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Maxwell's Biological Demon: Fermenter of Information

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Maxwell's Demon, a useful construct for physics, has become even more useful for information science and biology. This article builds on recent research which applied information science to show that Maxwell's demon cannot violate the Second Law of Thermodynamics: entropy is always generated by the demon when both the measurement and information erasure processes are properly accounted at the quantum level. Although the quandary to physics caused by the demon has now been resolved, information science and biology may still employ Maxwell's demon to great effect. The biological realm is populated at every level with Maxwell's demons which work to reduce entropy in order to sustain the life of a host cell. Each one of Maxwell's biological demons in the cell measures biochemicals, selects for use or rejects, and resets itself to continue its function. This article evaluates the yeast cell *Saccharomyces cerevisiae*, fermenter of popular beverages and biomass energy, as a Maxwell demon. As a yeast cell seeks to reduce the entropy of the materials it uses to sustain itself, it finds and reads extra information for the phase space typically ignored by physics when calculating the initial entropy of the sugar solution.