1145-92-2467 **Hildur Knutsdottir***, hildur@jhu.edu, and **Eirikur Palsson** and **Leah Edelstein-Keshet**.

Force-based modeling framework of individual cells used to study collective cell migration in development and cancer.

Cell migration is driven by biophysical and biochemical cues that act in unison and across multiple spatial and temporal scales. The research presented here focuses on cell-cell interactions and how individual cell behavior influences collective cell migration. The framework that I use is a hybrid discrete cell model, HyDiCell3D. Cells are represented as deformable ellipsoids that interact through both mechanical (i.e. cell-cell adhesion) and chemical (i.e. chemotaxis) signals. Internal biochemistry of each cell is captured by ordinary differential equations describing the evolution of a particular factor (i.e. protein or gene) and it is linked to the cell's mechanical properties. Cell motion is calculated from the net force acting on the cell. These forces are, 1) active forces, both random and chemotactic, 2) adhesive forces associated with cell-cell and cell-substrate contact and 3) exclusion forces that prevent cells from overlapping. The HyDiCell3D is fast, simulating thousands of cells in minutes on a laptop, fully 3D and has the flexibility to design simulations to capture different biological experiments. I will present examples of the use of HyDiCell3D to study breast cancer metastasis as well as a process that occurs in early development of sensory organs in zebrafish. (Received September 25, 2018)