Challenging the Robustness of Simulated Protocells

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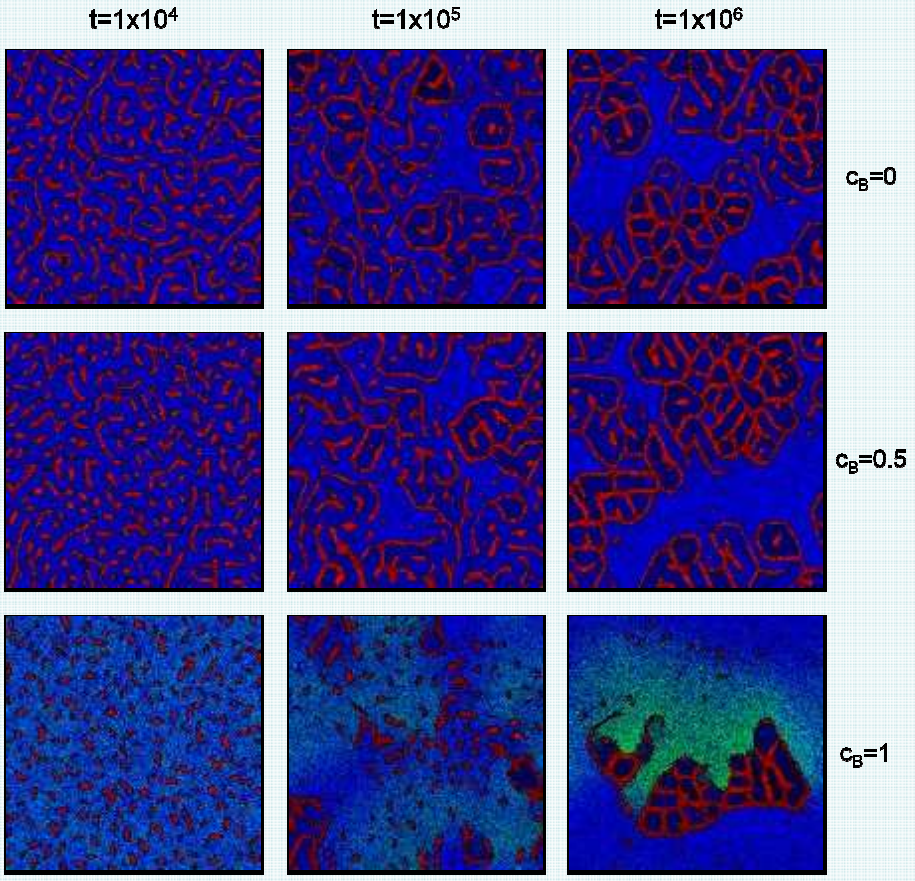

Simulated proto-cell development in the presence of a membrane-toxic particle. Depth of *red*, *blue*, and *green* correspond to the density of membrane particles, water particles, and membrane-toxic particles, respectively. C_B is the normalised concentration of membrane-toxic particles.

Ono's (2005) model of protocell self-organisation was extended to include a new membrane-toxic catalyst particle, *B*.

In the absence of the new particle (C_B=0), Ono's results are replicated: cellular structures organise and proliferate.

These cells are robust to low concentrations of the toxic particle (C_B=0.5) .

In sufficient concentration (C_B=1.0), the *B* particles disrupt protocell autopoiesis. Clouds of toxic particles reach high density along confining protocell membranes, rupturing cells, splitting entire cell assemblies, and driving cell migration in a predator-prey/pursuit-evasion dynamic.

Ono, N. (2005) Computational studies on conditions of the emergence of autopoietic protocells. *BioSystems*, 81:223-233.