

Model of Differentiation in Embryogeny

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Embryonic cells repeat proliferation by active cell division and differentiation. A normal embryogeny requires every cell composing an embryo to undergo a proper differentiation at a proper position in the embryo. However, active cell divisions probably cause disorder of the positions of the cells because they dynamically change the number of cell and the proportion of cell types in the embryo, and cause positional collisions of the cells. Thus, we consider the cell division as spatial disturbance of differentiation and discuss a simple two-dimensional model of embryogeny.

The following are factors that cause differentiation in cell biology: (i) the cell itself, with the passage of a set amount of time, (ii) interactions with neighboring cells (induction), and (iii) morphogen (diffusible signaling molecule). In our model, the factor (i) and (ii) are taken into account. This means that the differentiation is regulated only by local interaction.

I would like to discuss differentiation in embryogeny on the basis of the results of computer simulation of the model.