**Caterpillar compaction**

DNA compaction, say Ryan Case, Yun-Pei Chang, Nicholas Cozzarelli, Carlos Bustamante, and colleagues (University of California, Berkeley, CA), may work via a cooperative caterpillar-like mechanism. The caterpillar is formed by multiple copies of condensin protein—in this case MukBEF—with each V-shaped condensin contributing two legs. Compaction occurs when the caterpillar’s legs snap together.

“The main problem,” says Bustamante, “is that we have not had any bulk assay for the compaction activity of this protein. We decided to do a rather risky search for a single molecule assay.”

The assay involved binding MukBEF to DNA and then holding both ends of the compacted DNA strand using a dual beam optical trap. As the DNA strand was pulled, it gave way in a sawtooth pattern as individual copies of MukBEF stayed on the DNA but splayed apart to release their captured loops of DNA. The size of each peak depended on just how much DNA was released per event.

MukBEF binding was cooperative, so the proteins opened up in a set sequence starting at one end. Thus, after recondensing, restretching gave the exact same sawtooth pattern.

The open V of MukBEF may span 200 bp or more. ATP binding (but not hydrolysis) may drive compaction by closing the V. In vivo, however, DNA is already compacted by other proteins and supercoiled, so each condensin would reach across many kilobases of DNA. Bustamante hopes to establish a bulk assay for condensin action so that he can see this process occur in real time.

Reference: Case, R.B., et al. 2004. Science. 10.1126/science.1098225.

**Prions in packages**

When neurons are dying left and right, the mechanism of cell-to-cell spread of infectious prion proteins would not appear to be a problem in need of a solution. But prions originally enter their hosts via the gut and must somehow reach the brain.

Now, Benoît Fevrier, Graça Raposo (Institut Curie, Paris, France), and colleagues suggest that prions might travel at least partly via tiny vesicles called exosomes.

Exosomes form when late endosomes invaginate to form small, internal vesicles. The bag of vesicles, or multivesicular body (MVB), can fuse with the plasma membrane to disgorge these vesicles, named exosomes, which then travel to other cells to transmit messages. In the immune system, for example, exosomes transfer peptide-laden MHC proteins.

When the French group looked at the supernatant of PrPSC-infected epithelial and neuroglial cell cultures they found PrPSc. The released PrPSc was in a fraction consisting largely of vesicles that had the size and protein make-up of exosomes. PrPSc was also seen in association with MVBs.

PrPSc may be able to transfer between cells that contact each other, but exosomes provide a plausible means for prions to traffic over longer distances. How this ties in with the normal function of PrPSc is not clear. But if exosomes turn out to be an important mechanism of PrPSc migration, then blocking exosome secretion may slow down the spread of prion diseases.

Reference: Fevrier, B., et al. 2004. Proc. Natl. Acad. Sci. USA. 10.1073 pnas.0308413101.