

## Diffusing problem

In my project I wish to find a solution for diffusion problem equation under different initial and boundary conditions, also under different laws of diffusion. The simplest problem is normal diffusion, in which the particles perform a random walk and in which case the solution is simple - a Gaussian distribution (see Fig. 1). More complex situation is "The communicating walkers model"<sup>1</sup>, where the diffusion is affected by the condition of the walkers (the food and the concentration of "walkers" affect the rate of and/or bias the diffusion). In this case the result would have dendrite-like structure (see Fig. 2).



Fig. 1: 2D Gaussian distribution

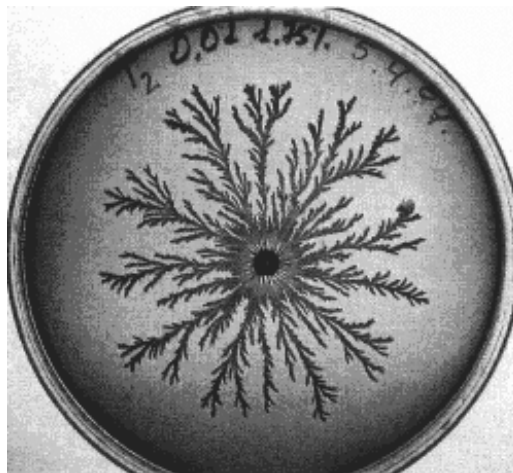


Fig. 2: Dendrite structure solution in real experiment

To write the simulation I'll use c++ compiler on a Linux Mandrake 8.1. I wish to use c++ so I can take advantage of the versatility and flexibility that OOP gives, for example, introducing several types of walkers (living cells - maybe several types of

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<sup>1</sup> Ben-Jacob E. Cohen I. and Levine H. 2000 Adv. Phys. **49** - 4, 395-554

them, food particles, chemical particles, etc.) and handling with great ease using OOP (Creating one class that all of them can be derived from).

The project would consist of two parts, *the simulation*, which will do the calculation and will output the data to a text file (or shared memory for faster implementation). And *the GUI*, which for starters will just display the data from *the simulation* graphically, and later, maybe, will have full control over *the simulation*. *The GUI* can be written in MATLAB, c, c++, using OpenGL, or using the X11 function to display the data.