

Peer Review

Review of: "Systematically Challenging Three Prevailing Notions About Entropy and Life"

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I agree completely with the authors about three misconceptions of entropy. I am sure that this paper is a step in the right direction, and we need more efforts to fight these misconceptions.

I have, however, a small comment on eq (1). Heat Q is not a state function; hence, it is incorrect to use the sign Δ . ΔQ means $Q_2 - Q_1$, that is, it supposes that there was heat in two states and ΔQ is the difference between heat in the second and the first state. However, this is not the case; heat belongs to the process and not to the states.

Hence, the correct way of stating the second law for a reversible process is $\Delta S = Q/T$, where Q is the heat supplied to the system during the change from state 1 to state 2 ($\Delta S = S_2 - S_1$).

The second law also has a form for an irreversible process (Clausius inequality), that is, $\Delta S > Q/T_{\text{ex}}$. In this equation, T_{ex} means the temperature of the environment. Later on, the authors obtain the inequality in Box 1, but it would be better to write it directly in Eq (1) like below:

$\Delta S = Q/T$ for reversible processes

$\Delta S > Q/T_{\text{ex}}$ for irreversible processes

Declarations

Potential competing interests: No potential competing interests to declare.