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Cellular automata models for cell migration

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For my vacation scholarship, I worked on a problem in mathematical biology. I aimed to create some models that describe the way cells move, using the method of cellular automata.

I thought of cells moving around on a 2-dimensional lattice, with only one cell allowed in each site. I then came up with a series of rules for updating the system. Beginning with a random distribution, each cell moves to a new location determined by the rules.

First I tried the idea of "food", or a substance cells want to move towards. I also investigated interactions between the cells - what happens when they collide, do they remain stuck together and form chains, or continue in a straight line?

My supervisor and I collaborated with experimentalists from the Royal Children's Hospital in coming up with some of these rules.

I produced a number of computer simulations, showing how the system changed according to the rules we had, and created some animations that were visually encouraging.

Overall it was a great experience, I would thoroughly recommend it to all other students!

Eleanor received an ICE-EM Vacation Scholarship in January 2005.
See www.ice-em.org.au/students.html#scholarship.