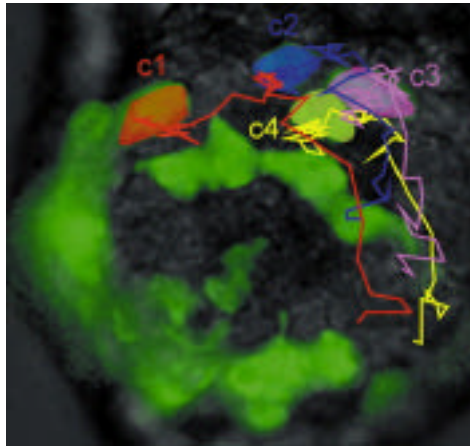
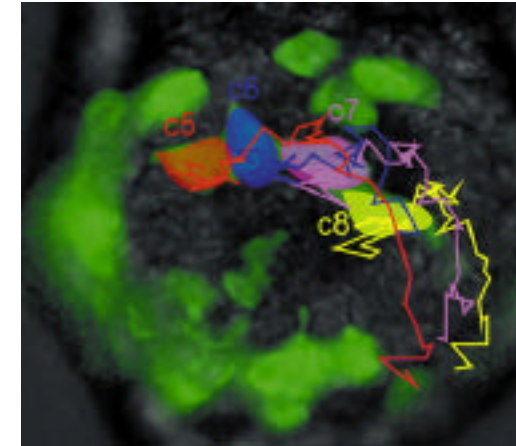
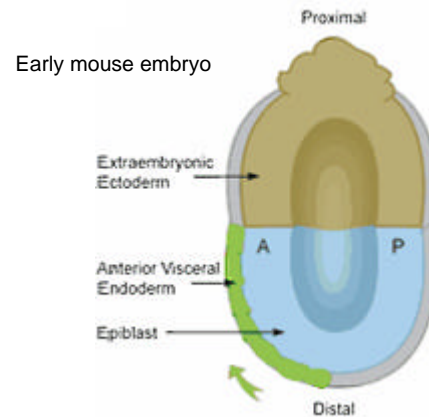


Tracking migrating embryonic cells in 3D during mouse development



Volocity tracks 1 to 4 of AVE cells



Volocity tracks 5 to 8 of AVE cells

Dr Shankar Srinivas and colleagues from the Division of Mammalian Development at the National Institute for Medical Research in London, dedicates his work to mouse embryo development. One major interest for him is to understand the patterning of the early embryo as this plays a key role in ensuring the correct development of the embryo. The anterior visceral endoderm (AVE) of the mouse embryo is a specialised extra-embryonic tissue essential for anterior patterning of the embryo. It moves unilaterally from its initial position at the distal tip of the egg cylinder to the future anterior of the embryo, thereby converting a proximodistal axis to an antero-posterior one. Very little is currently known about how this movement of the AVE takes place.

In order to find out more about this migration, Dr Srinivas conducted cell morphology studies and cell tracking measurements using **Volocity**. Migrating cells from transgenic embryos expressing GFP, were imaged at sequential time points using an inverted microscope. Five images per time point were acquired every 10-15 min over a period of 8-10 hours, then deconvolved and compressed into a single extended-focus image. The images showed that the AVE cells undergo drastic changes from columnar, clumped and inactive in the distal tip to squamous and motile with filopods projecting in the direction of the motion. Filopods were closely analysed with **Volocity** and the coordinates and length of each could easily be determined. This quantitation of filopodial orientation and cell shape analysis lead the researchers to prove that AVE cells are migratory. The time lapse analysis shows that once AVE cells reached the junction of the epiblast and the extra-embryonic ectoderm, migration is abruptly halted, AVE cells spread laterally, stop projecting filopods and become elongated. Using a confocal microscope, Z stacks of the embryo were captured at sequential time points and then reconstructed into 3D volumes using **Volocity Visualisation**.

Closer analysis of the cell movements was performed using the tracking features in **Volocity**. Eight cells were then manually outlined and the path of each of them was instantly generated by **Volocity** (images above). The cell tracks show that the movement of the cells is direct during distal to proximal migration, but becomes highly convoluted once the cells start spreading laterally. This result confirms that AVE cells stop migrating once they have reached the epiblast.

By using the charting features in **Volocity Classification**, a number of different types of chart could be produced for the tracking data such as velocity and vectors, meandering index and many others.