Review of: "A Law for Irreversible Thermodynamics? Synergy Increases Free Energy by Decreasing Entropy"

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Potential competing interests: No potential competing interests to declare.

The author seeks to establish a “fourth law” of thermodynamics as an increase in synergy among self-reproducing systems. The language is ambiguous, but he seems to be suggesting a two-variable optimization formula. This reviewer cannot judge whether the case has been made, because no formulae used in his calculations are presented.

Also, thermodynamic laws may be strong in their generality, but that strength comes with the disadvantage of ignoring the constitutive heterogeneity of the system. A thermodynamic law may predict the optimum of a variable like entropy or information, but ignores the fact that that optimum might be achieved by a virtual infinity of combinations of distinct components. Whence, it cannot give one a particular outcome. There is always a one-to-many or homomorphic mapping of the law to reality. Stuart Kauffman says that the boundary problem in such cases is “unprestatable”. This limitation of the law needs to be made clear.

This reviewer feels that the paper should not be published until more formulae are made explicit and the limitations of applying the law to heterogeneous systems are made clear.