Featured Publication Note
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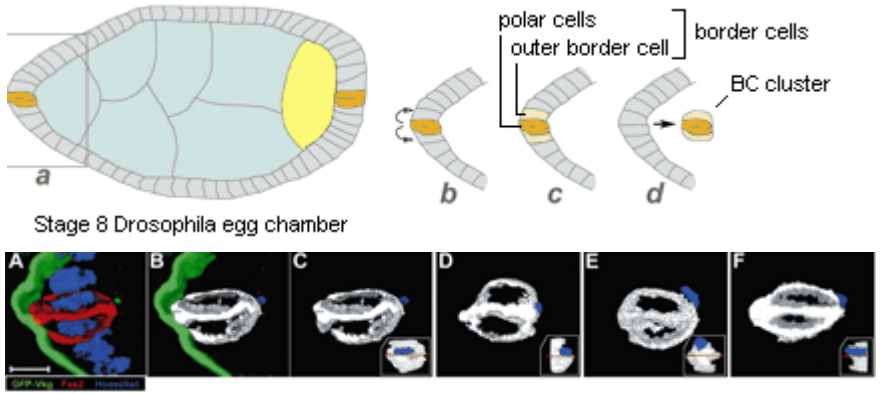
Apical capping and epithelial cluster migration in *Drosophila*



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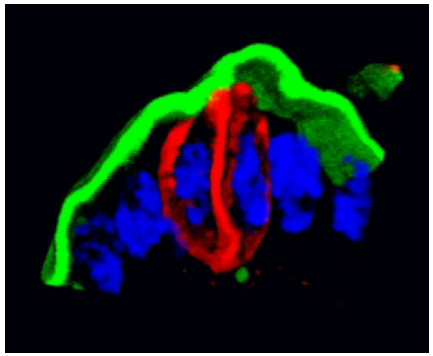

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1/ 3D-reconstructed anterior region of the egg chamber shown in FigA-C. Nuclei: blue, polar cells: red, BM: green. 2/ polar cells: white, apical cap: blue See movies at http://dev.biologists.org/cgi/content/full/132/13/3069/DC1

Dr. Noselli's lab at the Institute of Signalling, Developmental Biology and Cancer at the University of Nice Sophia-Antipolis in France, works on several aspects of epithelial morphogenesis in *Drosophila* development. One aspect is Border Cell (BC) migration, which is a model system used to understand the molecular mechanisms that control the transition of epithelial cells toward a migratory phenotype. Understanding this transition during development could provide better knowledge of cellular invasiveness and cancer. It is known that misregulation of extracellular matrix, including basement membrane (BM), promotes cell invasion and metastasis but its behavior in the early stages of migration is poorly understood.

The above illustration of the *Drosophila* egg chamber during oogenesis explains the formation and migration of the BC cluster. Anterior polar cells located in the epithelial monolayer of the egg express a ligand activating the JAK/STAT pathway of the neighbour cells, which differentiate into outer border cells. A mature cluster then forms and starts migrating. The researchers also showed that most of the components of the BM in stage 8 egg chambers form a surprising apical cap over the anterior polar cells.

In order to analyze this apical cap, Dr Noselli used **Volocity Visualization** for three dimensional imaging and reconstruction of the anterior region of stage 8 egg chambers. Image A is a projection of a Z-stack of 20 sections acquired with a confocal microscope, the total depth is 7.6µm. The green labeling of the basement membrane is also found at the apical side of the polar cells, and can be very clearly visualized in Movie 1, created using **Volocity**. Movie 2 is also a **Volocity** movie which shows that the apical cap is rod-shaped and runs along the apical surface. Interestingly, the apical cap associates with one of the two polar cells, revealing a previously unknown intrinsic asymmetry within the pair of anterior polar cells.

Image B is an intermediate processing image showing the BM in green, polar cells in white and apical cap in blue. Images C-F are the resulting 3D-reconstructed polar cells with the apical cap. Insets show the apical side of polar cells and the red line is the boundary between both polar cells.

Further experiments allowed the researchers to demonstrate that apical capping is not only asymmetric but also dynamic. Initially, each polar cell makes its own apical cap but only one develops. As polar cells undergo rounding and detach from the BM, the apical cap is kept. Once the BC cluster starts migrating the apical cap is no longer observed. Apical capping is therefore transient and BM cap dynamics are tightly coordinated with formation of migratory border cells.