

Abstract Submitted
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Temperature dependence of the multistability of lactose utilization network of *Escherichia coli* SUDIP NEPAL, PRADEEP KUMAR, Univ of Arkansas-Fayetteville — Biological systems are capable of producing multiple states out of a single set of inputs. Multistability acts like a biological switch that allows organisms to respond differently to different environmental conditions and hence plays an important role in adaptation to changing environment. One of the widely studied gene regulatory networks underlying the metabolism of bacteria is the lactose utilization network, which exhibits a multistable behavior as a function of lactose concentration. We have studied the effect of temperature on multistability of the lactose utilization network at various concentrations of thio-methylgalactoside (TMG), a synthetic lactose. We find that while the lactose utilization network exhibits a bistable behavior for temperature $T > 20^{\circ}\text{C}$, a graded response arises for temperature $T \leq 20^{\circ}\text{C}$. Furthermore, we construct a phase diagram of the graded and bistable response of lactose utilization network as a function of temperature and TMG concentration. Our results suggest that environmental conditions, in this case temperature, can alter the nature of cellular regulation of metabolism.

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