

## Diffusion-Limited Aggregation

A simple model for the growth of certain branch-like structures is called **diffusion-limited aggregation**, and it can be very easily modeled with a simple computer program.

- (a) Write code in your favorite programming language which implements the following algorithm: let  $N$  be a fixed number of particles on a 2D grid. Affix the first particle at the center of the grid. Then, place one particle in the grid at a random location, and have it perform an unbiased random walk until it occupies a square adjacent to a fixed particle, and then fix the walker at that location. Repeat this process until all particles have found a location.
- (b) Run the code for a reasonably sized grid with a large enough number of particles to observe structure formation. What do you see? If there are no bugs in the code, you should observe a strange self-similar structure called a fractal! Show a sample image of the structure formed by a run of your program.