Notable Failures to Explain Entropy

Previous attempts to explain the origin of irreversibility – and therefore entropy –all failed because they could not identify a manifestation at the submicroscopic level.

Boltzmann's investigations considered all possible collisions of molecules in a gas. From this he was sure that his 'H theorem' proved that a distribution of molecular velocities would ineluctably be driven to the Maxwell-Boltzmann distribution. But in fact he had only shown that this distribution is indeed associated with equilibrium conditions.

The number of molecules with component velocities in each of three-dimensional directions remains unchanged after each elastic collision except that they are reversed – the epitome of a reversible interaction. There is no number of completely elastic collisions that changes the distribution of relative velocities of molecules in a gas by one iota. Nor did Boltzmann shed light on how thermal radiation arises in a thermodynamic system.

Einstein's derivation of the Planck distribution of blackbody radiation associated with thermo-dynamic systems in equilibrium failed in a similar way to shed light on irreversibility. Although demonstrating that the resulting distribution would remain compatible with the Maxwell-Boltzmann distribution by means of momentum transfers to the kinetic motions of the molecules in the system, he did not use his own relativistic Doppler formula in this endeavor, and because of that simplification he failed to identify a source of irreversibility.

Statistical mechanics addresses the combinatorics of permutations that are inevitable concomitants of random distributions. Clearly there is an irreversible tendency to distribute an increasing amount of the total energy among more and more component particles. Clearly there are many more ways for particles to possess small portions of the total amount of energy than there are for some of them to possess large portions of the total amount. But this does not in any way suggest mechanisms by which these tendencies arise. The discipline is based exclusively on likelihood which leaves it vulnerable to suppositions of possibilities that, for example, all of the molecules of air in a room could end up in one corner of that room defying the conservation laws. There is physically no way for that to occur.