Adaptive Optic Microscope

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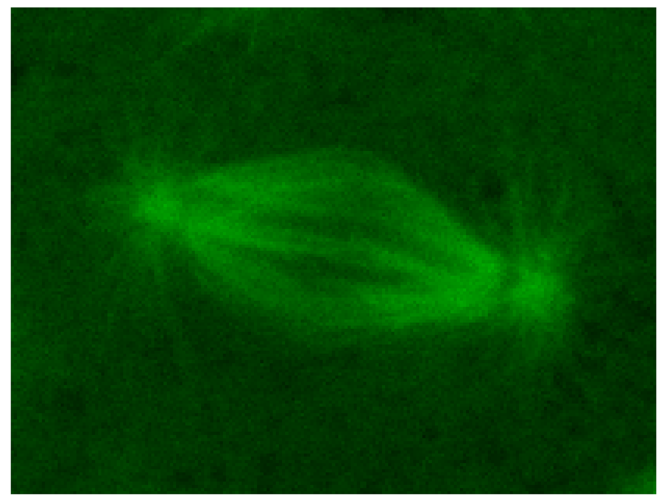
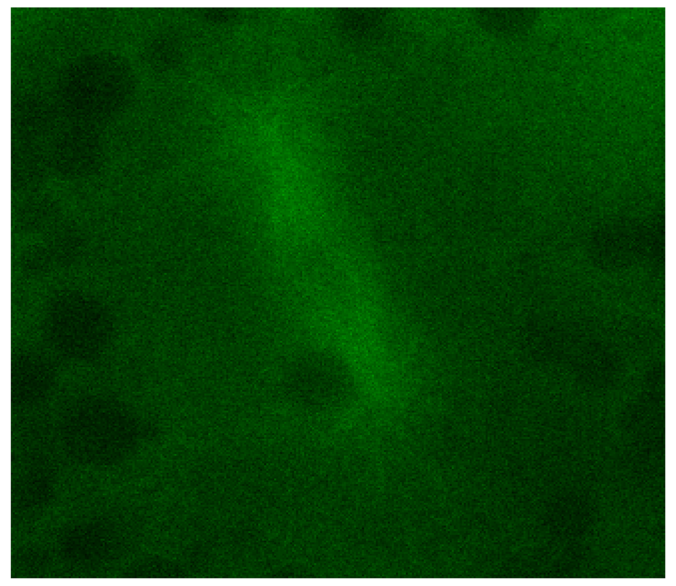
- Current biological imaging suffers from image degradation as the imaging depth increases
- This is due to the varying index of refraction in the optical path



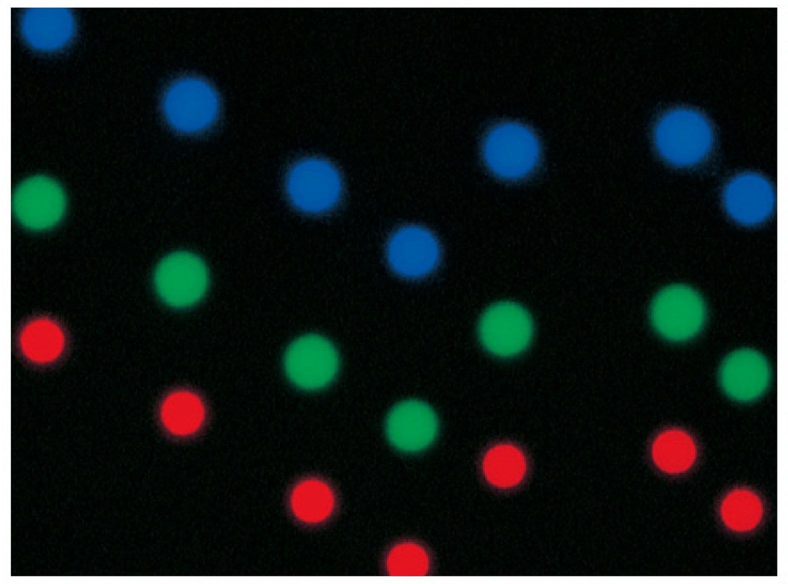
Mitosis: surface of Drosophila embryo



Mitosis: 25 um deep in Drosophila embryo

- Adaptive Optics (AO) technology has the potential for improving biological imaging by:
  - Measuring the optical aberrations using wavefront sensing technology
  - Correcting the measured aberrations using a MEMS deformable mirror

AO requires the use of reference sources to accurately measure the wavefront distortions introduced by changes in the index of refraction in the drosophila embryo. Our research has shown that fluorescent microspheres are good candidates for use as reference sources.



Project Goals

Measure the optical properties of fluorescent microspheres for use as reference sources to measure the aberrations introduced by the embryo

Find a suitable method of injecting the microspheres into the embryo at different depths

Measure the aberrations caused by the embryo

Design an AO system to compensate for the aberrations