regulating mitosis. However, its subcellular localization has been controversial — some groups report it to be a chromosomal passenger protein, whereas others describe it as a microtubule-associated protein. This study uses immunofluorescence to show that although survivin is found at both of these places, the main pool is associated with microtubules, and is involved in assembly of a bipolar mitotic spindle.

TRANSLOCATION

A new role for BiP: closing the aqueous translocon pore during protein integration into the ER membrane.

Haigh, N. G. & Johnson, A. E. *J. Cell Biol.* **156**, 261–270 (2002)

The cotranslational integration of membrane proteins into the endoplasmic reticulum (ER) occurs through the ribosome/translocon complex. The translocon creates an aqueous pore in the ER, so how is the integrity of the membrane maintained? Here, the authors show how BiP, a lumenal protein traditionally involved in protein folding, is used to seal translocon pores that are engaged in integration. They report that a pore contraction, triggered by translation of the nascent transmembrane sequence, stimulates ATP hydrolysis and the BiP-mediated sealing of the pore.

CELL POLARITY

The anaphase-promoting complex and separin are required for embryonic anterior–posterior axis formation.

Rappleye, C. A. *et al. Dev. Cell* **2**, 1–20 (2002)

In this study, the authors found that the anaphase-promoting complex — known for its role in cell-cycle progression — also mediates anterior–posterior axis formation. They propose that, by activating separin, APC induces the centrosome to associate with the posterior cortex of developing nematode embryos. This displaces PAR-3, which allows PAR-2 to accumulate in this area, thereby creating distinct anterior–posterior domains.

CYTOSKELETON

Single-molecule speckle analysis of actin filament turnover in lamellipodia.

Watanabe, N. & Mitchison, T. J. *Science* **295**, 1083–1086 (2002)

Existing methods for studying actin dynamics in living cells are limited in terms of their spatial and temporal resolution, thereby precluding quantitative modelling studies. In this report, Watanabe and Mitchison used fluorescent speckle imaging to follow single fluorescent actin molecules in lamellipodia. New speckles formed faster in the tips, and polymerization away from the tip generated actin filaments. Basal polymerization and depolymerization in the lamellipodium body occurred reasonably constantly.

SIGNAL TRANSDUCTION

Mastering hopscotch

In mammals, the JAK/STAT signal transduction pathway mediates signalling by interferon and other cytokines. In *Drosophila*, the same signalling pathway is implicated in several processes, such as eye development, germ-cell differentiation and embryonic segmentation. However, there is one component of the pathway that has proved elusive in flies — that is until now. Using a genetic screen, Steven Hou's lab have found the pathway's missing receptor.

The basic mechanism of JAK/STAT signalling is as follows: a ligand (such as a cytokine) binds to a cell-surface receptor, which interacts with JAK, a non-receptor tyrosine kinase. JAK then phosphorylates the transcription factor STAT, which moves into the nucleus and regulates the expression of specific target genes. In *Drosophila*, the ligand is encoded by *unpaired* (*upd*; also known as *outstretched*), JAK is encoded by *hopscotch* (*hop*) and STAT by *Stat92E* (also known as *marelle*, the French word for hopscotch).

To hunt down a *Drosophila* receptor involved in JAK/STAT signalling, Hua-Wei Chen, Xiu Chen and their colleagues used a gain-of-function *upd* mutant, which had an abormal eye phenotype. They then screened a *P*-element insertion library for suppressor mutations, reasoning that reduction in expression of a Upd receptor would reduce signalling through the pathway, and thereby suppress the phenotype. Four of the suppressors fell into a single complementation group, which was given the name *master of marelle* (*mom*).

The authors cloned *mom* by characterizing the genomic DNA adjacent to the *P*-element insertions, and ultimately identified a cDNA that complemented the *mom* phenotype. The cDNA encodes a transmembrane protein with weak homology to mammalian cytokine receptors, and is therefore a strong candidate for the receptor involved in JAK/STAT signalling in flies. Further support for this conclusion was provided by cell-culture experiments, which showed, for example, that Mom binds Upd and is required for phosphorylation of Stat92E.

Now that this key component of the JAK/STAT pathway has been found in *Drosophila*, some important questions about this signalling pathway can be tackled using the full range of methods available to fly geneticists. Is Mom the only molecule required to mediate signalling from Upd to Hop, or are other molecules required? Is Mom the only receptor in flies, or is there a receptor family, like there is in mammals? Having found the *master of marelle*, can researchers expect to master JAK/STAT signalling?

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Nature Reviews Genetics

References and links

ORIGINAL RESEARCH PAPER Chen, H.-W. *et al*. *mom* identifies a receptor for the *Drosophila* JAK/STAT signal transduction pathway and encodes a protein distantly related to the mammalian cytokine receptor family. *Genes Dev.* **16**, 388–398 (2002)

WEB SITES

Steven Hou's lab:
http://www-dcs.nci.nih.gov/resdir/person_index.cfm?p_id=325

Encyclopedia of Life Sciences:
http://www.els.net
Signal transduction pathways in development: the JAK/STAT pathway