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Spatiotemporal dynamics of a reaction-diffusion model on pollen tube tip growth.

A reaction-diffusion model is proposed to describe the evolution of spatial distributions of ROP1 and calcium on the pollen tube tip. The cytoplasmic ROP1 activate ROP1 on the membrane and the calcium ions inhibit ROP1, while ROP1 controls calcium influx with a time delay. Lateral movement of molecules on the membrane are depicted by diffusion. It is shown that bistable or oscillatory dynamics could exist even in the non-spatial model, and time delay can also promote oscillation. Stationary and oscillatory spatiotemporal patterns are found in the full spatial model which resemble the experimental data of pollen tube tip. (Received February 10, 2018)