DEVELOPMENT

# Jaguar driven

In *Drosophila*, the asymmetric cell division of embryonic neuroblasts requires, among other things, the formation of a basal crescent-shaped complex by cell-fate determinants and their adaptor proteins, one of which is Miranda. Because Miranda is localized to the apical cortex before the basal crescent forms, Yuh Nung Jan and colleagues figured that Miranda might require a motor protein that targets it to the basal site. Now they've found one — myosin VI Jaguar (Jar) — according to a report in *Developmental Cell*.

The Jan laboratory isolated Miranda-containing protein complexes from fly embryos using anti-Miranda antibodies and identified myosin II Zipper (Zip), which negatively regulates basal transport of Miranda, and Jar. Jar binding to Miranda is direct, as shown in glutathione *S*-transferase (GST) pull-down studies.

So what's the functional significance of this interaction? To address this question, Jan and co-workers took three independent approaches to reduce Jar activity in neuroblasts. In all cases, reduced Jar activity resulted in mislocalization of Miranda and misorientation of mitotic spindles — spindle reorientation being another feature of asymmetric neuroblast cell division.

Double-mutant studies indicated that Jar functions synergistically with Lethal giant larvae (Lgl), which is known to be required for basal-crescent formation. The apical complex was not affected, which led the authors to conclude that Jar and Lgl function downstream of, or in parallel to, apical localization.

All the myosins previously implicated in asymmetric cell division (including Zip in fly, as well as the ones in worm and yeast) are barbed-end-directed myosins, which move towards the plus ends of actin filaments. Jar is the first pointed-end-directed myosin. No

doubt, future studies will be aimed at uncovering the mechanism by which Jar mediates basal targeting and spindle reorientation.

*Arianne Heinrichs*


**References and links**

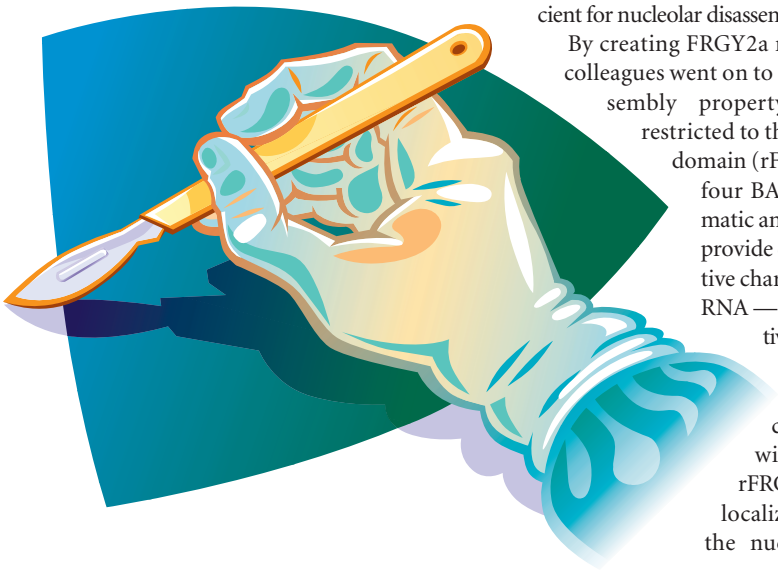
**ORIGINAL RESEARCH PAPER** Petritsch, C. *et al*. The *Drosophila* myosin VI Jaguar is required for basal protein targeting and correct spindle orientation in mitotic neuroblasts. *Dev. Cell* **4**, 273–281 (2003)

**FURTHER READING** Knoblich, J. A. Asymmetric cell division during animal development. *Nature Rev. Mol. Cell Biol.* **2**, 11–20 (2001)


NUCLEOLUS

# Disassembly dissected

In keeping with the physiological nucleolar dynamics in early embryogenesis, the nucleoli of transplanted nuclei disassemble in eggs and early embryos and reassemble at the blastula stage. Now, in *Nature Cell Biology*, Nobuaki Kikyo and colleagues have begun to analyse the molecular mechanisms underlying nucleolar disassembly.



Using dispersal of nucleolar phosphoprotein B23 in the nucleoplasm of embryonic XL2 nuclei as a marker of disassembly, a nucleolar-disassembly activity from *Xenopus laevis* egg extract was purified. The activity contained two germ-cell proteins — FRGY2a and FRGY2b (FRGY2a/b) — that share 83% amino-acid identity and are known to function as transcription factors and maternal messenger RNA-masking proteins in messenger ribonucleoprotein (mRNP) particles in oocytes. The authors then tested the ability of FRGY2a/b, recombinant (r)FRGY2a and rFRGY2b to disassemble nucleoli — in each case, nucleoli were disassembled in a similar and dose-dependent manner, showing that FRGY2a or FRGY2b alone is sufficient for nucleolar disassembly.

By creating FRGY2a mutants, Kikyo and colleagues went on to show that the disassembly property of FRGY2a is restricted to the carboxy-terminal domain (rFRGY2a-C), and that four BA islands (basic/aromatic amino acids) — which provide extensive, non-selective charge interactions with RNA — contribute cumulatively to disassembly.

To examine its *in vivo* effects, XL2 cells were transfected with rFRGY2a or rFRGY2a-C. rFRGY2a-C localized preferentially to the nucleus and induced both dispersal of B23 and nucleolar disappearance. By contrast, rFRGY2a localized mainly in the cytoplasm and didn't disperse B23 or reduce nucleolar size. However, by mutating the RNA-binding cold-shock domain in the amino terminus some rFRGY2a entered the nuclei and triggered disassembly.

Because transcription of rRNA is crucial for maintaining nucleolar integrity, the authors monitored rRNA synthesis during disassembly. Importantly, FRGY2a/b didn't disrupt rRNA synthesis and is, to the authors' knowledge, "…the first protein to be identified that can disassemble nucleoli without disrupting rRNA synthesis". Finally, Kikyo and colleagues showed that disassembly by FRGY2a/b could be reversed, indicating that the essential core structure of these nucleoli is retained.

Nucleolar disassembly by FRGY2a/b will have a considerable impact on the inefficient nuclear-cloning process, because proper nucleolar disassembly and reassembly is presumed to be crucial for the normal development of cloned embryos. In addition, this type of nuclear-remodelling study will "…provide key insights into the structural and functional organization of the nucleus".

*Natalie Wilson*


**References and links**

**ORIGINAL RESEARCH PAPER** Gonda, K. *et al*. Reversible disassembly of somatic nucleoli by the germ cell proteins FRGY2a and FRGY2b. *Nature Cell Biol.* **5**, 205–210 (2003)

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**WEB SITE**

Nobuaki Kikyo's laboratory:
http://www1.umn.edu/stemcell/sci/page/fac-mbr/frst-facmbr.htm