Review of: "The evolution of E. coli is NOT driven by genetic variance but by thermodynamics."

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Potential competing interests: No potential competing interests to declare.

The current study aims to elucidate the evolution of E. coli in relation to thermodynamics, but falls short in explaining the impact of thermodynamic variables on fitness. While the research mentions the Second Law of Thermodynamics, the relationship between entropy generation and fitness remains unclear.

The Second Law suggests that living organisms exist far from equilibrium, when in reality, they only achieve equilibrium with their environment at death, in terms of temperature, pressure, and ion concentration. Therefore, the following paragraph contains an error regarding the Second Law of Thermodynamics.“It is an inevitable consequence of evolution governed by the principle of least action, derived by Maupertuis in 1740. This principle is synonymous with the 2 nd Law of Thermodynamics. It says a system will minimize free energy, by whatever efficient means and mechanisms it has, to attain thermodynamic balance with its environment in the least time.” Moreover, the article may prove challenging for those without extensive knowledge of this subject matter.