

Review of: "Evolution, Through the Lens of a Physicist"

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This MS addresses an interesting question about the ability of physics, with its reductionist approach, to explain biological evolution. My feeling is that physicists will fail to understand biology if they ignore the main constituent of any living cell: water. The trouble here is that physics is deeply rooted in mechanics, and the pertinent variable of mechanics is mass. So, it is natural for a physicist to characterize living systems by the masses of their constituents. By weight, the average adult human is approximately 60% water, thus giving the false impression that water is just here to fill the voids generated by the stacking of the remaining 40 wt% of non-water. A second trouble is that biology is more related to chemistry than to physics, and the pertinent variable in chemistry is the number of objects (SI unit mol) and not their mass (SI unit kg). When considering numbers and not masses, a totally different picture emerges. For instance, a male human body is 96.4 mol% water, 2.2 mol% inorganic ions (Na^+ , K^+ , Cl^- , Ca^{2+} , Mg^{2+} , H_2PO_4^- , ...), and only 1.4 mol% organic matter (CHONS). For a female human body, we have 97.5 mol% water, 1.5 mol% inorganic ions, and only 1.0 mol% organic matter. In other words, what we see of an organism is at most 1.4 mol% (man) or 1.0 mol% (woman), and what we don't see is salted water (98.6 mol% for man and 99.0 mol% for woman). The usual trick to dissimulate these numbers is that it is usually assumed that chemistry is reducible to quantum physics. So, assuming that biology is reducible to chemistry and chemistry to (quantum) physics, physicists are fully allowed to give their opinion to biologists. But, if they omit water from the analysis, they are just focusing on at most 1.4 mol% of the living thing. Precisely, I was unable to find a single statement in this MS stating that a living thing is first mainly salted water and secondly organic matter.

Because salted water is everywhere, even in non-living things, this approach based on numbers and not masses explains that any reductionist approach to biology is doomed to fail. Instead, a systemic approach, including all species living on Earth and their environment, is required. This is because water is everywhere on Earth and in everything, living or not. But the situation is worse than this, as we know that to explain why ice floats on liquid, it is mandatory to use quantum field