



Physics Colloquium

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Friday, 30 October 2009

4:00pm, PSC 3046

Bacteria yelling

The term Quorum Sensing (QS) is commonly used to describe a bacterial cell-cell communication mechanism, which microorganisms use to coordinate and synchronise collective behaviour. Occasionally this has been also referred to as "Bacterial Talk". The bacteria produce QS molecules and sense the local concentrations of these substances. When these reach a certain threshold the cells upregulate, i.e. change their behavior. In suspended populations, which are often studied in microbiological laboratory experiments, this effect is only linked to the size of the population. In spatially organised populations, which occur primarily in nature, the quorum signals are disturbed by mass transfer limitations. On the other hand, this allows the cells also to deduct information about their spatial environment (a.k.a. diffusion sensing).

We study these processes for bacterial populations that are organised in biofilm communities, more specifically for patchy biofilm clusters with slow background flow. We present a mathematical model that is based on the description of the biofilm as a continuum and extended to account for QS. In our simulation experiments we investigate the possibility of inter-colony communication. Indeed we find that the interaction of convective and diffusive mass transfer with QS reactions can lead to non-local effects of up-regulation. This is joint work between the University of Guelph and the Helmholtz Centre Munich.

For further information on Physics colloquia visit <http://physics.stfx.ca>
Doughnuts and coffee will be served at 3:45 pm