

# Yeast tune their vacuole membranes to phase separate at their growth temperatures

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When yeast consume ample glucose, they grow rapidly. When that glucose is depleted, yeast enter a “stationary stage”, and striking changes occur. One of the changes is that the membrane of the vacuole (an organelle) phase separates into micron-scale domains [1]. This transition is reversible: at high temperature the vacuole membrane is uniform, and at a low temperature the membrane phase separates again [2]. The transition temperature scales with the growth temperature of the yeast cells, implying that the cells actively tune the composition of their vacuole membranes to maintain proximity to the phase transition. The process of the cell changing its membrane composition in response to temperature is slow. Specifically, when yeast in the stationary stage are held just above their transition temperature for one hour, their vacuole membranes remained uniform. The membranes returned to a phase-separated state only when the temperature was decreased again. The distribution of domains on the vacuole surface is reminiscent of patterns attributed to modulated phases or microemulsions [3].

[1] C.H. Moeller & W.W. Thompson, *J Ultra Res* 68, 28-37 (1979); A. Toulmay & W. Prinz, *J Cell Biol* 202, 35-44, (2013).

[2] S.P. Rayermann et al., *Biophys. J.* 113, 2425-2432 (2017).

[3] C.E. Cornell et al., *Biophys. J.* 115, 690-701 (2018).