Geometry (形); Inconspicuous regulator that determines the fate of cells

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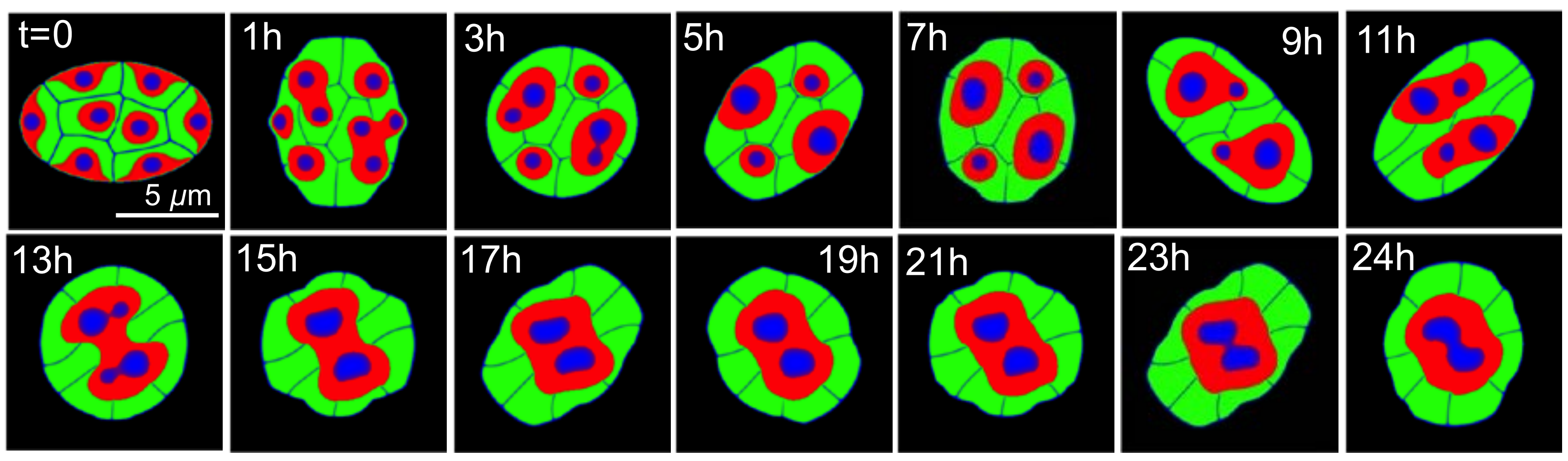
Through Zoom

In the history of mathematical study in pattern formation, the effect of domain has been considered as an important factor that can regulate spatial patterning. However, it is still unknown in biology how the geometry of the domain such as nuclear or cellular shapes can directly regulate the cell fate. In this talk, I will introduce two studies of spatial reorganization in chromatin and cellular dynamics and show that the domain is likely to play a critical role in determining the cell function.



$$\mu^{-1}\frac{\partial \phi_m}{\partial t} = \epsilon_\phi^2 \nabla^2 \phi_m + \phi_m(1-\phi_m)\left[\phi_m - \frac{1}{2} - A_m\phi_m(1-\phi_m)\right], \quad (1 \le m \le N)$$

$$\mu^{-1}\frac{\partial \psi}{\partial t} = \epsilon_\psi^2 \nabla^2 \psi + \psi(1-\psi)\left[\psi - \frac{1}{2} - B\psi(1-\psi)\right]$$

$$\mu^{-1}\frac{\partial \psi_0}{\partial t} = \epsilon_{\psi_0}^2 \nabla^2 \psi_0 + \psi_0(1-\psi_0)\left[\psi_0 - \frac{1}{2} - B_0\psi_0(1-\psi_0)\right]$$

□ Control of Nuclear Deformation

$$\boxed{\mu^{-1}\frac{\partial \phi_0}{\partial t} = \epsilon_0^2 \nabla^2 \phi_0 + \phi_0(1-\phi_0)\left[\phi_0 - \frac{1}{2} - \mathcal{D}(\mathbf{x},t)\phi_0(1-\phi_0)\right]}$$