

Noise in Gene Networks

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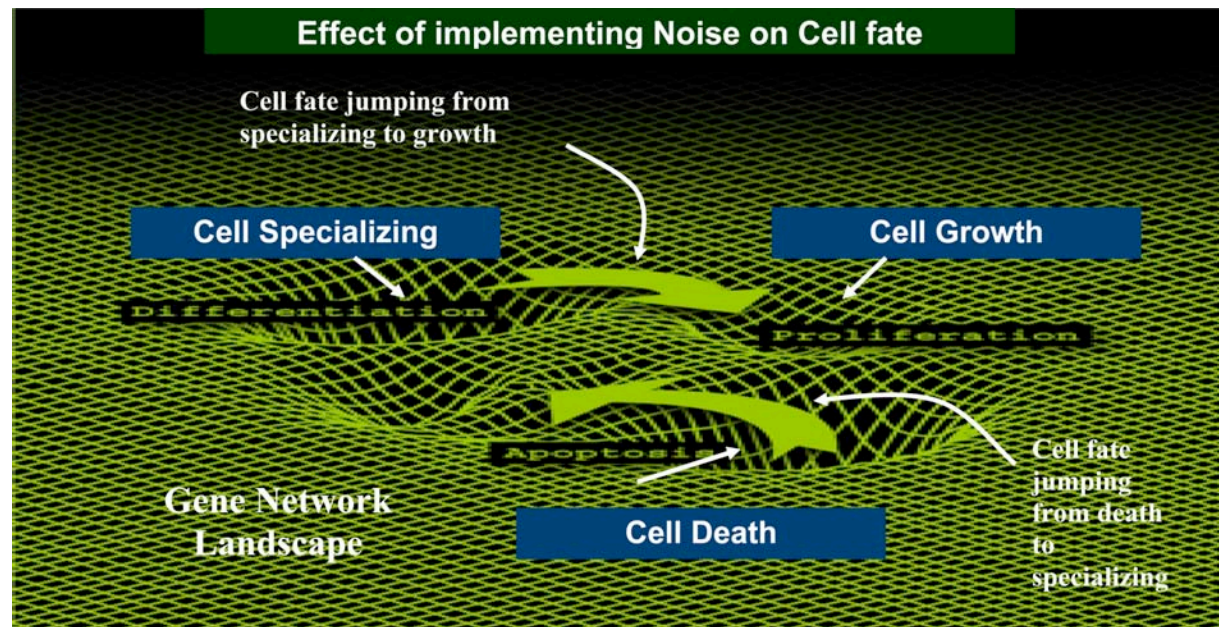
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Genes have been seen as acting in straight linear pathways in which every gene was responsible for just one action. However, research has shown that genes act together in a complex network interaction to produce a single action. So rather than one gene, many genes act together to produce a particular consequence in the cells.

This action of genes has been represented using a computer program (MATLAB) that makes use of the Boolean Network. This is just a mathematical network that uses a “1” when something is ON and a “0” when something is OFF. The something in this case is the genes.

Genes can produce cell fates (actions) when they act in this complex network. Some of these fates include cell death, cell growth, cells remaining dormant or cells learning how to do specific things (specializing). All these actions or fates are known as ATTRACTORS. An attractor is simply a state in a system that is very stable. In the cells, being in the state of growth or death for example is very stable and so the genes always interact in such a way that the end point of the cells is an attractor.

Even when the cells are in a particular attractor (stable state), noise in a biological system can make them able to jump from that attractor to another that is more stable since there are usually more than one stable state in a given network. Noise in this case refers to random changes in the gene sequence of the cells which might result in a gene being flipped ON when it's supposed to be OFF, or vice versa.



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