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

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First, I would like to discuss the notion that entropy is a measure of disorder. Entropy, as a state function, is useful for describing the behaviour of a process/reaction. Accordingly, for such scope, entropy values are calculated with respect to a reference state. I would like to invite the authors to comment on this view: “The entropy (S) is heat energy divided by the temperature. The change of entropy (ΔS) of a system or of a process is indicating that a heat exchange (Q) occurred. Although S is not strictly a measure of the order/disorder, ΔS is in relationship with the order evolution/devolution of the system/process: $\Delta S < 0$ means that the system has achieved a more ordered status, and vice versa.”

Also, the Boltzmann equation could be used in the end to assess the change of entropy (ΔS): in this way, the calculated ΔS is coherently in relationship with the states of the systems. For instance, according to formula (4), $\Delta S > 0$ means that $W2 > W1$ and the system evolved to a more disordered state (more configurational states have been created).

Then, another comment on the association of entropy to the microstates (formula 2). In my view, such a definition in classical thermodynamics is not elusive since it is definitely related only to the microstates of atoms and molecules and not to those of sub-atomic particles. It would be interesting to know why the sub-atomic level has been disregarded: does it contribute in a negligible way to entropy? So far, classical thermodynamics has considered only the chemical processes involving uniquely the contribution to the atomic and molecular forces to the chemical potential: what happens when the classical thermodynamic approach is applied to nuclear reactions?