**Response to Bill Miller Abstract 5/14/25**

A long-standing presumption among many physicists and mathematicians is  
that biology is a descriptive endeavor and any deep understanding of the  
living frame must issue from their more rigorous disciplines.

**[Unless the ‘meaning’ of physics and mathematics derive from the cell, placing the primacy on biology, physics and mathematics as derivative]**

Nonetheless, neither physics nor mathematics has explained the non-equilibrium living  
state in which intelligent self-referential cells deploy problem-solving  
competencies to sustain themselves across living scales.

**[In a recent paper (Torday JS. Symbiogenesis redicts the monism of the cosmos. Prog Biophys Mol Biol. 2024 Sep;191:58-62) I ask rhetorically why Symbiogenesis is conservative, non-destructive, rationalizing that the latter would not produce the memory needed to evolve effectively. And in the frame of Gould and Vrba’s ‘exaptations’, or pre-adaptations, the origin of Symbiogenesis is a holism. These ideas are predicated on the physics of homeostasis and the mathematics of the Cosmos (Plato), offering a way of understanding physics and math as aspects of biology]**

Consequently, some scientists argue that the reverse may be correct: biology might productively inform physics and mathematics, offering insights into how natural laws  
might extend beyond known physical and mathematical principles.  
In the same spirit, examining the specific attributes of biological  
information processing and living information management as specifically  
exemplified by cells might provide a productive further thrust to the  
fundamental action-logic of those theoretical information systems formulated  
by visionary information theorists.

**[But what if the story of life’s about energy, not matter? Consider embryogenesis, for example, which is due to a series of high energy phosphate exchanges, not information, culminating in the physiology of the off-spring, and beyond]**

To stimulate that initiative, it is proposed that information theorists might  
direct their attention to the specific informational characteristics of intelligent,  
measuring cells, which represent the basal strata of our living planetary  
system.

Several specific attributes of biological information have been  
empirically verified at the cellular level, thereby defining the informational  
conditions of our living system:

--All cells are cognitive, problem-solving agents.

--Their living context is the ambiguity of information.

**[Well, that starts even earlier, according to Schrodinger’s “What is Life”, the interior of the cell being constituted by negative entropy as the organizational principle for energy]**

--The uncertain validity of environmental stimuli governs the cellular  
reception, analysis, and deployment of all cellular resources.

**[Which is why the cell’s ‘GPS’ is homeostatic control of energy in order to determine the optimal position within the environment’s energy state based on commonly held mathematics of both mediated by Symbiogenesis]**

--Imperfect information requires cells to internally measure their  
received information.

**[Again, the measurement is that of homeostatic control of energy with respect to the environment]**

--Accordingly, all cellular information is a product of infoautopoiesis,  
entailing that all the information that any cell has about its external  
environment is exclusive, self-referential, and self-produced.

**[Information is material, but the guiding principle for autopoiesis is energy. Implementing Occam’s Razor, energy is much simpler than materialism]**

--Cellular infoautopiesis drives an obligatory and little appreciated  
derivative: each cell, and then we as cellular beings, create our  
exclusive self-referential representations of reality and act upon that  
self-generated purview.

**[No, it’s much simpler and more directly a function of serial homeostasis]**

--Obliged informational uncertainties stimulate the collective cellular  
analysis of self-generated cellular information, driving ubiquitous  
planetary multicellularity as a cellular expression of the familiar  
'wisdom of crowds'.

**[‘Wisdom of Crowds’ is controlled by the force of gravity, causing the cell to find its equipoise energetically]**

--Cellular information processing directs toward narrowing distinctions  
on the adjacents to diminish their obligatory uncertainty gap, yielding  
the effective minimization of surprisal in conformity with the Free  
Energy Principle.

**[How does the cell ‘process’ information? It is much simpler and more direct to measure energy in order to do as you suggest, guided by homeostasis as the mechanism….it’s entropy]**

--Every cell does work to sustain its self-directed state of homeorhetic  
preferential flux.

**[The ‘work’ is done by gravity, the cell just has to comply through homeostatic balancing of energy]**

--Narrowing the distinctions on the adjacents as the effective  
minimization of surprisal enables cellular predictions and  
anticipations.

**[‘Narrowing the distinctions on the adjacents’ is calibrating the energy of the cell and its immediate environment in order to achieve equipoise]**

--Self-referential cellular states of homeorhetic preference drive  
multicellular eukaryotic macroorganic behaviors and emotions.

**[Self is established as the ‘equal and opposite reaction to the force of gravity’, establishing the ‘set-point’ about which the cell oscillates, like a Schrodinger Wave. Multicellularity is the way in which Symbiogenesis formulates new traits in an ever-changing environment due to an expanding Cosmos. The ‘do-dads’ are the history of the organism, which it uses to measure homeostasis, the underlying unicellular state perpetuated as the germ cells, through which epigenetic marks are processed for Lamarckian adaptation]**

**SOME BASIC QUESTIONS (for the discussion)**

Information in the living frame has been commonly defined according to  
Bateson’s familiar definition as a 'difference that makes a difference over  
time.' How might that definition explain internal self reference that governs  
our lives, enabling living information management? Might other definitions  
serve better?

**[‘The difference that makes a difference over time’ describes serial homeostasis, which occurs internally as the reaction to the original force of gravity that set life in motion in the first place]**

How can previously formulated information theories illuminate the cellular  
living process within its obligatory context of informational ambiguity?  
How do current information theories explain the presence of inference,  
prediction, and anticipation.

**[Again, if you exchange energy for information, inference, prediction and anticipation are all resolved]**

Why do these informational cues, which must first manifest at the level of  
cells as exclusive states of self-referential homeorhetic preference, exert in  
multicellularity as nuanced multicellular behaviors and emotions?

**[At the cellular level, when homeostasis is disrupted, the cells involved produce Radical Oxygen Species that cause gene mutations and duplications. Once the cells re-establish homeostasis with respect to their new environment, the self-referential self-organized entity is healed in the short run and evolved in the long run…btw, the endocrine system is known to be under epigenetic control, demonstrating that behaviors are dictated by the environment]**

Recent research confirms the remarkable competencies of diverse  
intelligences across living scales. How might applying information systems  
theory contribute to our debate about any categorical distinctions between the  
living frame and the abiotic realm? If a fluid continuum is asserted, how  
might that be rationalized?

**[The Elements that we have evolved from, like iron as the core of heme protein for oxygen carrying capacity, or iodine as the basis for the thyroid were produced as by-products of star formation or Stellar Nucleosynthesis as the ‘logic’ of the Cosmos. Symbiosgenesis- the assimilation of factors in the environment- is the mechanism by which such Elements have been incorporated into our physiology and consciousness]**

Is our understanding of biological systems improved by asserting an  
immaterial Platonic informational platform permitting cells to interrogate a  
constrained portion of universal informational space-time (? phase space  
partition) as part of a universal informational fabric?

**[No. This is deductive, and is therefore tainted by anthropomorphic ideation]**

Given the extraordinary competencies of current AI systems and projected  
future abilities, how might information theory inform constructive responses  
to inevitable social, economic, and cultural pressures?

**[Well no, AI doesn’t account for non-local consciousness, which is where complex cultural pressures emerge from]**

What should govern our ethical responses to the still-developing organic constructs  
 which will include synthetic combinations of digital competencies and living cells?  
If 'consciousness' is determined to be a litmus of our ethical stance toward  
other living entities, what practical informational threshold exists, if any?

**[I am of the opinion that we are all ‘holisms’, and we must operate in that vein to do what is best for the whole, not based on information but on the flow of energy through us. Gregory Bateson addresses this as ‘The Double Bind’, in which we deceive ourselves to the point of tying ourselves in a knot. The other metaphor he uses is an ‘energy glut’, which occurs when we lose our sense of homeostatic flux in order to ‘fit’ with our environment…it’s Darwin’s ‘Fitness’ couched in energetic terms. That’s where empathy and self-sacrifice emerge from, but only if one thinks and acts in service to the whole.]**