

Is Naturalism on Life Support?

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Abstract

Most bench scientists would find this question to be absurd. What could possibly be more fundamental to science than the presupposition of at least a necessary “methodological naturalism.” Pre-assuming that everything arises from physiodynamic causation alone has served science well, hasn’t it? But then, there’s the scores of nagging problems that arise from limiting investigation of a perceived reality to nothing more than Monod’s Chance and Necessity. Tension begins with the fact that the scientific method itself would be precluded if the philosophy of physicalistic naturalism were consistently maintained. Next, there’s nothing physical about numerical constants such as pi and the speed of light. All of the physical laws that govern physiodynamics are abstract formal mathematical concepts. The manipulation of these equations is altogether “teleological.” Logic theory loses all substance and reliability in a purely physicalistic epistemology. Our argument for physicalism betrays itself in its necessary use of nonphysical formalisms in trying to make its case. Consciousness, perception, language, and interpretation of results cannot be trusted within a purely physiodynamic ontology. Evolutionary biologists continue to bury their heads in sand regarding the choice-based controls needed for synthetic organic chemistry. Chance and Necessity don’t know what “function” is, and could care less. No rational justification exists for blindly believing that inanimate nature programmed prescriptive infogenesis using representational code. On-the-fly live DNA reprogramming to achieve rapid adaptation has now been documented in multiple species. An RNA stochastic ensemble doesn’t DO anything useful even if it spontaneously “emerged.” But its half-life is only four hours. Eons of time and purely metaphysical multiverses provide no mechanisms. No explanation is offered for the particular chiral-induced spin selectivity so critical to life. The list of inadequacies of physicalism goes on and on [1].

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What is naturalism?

Usually, the first thing that comes to our minds is “anti-supernaturalism.” But the closest to an actual definition of naturalism is probably, “The belief that only natural laws and forces operate in the universe;” or maybe, “Nature contains all of reality.” Most philosophic naturalists believe that physicalism

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is sufficient to describe and explain ontological *being*, and that no ultimate purpose exists in cosmic events. Although not synonymous with naturalism, physicalism/materialism tends to be hopelessly wed to naturalism. Even when naturalism is limited to methodological naturalism, physicalism still functionally winds up defining what is “natural” in our minds, models, hypotheses and lab procedures. Naturalism was long ago incorporated definitionally into scientific methodology.

The vast majority of us adopted an anti-teleology metaphysical perspective early in our scientific education. We see this as quite necessary to ensure rigorous scientific methodological accountability. In the early days of naturalistic science, distilling down our worldview of ontological reality to little more than mass/energy, chance and necessity, thermodynamic flux, etc. seemed wise. We *had* to protect science from philosophic and religious intrusions. Our response was to limit natural science investigations to physiodynamic interactions. We incorporated this limitation into natural science to prevent contamination of results and conclusions by undependable data attributable to superstition and supernaturalism. We wanted to study the regular and repeatable observations of “natural” occurrences. Entertaining irregular and unexpected miracles would make scientific investigation virtually impossible. Law-like causation produces the same effects every time with very little statistical variation. Most scientists subscribe to this traditional approach to the scientific method. The pre-assumption of uniformitarianism ruled by Necessity has seemed very productive. Why question it?

Relativity, quantum mechanics, Onsager’s paired disequilibria thermodynamic fluxes, etc. have all played major roles in softening our absolutism of physicalism/materialism even within “the physical sciences.” But the initial serious challenge to physicalism in the physical sciences has been the crucial roles played by the numerical constants, the extraordinary fine-tuning that allows life on this planet [2], the mathematical governance of physicality, the formalism of the periodic table’s organization, and the effectiveness of weights and measures capable of representing physicality with numbers. Is mathematics physical? All these abstractions are highly conceptual, representational and formal rather than physical. Most all of the laws referred to as “necessity” in Monod’s “Chance and Necessity” are mathematical expressions. Nonphysical mathematics governs every aspect of physical causation and order (The Formalism > Physicality [F > P] Principle [3, 4]). Mathematical manipulations put a physical man on the physical moon. We can fully and accurately predict what mass/energy conversions will do with nonphysical mathematics. This has caused more than one Nobel laureate to ask why nonphysical math governs so well the material world. We have had zero success in explaining “The unreasonable effectiveness of mathematics in the natural sciences” [5-10]. But this “unreasonableness”

is only because we began with and based all of our thinking upon metaphysically presupposed physicalistic naturalism. When intra-cosmic formalisms are also regarded as natural, there is nothing at all unreasonable about mathematics.

Even with methodological naturalism, the question remains, “What do we mean by “natural?” Naturalism’s answer to “What is natural” only cycles back tautologically to the same old tired dogma, “Only natural laws and forces operate in the universe.” This is not a scientific, but a purely metaphysical pontification. Many bench scientists appreciate the purely metaphysical nature of physicalistic presuppositions. They have no problem with settling for “methodological naturalism” rather than insisting on a dogmatic worldview of “ontological naturalism.” But the practice of limiting science to methodological naturalism still functionally constrains investigations to a materialistic physiodynamic determinism. Choice causation and agency, both prominent aspects of everyday down-to-earth reality, are still excluded from scientific investigation. “They are considered *philosophically* to be too teleological.”

Another problem with “methodological naturalism” is that it is itself metaphysical. It derives from its own philosophic pre-assumptions. It presupposes, for example, that certain tightly controlled biochemical reaction sequences and biological orchestrations should not be viewed as “purposeful.” That too would be seen as too teleological. Methodological naturalism just wants to study physical science phenomena, leaving life’s choice controls and engineering in never-never land. The same was done with human engineering science. We just chose to turn a blind eye in natural science, we thought, to anything involving agency. Never mind that the scientific method itself is a function of agency, and that only agents practice the scientific method. Had we been logically consistent, we would have effectively eliminated ourselves from scientific investigation. Instead, we even labeled psychology and sociology as sciences.

Bartosz Wesół [11] contends that naturalism, when defined as an ontological position grounded exclusively in the scientific method, is ultimately self-refuting. He draws on the works of William James and Charles Sanders Peirce. Wesół argues that they both pose significant challenges to naturalism.

“James interprets naturalism as an “over-belief,” a dogmatic worldview that is assumed rather than justified through science. Peirce, in turn, highlights the indispensable role of abduction in scientific inquiry, a conjectural process that cannot itself be naturalistically explained. When combined with Jaegwon Kim’s analysis of the epistemological and metaphysical dimensions of naturalism, these insights reveal that radical naturalism cannot justify itself, and it is also self-refuting. As a result, the scope of legitimate naturalistic positions must be reconsidered within more modest boundaries.” [11]

Einstein's advocacy of "minimum metaphysics"

Einstein in his 1905 Annus Mirabilis papers seeking the unity of physical laws advised a minimum of metaphysics [12]. In the natural sciences, we take great pride in minimizing ultimate metaphysical questions. But is our pride justified? Is our science as stripped of metaphysics as we claim? Or is all of natural and physical science based squarely on a purely philosophic presupposition that "Physicodynamics is all there is"? Clearly, ontological being consists of far more than mass/energy. Nonphysical formalisms abound, especially within science itself. Axioms are well-entrenched unproven pre-assumptions. Both mathematics and physics are based on unproven pre-assumptions that harden into axioms. No matter how pristine our logic, rationality always emanates from some initial unproven "article of faith." Sound logic theory is essential to the practice of science, but we must always remember that all logic flows from unproven presuppositions that are just believed. There is no such thing as a nonbeliever. All human beings are believers, including the best of scientists. It is the nature of the human finite condition not to be able to prove all sorts of metaphysical beliefs from which all of our reasoning emanates. Another foundation of natural science is repeatable observation, especially by independent teams of researchers. But our senses offer an additional quagmire of philosophic indeterminants and enigmas. Then there is the small matter of formal language required to communicate research findings. What about logic theory's and language's roles in the scientific method? Are either of these elements physical? Physicalism in science becomes thoroughly hypocritical when we fail to acknowledge the essential role of nonphysical formalisms that originate from the far side of The Cybernetic Cut [13-15].

Can non-trivial formal function arise spontaneously out of physicodynamics?

What is function? To define function necessarily involves the use of formal concepts such as "purpose," "goal," "meaning," "utility," "task," "role," "usefulness," "control," "steering," "directing," "choosing with intent," and "formal work" (not the "work" of physics, although even that is defined by a formal *mathematical* formula). In mathematics, "function" is an expressed rule or law that defines a relationship between an independent variable and a dependent variable. Mathematics plays the major role in formulating physicodynamic relationships. In every case, "function" is formal, not physical. Chance and necessity are utterly blind to functionality. The physics definition of "work" has absolutely nothing to do with utility. Every aspect of achieving function is formal rather than physicodynamic. Chance and necessity logically cannot possibly generate refined function. Pursuing usefulness requires purposeful choices. Functionality is a formalism, not a physicodynamic

property. Events must be steered by purposeful choices to achieve non-trivial refined function. The latter has never been observed to arise spontaneously from physicodynamics alone. Abiogenists worldwide are spending lifetimes trying to extract formal function out of physicodynamics when no empirical evidence exists to suggest that this is even possible. Why can't bench scientists appreciate this simple, perfectly obvious fact? They are blinded by their purely metaphysical commitment to physicalistic naturalism. Once committed to the naturalistic metaphysical imperative, physicodynamics HAS TO be able to produce the formalisms of life. But that perspective encounters a logical blockade, not just a best-thus-far empirical limitation. Neither chance nor necessity can steer events toward utility. Physical laws, constraints and forces do not perceive, value or pursue usefulness. Only formalisms can produce non-trivial function.

Are formalisms and function "natural?" If not, formalisms and function must be "unnatural," and excluded from natural science as we did with Engineering science. But the fact that formalisms and function have teleological elements does not establish that they are "unnatural," mystical, superstitious or religious. This is especially true if we draw a distinction between intra-cosmic reality and extra-cosmic metaphysics. Ultimate, transcendent metaphysical questions by definition are not going to be answered by physics and chemistry. That is not the case with intra-cosmic phenomena. In "Mundane Proximate Teleology," ordinary everyday formalisms, function, Choice Causation and agency are common, "natural," and are fully addressable by natural science.

Maxwell's Demon

What is the silly cartoon character of Maxwell's demon doing in physics texts? His existence points to a major deficiency in the explanatory power of physicalistic naturalism. His personage represents an ever-present reminder of formalisms and their influence *within* cosmic reality. We are talking about what this author calls, "Mundane Proximate Teleology," as opposed to questions of ultimate transcendent metaphysical teleology. Bench science does not and should not concern itself with metaphysics. But this should not preclude natural science's study of Mundane Proximate Teleology.

Physicalistic naturalism gets quickly into trouble as a direct result of "dissing" Maxwell's demon and his purposeful choices of when to open and close his trap door. An energy differential/gradient is impossible to achieve as a Sustained Function System (i.e., the simplest heat engine) without the demon's active selection of when to open and close the trap door between compartments [16](See Figure 1). Failure to acknowledge the Demon's role of *choice control* kills all hope of generating a sustained heat engine. Choice Determinism is the most consequential cause and force on earth. It has dramatic and vast real effects.

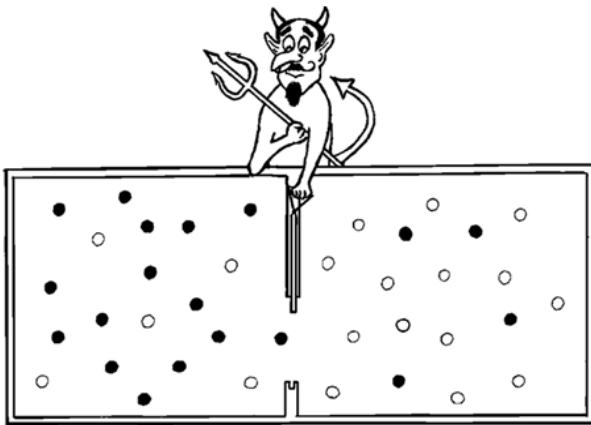


Figure 1: “Mundane Proximate Teleology:” Maxwell’s Demon on earth has to purposefully choose when to open and close the trap door to accomplish his goal. The gas molecules are inert/ideal. No physicochemical mechanism can explain spontaneous formal self-organization to the utilitarian end of creating even the simplest non-trivial heat engine equivalent. To create a heat differential between compartments requires purposeful choices. No Choice Causation—No Heat Engine. No Heat Engine—No Life far from equilibrium. (Figure from Chapter 10, “Moving ‘far from equilibrium’ in a prebiotic environment: The role of Maxwell’s Demon in life origin.” In *Genesis - In the Beginning: Precursors of Life, Chemical Models and Early Biological Evolution* Seckbach, J Gordon, R., Eds. Springer: Dordrecht). Also cited in Abel, D.L., *Mutations of WHAT?* Journal of Bioinformatics and Systems Biology, 2025. 8: p. 83–98.

Physicalistic naturalism lacks steering, directives, formal organization (as distinguished from mere self-ordering phenomena), orchestration, controls and governance of most aspects of everyday mundane reality. Meaning, purpose, goal and pursuit of useful function are nonexistent in consistently held naturalistic presuppositions. The sterility of physicalism is the price we pay for philosophically castrating ordinary reality of common everyday teleology (“Mundane Proximate Teleology”). Mundane Proximate Teleology is simply not the same as questions of metaphysical ultimate transcendent teleology.

When we look in any direction, the chances are overwhelming that we will see the effects of Choice Determinism, not just Physicochemical Determinism. Where did all these everyday earthly choice-contingent effects come from? What *caused* the *choice commands* that caused all these effects? If we can’t study how they came about because they are “too teleological,” we might as well close down our labs and return to the dark ages.

Only a fool believes that the orchestration of life’s efficacious executable choice commands was purely physicalistic. No logical or empirical data support such a blind religious belief. Four-dimensional genomics (including devices needed to process those choice commands) puts to

shame our finest mainframe computers and three-dimensional printers. Not even a simple piece of wire can be produced by physicochemical causation alone. Then there’s all of the prescribed adaptive polymorphisms to explain [17]. Reserve programming modules are called up into upper memory allowing rapid adaptation to sudden severe environmental challenges. Irrefutable evidence now exists in multiple species of active ongoing real-time reprogramming of DNA to achieve rapid adaptation [18].

There will be no escaping the Universal Determinism Dichotomy (UDD) [19] in science, not if we want to synthesize a single RNA polynucleotide analog molecule or the simplest correctly folded polypeptide. The specific functional polysaccharide requirements are even more demanding [20, 21].

Are intra-cosmic formalisms and teleology necessarily supernatural?

If mathematics is not natural, what is the justification for calling the laws and constants of nature “natural”? Physics cannot be a “natural science” if mathematics is not also natural. If the mathematics of physics is not “natural,” what is? Mathematics may not be physical; but that doesn’t establish that it is not “natural.” What about a “force.” What exactly is a force? The definition of “natural” is not as physicalistic as we might like to argue.

Chance and Necessity could not have caused mathematics. The formal source of mathematics is beyond physics to elucidate. Such is the very definition of “metaphysics.” But science has no obligation to address ultimate metaphysical questions. They are not the subject of bench scientists’ investigations. Philosophers have no business impeding bench scientists’ work with transcendent philosophical questions. Any type of causation on earth should be fair game for science. Choice causation is one of those types or causation. It cannot be declared off limits simply because philosophers consider it to be too teleological. Science must be able to investigate “Mundane Proximate Teleology” if that is what is repeatedly observed on earth. The latter must be distinguished from questions of ultimate transcendent metaphysical teleology.

Controls are observed everywhere in immediate down-to-earth reality. Are these controls not “natural”? Controls are ever so much more than mere constraints [22]. Controls always involve purposeful steering. We cannot discuss controls without acknowledging the Universal Determinism Dichotomy (UDD) [19]. Controls arise only from Choice Determinism, not Physicochemical Determinism. But including Choice Determinism in science as a legitimate cause of real effects would require redefining what is “natural” in “natural science.” This should have been done long ago.

Another softening factor from our naturalistic

fanatical absolutism has been the epistemological problem encountered even by naturalistic science. Science itself is an epistemological system of finite minds. It requires formalisms like language, representational sign and symbol systems (e.g., the graphing of results), experimental design and execution, the formal rules of logic theory, the tabulation of data, the drawing of rationally sound conclusions, the extensive use of digital and analog designed and engineered lab equipment, even adherence to ethics in the reporting of results. None of the major components of the scientific method are physical. They are all abstract, conceptual, nonphysical formalisms of mentation. How did they arise out of Chance and Necessity? How did the Material Symbol System (MSS) of genomics arise in a purely physicalistic reality?

The required tight controls of the simplest synthetic chemistry

Physicalism cannot explain the stepwise critical controls required for even the simplest synthetic chemistry, organic synthetic chemistry especially. Every synthetic chemist is intimately familiar with this problem. Unfortunately, evolutionary biologists, abiogenists in particular, are usually not. Delicate Mundane Proximate Teleological controls are required for every step of organic synthetic chemistry. Success requires marshalling reactions in the right order at the right temperature, pressure, light, and in the right precise quantities with the needed pauses in reactivity to produce anything other than useless tar [23-26]. Run-away reactions must be stopped at just the right time. The carefully ordered steps and conditions required for synthetic chemistry and orchestration of any protolife model have been extensively covered in a 2024 paper entitled, “Why Is Abiogenesis Such a Tough Nut to Crack” [1].

In the real world, not even a simple homochiral 5-carbon ribose or nucleoside molecule can be manufactured spontaneously under prebiotic conditions. RNA chemists like Albert Eshenmoser and Leslie Orgel spent their lifetimes in frustration trying to make an ultra short simple stable RNA stochastic ensemble. They couldn't even make it past a trimer to a tetramer. Even if they had, an RNA stochastic ensemble would have contained zero Prescriptive Information (PI) [27-29]. And that stochastic ensemble would have been racemic with many 2'5' bonds forming instead of the required 3'5' phosphodiester bonds. Just one 2'5' bond in a polynucleotide can preclude life's formation. Nucleotides would have had all kinds of aberrant unwanted side chains. Then, there is the extreme half-life problem of only 4 hours for a short RNA stochastic ensemble. RNA's half-life shrinks to minutes as the number of monomers increases to typical cellular RNA lengths [25, 26, 30]. Not even the shortest RNAs form spontaneously under prebiotic conditions. Most synthetic chemists now regard the RNA World model of life origin to be dead in the water.

What is life?

Up until 2026, life had never been adequately defined. It was only well described [31-41]. NASA's attempt to define life, “A self-sustaining chemical system capable of Darwinian evolution,” was grossly inadequate. Stuart Kauffman's best attempts to teleonomize life-origin remain sterile [33, 42]. But in 2026, life was finally formally defined with a testable, falsifiable definition [43]. The dichotomy between life and non-life is not a gray-scale transition [44]. The new long-awaited definition [43] provides a digital, crystal-clear, yes-or-no absolute. A cell is either actively exercising this unique *functional* process, or it is not. This definition of life is all-encompassing of the entire array of living organisms, whether single-celled; multi-celled; sterile/nonreproducing (e.g., the “mule problem”); and currently evolving or not evolving. It is applicable to Monera, Protista and on up to the remaining three Kingdoms. Interestingly enough, this definition is also fully applicable to NASA and astro/exobiology pursuits. “Biosignatures” include the functional processing devices designed and engineered by subcellular life to process its own undeniable cybernetic programming. Active ongoing Processing of Efficacious Executable Choice-Commanded Causation and Control (PEECCCC) is alone what produces life's formal computational haltings. ALL known life is programmed [45]. The definition emphasizes the gerund phrase, “being alive.” Efficacious Executable Choice-Commands aren't just instructions. The active ongoing cybernetic processing actually performs the tasks and accomplishes the highly integrated biofunctions. A real-time symphony of disparate instruments each with their own varying sheet music is orchestrated into the singular goal of being and staying alive. Regulation is accomplished with live configurable-switch settings and re-settings at bona fide “decision nodes.” True choices are made that determine formal accomplishments. The recordation of prior programming into DNA is broken up and re-assembled as new programming for the algorithmic optimization of adaptation. This re-programming has now been proven in multiple species. It is called Programmed Genomic Rearrangements (PGRs) [46-54]. This collective execution/processing is what dichotomizes life from non-life [32, 44, 45, 55, 56]. Active ongoing Processing of Efficacious Executable Choice-Commanded Causation and Control (PEECCCC) constitutes the long-sought-after potentially falsifiable definition of life.

Objection to this definition generally focuses on objection to the word “Choice.” Choice is viewed as too anthropocentric and too teleological to be entertained even by “methodological naturalism.” We fail to realize that this objection is purely metaphysical, not scientific. Choice is the active selection of something at a bona fide decision node from among multiple options, the choice of which is not precluded by laws and constraints. Choice is real. Choice is everyday ordinary reality. Choice is a *natural* aspect of

mundane ontological *being*. We are talking about Mundane Proximate Teleology. This has nothing to do with ethereal, ultimate, transcendent superstitious or religious metaphysical belief. Most of down-to-earth everyday reality cannot be generated apart from Choice Determinism. Subcellular molecular biology, genomics and epigenetic regulation are no exceptions.

What *is* scientific is both logically sound and empirically repeatable. What we repeatedly observe on earth is purposeful choices in molecular biology, its four-dimensional genomic programming controls, alternative splicings of lncRNAs and highly regulatory epigenetic switch settings. Subcellular life is controlled, not constrained. Controls require formal active selections from among real physical options. Even molecular evolution would have required active selections prior to any realized non-trivial function [56]. Nothing can be controlled without Choice Commands, including life's programming. Choice commands are produced only by agency. Epigenetic switch-settings regulate genes by purposeful choice, not by chance or fixed law. This is what "regulation" means.

Life exists in virtually every environment on earth. If anything, life has far more to do with abstract concept, highly refined formal function, formal organization and outright orchestration than it does with physical law. Very real directives and controls, not just constraints, are instantiated into physical media much the same as these written thoughts are instantiated into "physical" digital media. Even quantum theory becomes incompatible with blind belief in Mass/Energy all-sufficiency. Life's programming commands & computational halting are not physical. Are they natural? If not, then the natural sciences of molecular biology and genomics must immediately be demoted from their current natural science status into the same class of science as Engineering. But if we have to "excommunicate" biology from natural science, it's time to reconsider our purely metaphysical concept of what is "natural" in nature. If the science of biology is not science, something is very wrong with our current most fundamental axiom of science. We are long overdue for a major Kuhnian paradigm shift [57].

The focus of The Gene Emergence Project has always been elucidating how executable choice commands arose naturalistically. What has become painfully apparent over the last 25 years is that genomes could not possibly have arisen from physiodynamics alone. Genomes issue choice commands, not constraints. Mere bifurcation points and neural net nodes are not "decision nodes." Decision nodes require efficacious purposeful choices, at least if any refined function is expected to result [17, 32, 44, 45, 55, 56, 58-60]. No functionality is as refined as that of life. Which particular nucleoside next to polymerize is "physiodynamically inert." No physico-chemical preference exists for one nucleoside over the other three. Semantic and syntactical representationalism is formal, not physical. Chance and

necessity simply cannot orchestrate all of these efficacious commands from stochastic ensembles. The syntax of tokens (physical symbol vehicles) is highly intentional. Template models all fail to explain the source of Prescriptive Information (PI) of the template itself.

Efficacious Executable Choice Commands leading to sophisticated function of any kind are impossible without active selection, not the passive after-the-fact selection of evolution [61-63]. Genomes issue effectual orders that only later produce realizable function. Genomes' computations successfully "halt" only after successful commands are chosen and processed. The ultimate in function is only later produced: homeostatic metabolism far from equilibrium. Mutations affect proven effectual programming choices almost always for the worse. The rare instances where spontaneous mutations produce some obscure benefit (e.g., malaria resistance) are usually very contrived, happenstantial, and unintended rather than straightforward. Life consists of highly integrated circuits of formally halting computations. Life is programmed and cybernetically processed by active selections at bona fide decision nodes. The choices of nucleosides, alternate splicings, operators, widely distributed enhancers, tandem repeat number, epigenetic switch-settings, DNA methylation sites, histone acetylation sites, protein transcription factor sites, etc. are made in advance of any secondarily and passively selectable phenotypic superiority. How did Chance and Necessity accomplish such formal tasks? Physiodynamics does not have the capabilities of making such functionally efficacious choices. Physical organisms "being alive" is wholly dependent upon their active ongoing *Processing of Efficacious Executable Choice-Commanded Causation and Control (PEECCCC)*. [43, 44]. This includes the engineering of the extraordinary devices needed to process these programmed commands [55].

Function, formalism and life are inseparable

It was always easy to dichotomize Engineering science from so-called "natural science." The role of formal agency and teleology were so blatantly obvious in Engineering. But with the elucidation of so many undeniably formal choice controls at the molecular biological level, it is no longer possible to dichotomize formal choice commands from the "natural science" of biology. The effects of life's causation cannot be properly studied while denying the fact of executable choice commands of genomic and epigenomic programming. Controls cannot be reduced to constraints [22]. That life is programmed and cybernetically processed was emphasized by Nobel laureate Hamilton Smith of Johns Hopkins University and J Craig Venter from the Institute for Genomic Research (TIGR). Their team sequenced the 1.8 Mb genome of the bacterium *H. Influenzae* using formal *computational* methods. This work has given birth to tremendous growth in the field of bioinformatics. Multiple kinds of Prescriptive Information (PI) [27-29] are stored not only in DNA, but also

in other conceptually complex carbohydrates, lipids, proteins, and peptides. Even non-protein enzymes contain controlling Prescriptive Information (PI). Life's PI doesn't just contain instructions. PI's processing actually DOES what is needed. It contains efficacious executable choice-commands. PI is not just a Shannon possibility space.

The work of Smith and Venter should immediately disqualify traditional naturalism as an all-inclusive worldview. Life is just too formally infocentric, cybernetic and computational. That life is prescribed by active ongoing Processing of Efficacious Executable Choice-Commanded Causation and Controls (PEECCCC) has been affirmed many times over by J. Craig Venter:

“Life is the software of biology.”

“We are, in essence, information-processing machines.”

“In the code of life, we find the keys to unlocking the secrets of existence.”

“The human genome is the ultimate instruction manual for building a living being.”

“In decoding the genome, we are decoding the language of life itself.”

“Every organism is a masterpiece of biological engineering.”

Craig Venter [64]

None of these realities of life are physico-dynamic. All of them are based on formalisms from the far side of The Cybernetic Cut [13-15]. These formalisms are choice-based. They require active selection at bona fide decision nodes. Genomic prescription and algorithmic optimization cannot be achieved by passive, secondary, after-the-fact phenotypic differential survival. Chance and Necessity cannot achieve them either. We have to decide, once and for all, whether these formal aspects of life are “natural” or “unnatural.” If they are unnatural, we must boot biology out of the natural sciences the same way we did with Engineering science. If they are natural, then biology can stay within the natural sciences. But this is only if we redefine the traditional meaning of “natural” in “natural science.” The current definition of “natural” in “natural science” excludes and disallows Choice Determinism. Choice is *metaphysically* labeled to be too teleological. But Choice Determinism through active ongoing Processing of Efficacious Executable Choice-Commanded Causation and Control (PEECCCC) is exactly what defines life on earth [1, 17, 32, 44, 45, 55, 56, 58-60, 65]. We have no justification for thinking that extra-terrestrial life would be any different with regard to needing actively selected controls.

If natural science cannot address this major aspect of reality, it doesn't deserve its superior role in epistemology that we currently grant it. Science and philosophy were supposed to be about “progressive discovery” of the single objective reality. They were supposed to be about progressively bringing our finite subjective epistemology into greater correspondence with singular ontological being. If life and life's biosignatures have to be excluded from naturalistic science, something must be very wrong with our very definition of science. And indeed, there is! What is wrong is the purely metaphysical presupposition we insisted on incorporating into our very definition of science, that “physicodynamics is sufficient to explain everything.” Clearly, this is not the case. Physicodynamics cannot explain a single formalism.

Is life “natural?”

Most scientists have always presupposed that life is just a part of the physical, natural world. Astrobiology's most fundamental presupposition is that life, given enough time and planetary bodies, is an inevitable effect of inanimate natural-process causation. Abiogenesis researchers are committed to life's reducibility to nothing more than physico-dynamics and irreversible nonequilibrium thermodynamics [59, 66-79]. Life is believed to have spontaneously “self-organized” and “emerged” from nothing more than “complexity” and the self-ordering of Prigogine's dissipative structures [80-89]. Astrobiology pre-assumes that the evolution of life elsewhere in the physical cosmos “by natural process” was inevitable. Abiogenists are resolute to reduce life-origin to nothing more than physics and chemistry.

Thus, the above perspectives clearly establish that life is considered by physicalistic naturalism to be “natural.” Life is *not* seen as unnatural, mystical, vitalistic or somehow transcendent. The perspective of philosophic naturalism that life is “natural” is very important. We must carry it with us through our continuing discussions of “life.” It could also be argued by metaphysical naturalism that *everything* on earth and within the cosmos should be considered “natural” given naturalism's beliefs about cosmic and solar system origins. What else *could* everything be, including life, but “natural”? Even those “soft” naturalists who limit their approach to science to “methodological naturalism” functionally limit their scientific method perspective to what amounts to mass/energy physicalistic explanations. Natural science not only views the cosmos and all of its contents as natural, it sees them as being physicalistic. Biology and chemistry are respected as a natural sciences in accord with science's most fundamental axiom: “Nature is sufficient to explain all of nature.” We therefore expect to be able to study all aspects of life as natural physicalistic phenomena. But are they?

It depends on how we define “natural.” The absolute need for Maxwell's demon's purposeful choices in subcellular

life haunts naturalism day and night [16, 45]. For physical organisms to be “alive” is wholly dependent upon their active ongoing *Processing of Efficacious Executable Choice-Commanded Causation and Control (PEECCCC)*. [43, 44]. This includes the engineering of the extraordinary devices needed to process these programmed commands [55]. Are life’s formal computations and nano-equipment “natural”? [17, 32, 45, 59, 60] Since life has now been found by chemistry and biology to be wholly dependent upon formalisms, should we call life “unnatural” to preserve our purely metaphysical physicalistic presupposition? Or should we redefine what “natural” means in order to preserve “natural science?” The bottom line here is that Natural science must be free to study Mundane Proximate Teleological causation.

Self-organization and Emergence

No empirical evidence exists of the kind of “self-organization” and “emergence” upon which all of abiogenesis physicalistic belief is based. Pasteur’s and Virchow’s original First Law of Biology remains unfalsified: “All life must come from previously existing life.” Stanley Miller’s famous experiment in 1953 [90], and all abiogenesis research since, has not put a dent in explaining theoretical proto-life’s initial orchestration [1]. No explanation has been provided for life’s active selection of controls [91]. Protocellular metabolomics research is stagnant in the absence of purposeful steering toward biofunction. Reactions must be extremely controlled, not constrained [22] for even a theoretical protolife to arise [1, 32, 59, 91].

Abiogenesis required Mundane Proximate Teleology

Lifetime membrane research by specialists like Pier Luigi Luisi [92-95] and David Deamer [96-101] have never been able to generate a natural derivation of active selective membrane transport [102-106]. Spontaneously formed protolife from a self-replicative RNA analogue is a fantasy. Even if one “sequenced itself into existence,” it would only mass produce itself at the expense of every other needed potential biomolecule in that environment. Tremendous active-transport membrane challenges exist that are being ignored by proto-membrane theorists. A huge number of highly specific transmembrane proteins are needed. Glycoproteins, transport proteins, cholesterol, glycolipid, peripheral protein, internal protein, filaments of cytoskeleton, integral protein, surface protein, Alpha-helix protein, hydrophobic tails, hydrophilic heads, phospholipids, and highly specific carbohydrates are all needed. Lipase and many other enzymes are needed to make a real cell membrane. No enzymes of any kind are present in a micelle or vesicle environment. Not even enough functional peptides are there yet. The building blocks of lipids are fatty acids, phosphate, glycerol and ethanolamine. Very few of the incredible number of possible three-dimensional steric lipid formations fit the required bill for any conceivable

active transport membrane or form of life to arise. Cell membranes have highly selective pores that allow only certain metabolites in, and preclude others from getting in. Then, there are critical excretory and secretory pumps. Spin selectivity is a critical need. A bilipid layer micelle is a cartoon of an active transport membrane with highly selective pores. Not just osmotic gradients are required, but an incredible array of essential homeostatic requirements is maintained by cellular membranes in the simplest uni-cellular organisms. Outside lipids are different from inside lipids. Very complex layers of lipids exist even in organelles. They are highly organized with undeniably orchestrated functions, not just self-ordered by law or constraint. Ionophore pores are highly selective. What exactly does selective mean? The answer to this question is not explainable by any law, constraint or the four known forces of physics. Selection has to be active, not passive, for a proto-cell to even faintly resemble life. A cell membrane requires thousands of different lipids and protein-lipid complexes. Monoacyl lipids are a catastrophe. Different diacyl lipids are required on the inside from the outside to perform the required proton gradient and pumps. Nobody knows how natural law could prebiotically make the outside of the cell membrane different from the inside in a functional sense. An inanimate environment sees no need to arrange the tails and heads so as to achieve function.

Lynn Margulis’ models just presuppose organelles rather than explaining their origin [38, 107-112]. Membranes are critical to organelle function, too. How were monoacyl lipids avoided in a prebiotic environment? How were all the highly specific protein-lipid complexes made for selective transport. How were nutrient ingestion, waste excretion, and secretion channels in the supposed “protocell” developed to make it even resemble a protocell rather than a pathetic vesicle or micelle. A proton gradient is needed. How did prebiotic nature achieve that?

We appeal to templates. But templates of *WHAT?* What would have been the source of a template’s Prescriptive Information in inanimate prebiotic nature? Even if a pure population of homochiral monomers could spontaneously form in a racemic world devoid of already existing life, no explanation exists for the syntax and semantics of their polymerization into superimposed representational codes that prescribe formal function. The latest and best models of a supposedly spontaneous source of homochirality have been published by Ozturk et al [113, 114]. These authors showed that magnetic surfaces can act as chiral agents in a prebiotic environment. Crystallization from a racemic solution on a magnetic mineral surface can occur that produces an enantiomeric excess of homochiral molecules. Ozturk in a lecture at Harvard [113] continued with his “Central Dogma” of homochirality. The Chiral-induced spin selectivity CISS phenomenon can work in both directions.

All living systems have chiral-induced *electron spin*

selectivity (CISS) critical for such function as active transport through membranes. That is why the best synthetic chemists' yields are so pathetic, while subcellular life produces yields of 99.99999% purity. Electron spin polarization spins up or spins down. Homochirality only allows one electron spin to go through membrane channels, and not the other. Life can take two HO groups and produce *either* HOOH or $O_2 + 2 H^+$. Chiral-induced electron spin selectivity permits selection of the correct option needed for abiogenesis. CISS correlates the electron spin with the homochiral twist direction. One surface is parallel, the other is anti-parallel. No such correlation existed in an inanimate environment to achieve needed function. Even abiogenists often fail to appreciate these synthetic chemistry realities.

Electron transport in/through a chiral medium is spin selective. Electron Spin alignments are controlled by the handedness of the molecules they pass through. When photoelectrons go through a DNA monolayer on a gold plate, they get heavily filtered based on their spin alignment. This is because the sugars in DNA are already all right-handed. Notice that the homochirality is provided by the DNA from an already-living source. The genetic code could not have formed without homochirality already being in place. As Ozturk himself acknowledges, homochirality is "a prerequisite for life to start." And it must be pure, not just an "enantiomeric excess." Yes, enantiomeric excess can be induced by a naturally occurring symmetry-breaking agent such as a magnetic mineral surface. The problem comes with the need for amplification to the absolute enantiomeric purity needed for abiogenesis. Ozturk says he "knows how to produce d-RAO to then produce d-ribonucleotides." Yes, "investigator involvement" can, with great difficulty, and only for the most part up to dimers and a few trimers. A prebiotic environment cannot even generate d-tetramers of ribonucleotides with no poisonous 2'5' bonds and no unwanted side chains. Many RNA synthetic chemists have learned this the hard way. Not only is the RNA world dead because of synthetic chemistry blockages, it is dead because no RNA World model can generate a template of Prescriptive Information out of stochastic ensembles. Efficacious syntaxes have to be chosen according to rules, not laws.

The Amyloid World hypothesis [115] is also dead for the same two reasons. It's peptides use rare amino acids that won't polymerize in water without extensive experimenter involvement. The free energy is positive, meaning that monomers are favored over polymerization. This is a common problem with all organic polymerizations under prebiotic conditions. This is why the half-life of RNA is so short, especially with high mer lengths of RNA that are needed for even theoretical life. The hydrolysis rate is faster than the condensation rate. Dehydration synthesis is not easy to accomplish in an aqueous environment. The extreme heat at hydrothermal vents doesn't help, either. The very

conditions needed for synthesis are the same conditions that denature most any peptides that form. Amino acid mixtures include numerous non-biological amino acids. They must be absolutely homochiral levo-enantiomers. Tertiary structure is critical. Axe calculated the probability of a single functional polypeptide fold to be only one in 10^{77} [116].

Wet/dry models in mud fields are not realistic. Montmorillonite not only templates no Prescriptive Information (PI), it absorbs all kinds of unwanted contaminants that pollute life's needed absolute purity. The abiogenic chemical and infogenesis problems are too vast to cover in this paper. They seem inexhaustible [1]. Physicalism could not have generated the formal Periodic Table or Codon Table with its symbolic choice-based commands. Inanimate nature cannot generate highly specific functional lipids, carbohydrates, peptides, proteins, or polynucleotides, let alone where and when they would have been needed for abiogenesis. Historical and life origin sciences are immediately embarrassed trying to explain the cause and effect of genomic programming, the processing of that programming, and the engineering of the nano devices needed to do that processing. Superb synthetic chemist Professor James Tour at Rice University enumerates many of the challenges that face abiogenic research in his 14-lecture series on abiogenesis [117].

Few evolutionary biologists appreciate just how critical are the tight controls needed in synthesizing most abiogenic building blocks. Even abiogenists lack the expertise of synthetic chemists. Polymerization raises a whole slew of additional barricades. Mundane Proximate Teleology is needed in order to do most any organic synthetic chemistry in the lab. In a harsh prebiotic environment, virtually none of these precise choice-based controls would have existed.

Glassware has to be thoroughly cleaned and rinsed with distilled water or hydrogen peroxide. The quantities of reactants must be carefully measured. Only one product can be produced at a time with the environment cleared of all other potentially cross-reacting molecules. The sequencing of reactions is crucial. Run-away reactions must be stopped at just the right time. Temperature, pressure, light, humidity, must be optimized for each and every sequential reaction. The slightest impurity of just one reactant can ruin success at every step. None of the needed highly specific enzymes were present in a prebiotic environment. Highly intelligent chemists must keep separating out from ongoing reactions what is wanted and needed to prevent the inevitable tar end-product. No mulligans are possible. Cross-reactions occur at every turn. The conditions needed to form needed products are often the same conditions that degrade them. All ribose would have been gone, even if it had formed, within two days in a magnesium rich early earth crust. The yield is often only 1-2% of most organic syntheses, creating a mass transfer crisis. This problem arises with any net movement of mass from one location or phase to another. Mass

Transfer is involved in evaporation, drying, precipitation, absorption, membrane filtration, distillation, etc. With such low yields, even in carefully controlled synthetic chemistry labs, any environment soon runs out of resources. Aqueous environments prevent dehydration synthesis. Polypeptides cannot form in the presence of sugars or aldehydes. Amino acids and sugars cross react, resulting in insoluble polymers. Molecules oxidize. Ammonia in a reducing environment is anything but helpful. A reducing environment is even more degrading. Amino acid mixes are not just of the 20 classic needed amino acids. Many other poisonous amino acids are mixed in that would have jammed abiogenesis.

Four fundamental kinds of molecules are needed for abiogenesis, not just proteins. Lipids, polysaccharides and nucleotides are also essential. All of these players present tremendous engineering problems to produce. Even then, they are only racemic. The possible permutations of polysaccharides and lipids alone that can form is mind-boggling. Abiogenesis is not just a protein or nucleoside-formation problem. Polysaccharides and lipids present far worse challenges. Selection of only the correct moieties is statistically prohibitive. Even if the production problems of basic building blocks is overcome, then all the polymerization problems begin. As Tour points out, just six repeated units of D-glucose can form one trillion different branching and stereo-chemically distinct hexa-saccharides. Only a few out of this vast phase space can be used. Nobody has ever made a self-purifying starch necessary for life in a relatively useful stereochemical form in a prebiotic-like environment. This doesn't even address a purely homochiral right-handed only ribose. A pre-biotic environment can't generate homochirality.

Carbohydrate polymerization is statistically prohibitive without highly specific enzymes that were simply not present in a pre-biotic environment. Polysaccharides have vast numbers of carbohydrate appendages. They have highly unique assemblies and important functional three-dimensional structures, the same as proteins. Even when one already has D-glucose, it can have a large number of other possible forms mixed in as pollutants that terminate any hope of abiogenesis. To make a 5-carbon carbohydrate requires outright engineering. DNA tripartite needs ribose. Virtually none of the building block precursors form spontaneously, especially with enantiomeric excess. But excess isn't good enough. Homochirality of sugars and amino acids needs to be 100% for electron spin up or down to make life work. Prebiotic reactions had no control over critically-needed stereochemistry. Sophisticated enzymes not only make reactions possible, but speed them up by many orders of magnitude. Abiogenesis could never have occurred at the ridiculously slow pace of reactions in the absence of sophisticated enzymes. Early enzyme-like moieties would have been totally inadequate. Enzymes not only make things happen; they speed things up. They also check things out and

correct mistakes. But enzymes themselves need nucleotides and coding rules, not laws, to make them. Enzymes are even needed for polysaccharide and proper active transport lipids. Dehydration synthesis of peptides and proteins cannot occur in an aqueous environment without very creatively designed and engineered enzymes.

Amino acids don't just have an A and a B prong. Half of the amino acids also have a C prong that winds up getting in the way. They couple in the main chain. Enzymes were needed from the very beginning of the process to make proper folding possible. If you had a mixture of amino acids and sugars in the same place and time trying to make sugars, the amino acids have the same alcohol groups that would compete. The amine groups would compete in the same types of reaction and would preclude sugar formation. Nobody has ever explained higher-order structuring (engineering) of these initially needed molecules. Mere Gibbs-free energy minimization alone does not explain how the needed particular *functional* shapes are produced. The Levinthal 1.0 paradox asks how nature could have formed the needed sequencing of monomers in a linear chain of nucleosides or amino acids (primary structure) and have it wind up folding into the needed three-dimensional shape (secondary > tertiary structure) to become the needed specific enzyme [117]. Foldamers and chaperones are additional enzymes needed to assist the proper folding into the needed three-dimensional shape. But, how were *they* produced in a prebiotic environment? Translational pausing is critical to protein folding. Translational pausing is controlled, not constrained, by superimposed, multi-layered coding in the mRNA [118]. Alignment is not just a covalent bond problem, but a non-covalent spatial interaction problem also.

The Levinthal 2.0 paradox addresses astronomical possibilities from which only a very few are usable. In many cases, this is where the Universal Plausibility Metric of life-origin models measures out to less than a ξ of < 1.0. The Universal Plausibility Principle is thus violated, requiring peer-review rejection of the model for lack of scientific *plausibility*. Mere possibility does not make a model scientifically plausible. Nobody has solved the problem of needed Prescriptive Information (PI) and code problem for the sequencing of nucleotides. No instructions, let alone actual executable choice-commands, exist in an inanimate, prebiotic environment. What steered and controlled all this chemistry to avoid tar production? Nucleic acid prescriptions have to be programmed with representational code. That instructional code then has to be instantiated into a replicable physical matrix in order to generate repeated production in the future. This is especially true for any newly needed enzyme. How did inanimate nature accomplish all this? Gene editing (e.g., Crispr) is engineering, not natural science as has been traditionally defined. How were genes edited into useful prescriptions prebiotically? Production of the needed fatty

acids, glycerol ethanolamine and lipids are all directed and engineered by coded Prescriptive Information. Non-covalent interactions have to all be aligned because Prescriptive Information travels down these channels by electrostatic potentials.

Protocells cannot be organized and engineered into existence by mere laws and constraints. Bioengineers have clearly defined the minimum requirements for the simplest protocell to come to life. Of the 15 minimal essential components, absolutely none has been made in a prebiotically relevant environment. Chemists haven't even made pure yields of the four basic classes of molecules prebiotically, let alone the compounds of those basic classes. The protein-protein interactions alone in a simple yeast cell have $10^{79,000,000,000}$ permutations. There are only 10^{90} elemental particles in the cosmos [23, 24, 26, 30]! A hands-off, spontaneous formose reaction is an implausible source of a pure dextro-ribose and RNA. Many of the chemical species generated in controlled laboratory conditions are nothing more than carboxylic acids. To any qualified chemist, a spontaneous formose reaction is not the explanation hoped for. You cannot get the moieties needed to do any sort of synthetic chemistry work needed for life to form even when the world's finest synthetic chemists are controlling all of the many needed processes. Where is this objective reality in the minds of naïve, simplistic thinkers when they argue, "The life-origin problem has largely been solved"? Even if you have all 20 amino acids, they must be separated and isolated. The smartest micelle-vesicle researchers cannot design and engineer even an adequate active transport membrane, let alone a real protocell. Any progress in that direction is always proven by Materials and Methods to be teleological (which, of course, we euphemistically try to reduce to "teleonomy"). All of these papers defeat the very purpose for which they were written: to demonstrate the capabilities of *naturalistic* production. What is demonstrated instead is humanistic creationism. No human agency, . . . no experimental success!

All of these players needed a Mundane Proximate Teleological manufacturing plant. Inanimate nature must have had all 20 amino acids (or possibly 22), and only those amino acids, available in the same place at the same time to make most ANY enzyme. Even if all 20 were available at the same place and time, how is the cross-linking problem solved caused by half of all amino acids having a C prong? Enzymes are required to keep that from happening. But in order for those enzymes to form, they themselves had the exact same problem. 2'5' dinucleotide contamination prevails. 2'5' dinucleotides cannot code for protein. 3'5' dinucleotides are essential for abiogenesis. Yet spontaneously formed RNA yields a mixture of 75-85% 2'-5' dinucleotides. This would have precluded naturalistic abiogenesis. If only 1% were 2'5', NO peptides can be instructed or constructed. Each

amino acid has to have three nucleotides coding for it. If one out of three has a 2'5', no amino acid is coded. Small interfering RNA (siRNA) is formed from 2'5' RNA: siRNA stops translation. In RNA, the 2'5' linkages (30 to 70%) act like siRNA. Chemists have to store reagents at -112 degrees F (!) to make 3'-5' dinucleotides. Nucleobases need protection. The phosphate needs activation. To make nucleotides in the lab, glassware must be washed with 3% H₂O₂. Then, the glasswork requires ten washes with RNase free water. This could never have happened on early earth. Primed RNA has never duplicated more than 10% of itself. Again, synthetic chemist Professor James Tour at Rice University deserves the credit for enumerating all of these many requirements for any purely physicalistic/naturalistic abiogenic scenario. Most all of these requirements are statistically prohibitive. In addition, the models violate the Universal Plausibility Principle of basic science [119-121]

Then, there is the origin of heritability problem. Inorganic and organic abiogenic Metabolism-First models have no heritability and no way to sustain any accidental "successes," not that a prebiotic environment would have known what a "success" was. How would an inorganic or organic composomal reaction sequence have been preferentially preserved, and by what means?

The physicalistic "Eons of time" argument crumbles under the weight of ultra-short half-lives. There's also not enough time in 14 billion years, and not enough elementary particles in the cosmos, to overcome relevant probability bounds. Inanimate nature could not have collected in piecemeal fashion all components through long periods of time. There would be no basis for secondary, passive selection without a superior living final product to differentially survive. Organisms first have to be alive to differentially survive best. As Tour points out, eons of time is not the savior of abiogenesis theory. Eons of time is it's greatest enemy. A common contention of physicalists is that "Cells were simpler back then." Tour asks, "Just how simple were they?" The simplest holistically "living" proto-cell would have had to manifest right from the beginning:

1. DNA replication, repair; restriction, modification
2. Basic transcription machinery
3. Amino-acyl tRNA synthesis:
4. t-RNA maturation and modification
5. Tremendously *conceptually* complex Ribosomes
6. Ribosomal proteins and their organization and orchestration
7. Ribosome function, maturation and modification
8. Translation factors
9. Controlled RNA degradation

10. Protein processing, folding and secretion
11. Superimposed, multilayered coding (Superimposed codes of Ontological Prescriptive Information (PI_o) purposely slows or speeds up the translation-decoding process within the ribosome. Variable translation rates help prescribe functional folding of the nascent protein folding. This would have been critical right from the start.)
12. Cellular replication is highly prescribed and controlled. It is not just “cell division.”
13. Intra-cellular molecular transport
14. Glycolysis
15. Proton motive force generation
16. Pentose phosphate pathway
17. Lipid metabolism
18. Biosynthesis of nucleotides and cofactors
19. Minimization of heat release. The need to mitigate chiral-induced spin selectivity to prevent cellular heat stroke. Homochirality had to be there from the beginning. Homochirality could not have been developed through time. Any protocell would have burned up without chirality.
20. Membrane transport is highly selective and exquisitely tailored to cellular needs.
21. Micellar, vesicle and proto-cellular concepts are not immune to such requirements.
22. Excretion of waste, ingestion of nutrients, secretion—all mediated by a true cell membrane that thoroughly embarrasses any lipid bilayer micelle/vesicle of a supposed protocell.
23. No purified reagents, buffers, or catalysts were present in a prebiotic environment. Everything had to be manufactured from the simplest molecules: CH₄, NH₃, CO₂, O₂, H₂S, sulphate, H₂O, formaldehyde, carbonate, formate and cyanide. Many of these needed molecules are lethal to life.
24. No source of phospholipids or nucleosides existed in an inanimate environment; no human-designed coupling agents or protecting groups; no H₂O₂ and distilled-water-rinsed and dried flasks; no purified solvents; no vacuum pumps or degassing steps; no ability to arrest or restart reactions when needed; no method of transfer of reagents from one flask to the next for critical sequential steps done in the required order, etc.

The Materials and Methods in abiogenesis research papers are most often *not prebiotically relevant or plausible*.

Hypothesized Silicon Life chemically dead-ends. The bonds are too rigid.

Every published model of abiogenesis thus far can be shown to measure out with a Universal Plausibility Metric of ξ [xi, pronounced “zai” in American English, “sai” in UK English] equaling <1.0. This requires peer-review rejection of that model and manuscript for reason of scientific implausibility (The Universal Plausibility Principle [UPP]) [119-121].

The life-origin mystery has not changed since Leslie Orgel wrote in his final solo paper:

“Almost all proposals of hypothetical metabolic cycles have recognized that each of the steps involved must occur rapidly enough for the cycle to be useful in the time available for its operation. It is always assumed that this condition is met, but in no case have persuasive supporting arguments been presented. Why should one believe that an ensemble of minerals that are capable of catalyzing each of the many steps of the reverse citric acid cycle was present anywhere on the primitive Earth, or that the cycle mysteriously organized itself topographically on a metal sulfide surface? The lack of a supporting background in chemistry is even more evident in proposals that metabolic cycles can evolve to “life-like” complexity. The most serious challenge to proponents of metabolic cycle theories—the problems presented by the lack of specificity of most nonenzymatic catalysts—has, in general, not been appreciated. If it has, it has been ignored. Theories of the origin of life based on metabolic cycles cannot be justified by the inadequacy of competing theories: they must stand on their own.”[122]

“The prebiotic syntheses that have been investigated experimentally almost always lead to the formation of complex mixtures. Proposed polymer replication schemes are unlikely to succeed except with reasonably pure input monomers. No solution of the origin-of-life problem will be possible until the gap between the two kinds of chemistry is closed.”[122]

“Solutions offered by supporters of geneticist or metabolist scenarios that are dependent on “if pigs could fly” hypothetical chemistry are unlikely to help.”[122]

“Assembly Theory” has been widely criticized [59, 66-79, 123]. Persistent mineral models of protometabolism lack heritability [124-131]. Irreversible nonequilibrium thermodynamic models lack directionality and intent toward utility [132-137]. The supposed mechanism leading to life origin is the absorption of ultraviolet light by RNA and DNA molecules. The dissipation of energy is thought to have led to the evolution of complex biosynthetic pathways. Well shazaamm!!! That was easy. Isn't it amazing how vivid physicalistic imaginations can be? Without Choice Determinism, the prebiotic spontaneous generation of most all the needed pure biomolecular *monomers* is statistically prohibitive, let alone the highly prescriptive nucleic acid and other polymers. The sequencing of monomers into

meaningful efficacious syntaxes is an even more daunting task. Life uses formal coding schemes independent of any Physicodynamic Determinism. The exclusion of formalisms from physicalistic naturalism on earth or in space is the only thing that makes purely physicalistic abiogenesis models *seem* feasible [17, 43-45, 55, 56, 58, 138]. But all that ever results is humongous phase spaces of possibilities that are never specifically selected. Without steering toward formal function, the chemistry dead-ends every time.

No optically active populations of molecules (enantiomers) are emitted at hydrothermal vents, hydrothermal pools or meteorites. Racemic mixtures (racemates) have equal amounts of left- and right-handed enantiomers of chiral molecules and salts. The rotation caused by one isomer is immediately cancelled by equal numbers of the other. The only known natural source of enantiomeric purity is life. All industrial sources of homochiral molecules require purposeful engineering choices and seeding with life-derived homochirality. Life's formal computations and nano-equipment must be viewed as "natural" by biology [17, 32, 45, 59, 60]. But this requires redefining "natural" in The New Naturalism. Mundane Proximate Teleology must be regarded as a legitimate subject of natural science investigation. We regard all of the millions of lifeforms on earth "natural." We do that already every time we argue that life evolved into existence spontaneously from nothing but physicyodynamics. We declare life to be natural. The trouble is, natural selection is only a passive, secondary, after-the-fact-of-life selection. Active selection is needed in order to generate prescription of sophisticated biofunction. Even molecular evolution required active selection rather than passive secondary natural selection of the fittest already living organisms [56]. Since life is wholly dependent upon formalisms, should we call life "unnatural" to preserve our purely metaphysical physicalistic presupposition? Or should we redefine what "natural" means in order to retain molecular biology and genomics as "natural science?"

Ongoing adaptive re-programming of DNA in multiple species

Geneticist Jeffrey P Tomkins does a nice job reviewing recent genomic research findings in varied species every two months [18, 139-143]. In April of 2026 [18] Tomkins calls attention to findings in single-celled ciliates, stick insects, nematodes, Zokors (mole-like tuber and root-eating rodents), even in human immune systems, of outright real-time, live reprogramming of genomes with each reproductive cycle. Archaic is the concept of spontaneous random mutations being only secondarily and passively selected for sophisticated new functions. Genomically programmed rearrangements (GPRs)—vast *directed* polymorphisms—have been found that purposefully alter both DNA syntax and chromosome structure. These polymorphisms are not just

nonrandom, as we now know many mutations to be [144-147]. And the non-randomness is not just physicyodynamically caused. The non-randomness is prescribed with intent. The GPRs are programmed and cybernetically processed. Their computations halt with engineering marvel. These deliberate modifications occur during both early embryological development and in adaptation to extreme environmental challenges. These phenomena are not just the calling-up into upper memory of pre-recorded programming modules held in reserve reservoirs for emergencies. Extensive *new programming* and re-programming occurs real-time to meet the need for rapid response to stress and predator threats. This phenomenon alone provides undeniable evidence of Mundane Proximate Teleology at the subcellular level. DNA sequencing and structure are literally engineered to creatively generate optimized algorithmic adaptation. The notion of the all-sufficiency of random mutations with secondary phenotypic selection cannot explain the observed purposeful reprogramming. Algorithmic optimization must occur at the genetic level (The Genetic Selection (GS) Principle) [62].

The ciliated eukaryotic protist *Oxytricha trifallax* uses code encryption to formally organize and regulate scrambled segments of DNA [148-150]. This unicellular organism literally re-programs itself with each reproductive cycle. It uses its micronucleus for reproduction. Its macronucleus controls its metabolism. Following sexual conjugation of two *Oxytricha*, the old germline DNA is 90% degraded into 225,000 precursor DNA segments. The micronucleus reprograms a new macronucleus. 16,000 new nanochromosomes are formed. The reconstructed genes come from dispersed fragments within the micronucleus. Inversions of these prescriptive informational syntaxes are common. Encryption and decoding "technology" is employed to identify and codify all of these scrambled segments. Internal eliminated sequences from exons make respliced gene expression possible. No other description of this genomic reprogramming is possible other than flat-out "engineering." We are looking at direct empirical evidence of Mundane Proximate Teleology at the subcellular level. In nematodes such as *Ascaris* and *Rhabditidae*, DNA segments are excised in early embryogenesis and post development to improve efficiency. This process is known as Programmed DNA Elimination (PDE), a form of Programmed Genomic Rearrangements (PGRs) [46-54]. The DNA in reproductive cells remains unchanged. But certain DNA sequences are permanently excised in the production of somatic cells. Large numbers of double-stranded DNA breaks are deliberately induced to allow their recycling and new programming. 13-18% of the germline genome is removed—close to 1,000 genes. Satellite DNA and germline ends are removed. New telomeres are added. This genetic editing provides formal algorithmic optimization. Once again, we observe Mundane Proximate Teleology at the subcellular level.

Next, Tomkins calls our attention to the genetic mediated habitat adaptation of *Timema cristinae*, a stick insect [151-155]. The insect sports two different color patterns: striped or green. This coloration mimics two different host plants found on two different mountains. The mimicry protects the insect from bird and lizard predators. Conceptually complex, not just complex, structural genomic reprogramming (translocations and inversions) within Chromosome 8 allows the insect to change its mimicry. One mountain habitat mimicry was mediated by 43 million nitrogen bases involving 299 genes; the other mountain's mimicry was mediated by 15 million bases involving 97 genes. These chromosomal rearrangements are programmed independent of each other and are fully functional. Genomic structural variants (SV) is a form of PGR. SVs enable zokors (*Eospalax*) to survive in low-oxygen high-altitude environments. 18 large inversions greater than 1 Mb were found near the ends of in *E. bailey* chromosomes [156]. This species occupies the most oxygen-deprived habitats. Intronic SVs were identified in three hypoxia-related genes (EGLN1, HIF1a and HSF1) with upregulated gene expression. A 50 million base rearrangement on chromosome 1 allowed closer proximity of topologically associated domains (TADs) and low-oxygen genes. Thus, hypoxia tolerance was shown to be mediated by Programmed Genetic Rearrangements (PGRs). Similar findings were reported in sheep [157]. These PGRs provide still more evidence of Mundane Proximate Teleology rather than traditional physicalistic/naturalistic explanations.

Immune systems in vertebrates reveal V(D)J and class-switch recombinations creating diverse antibodies and T-cell receptors [158]. These greatly expand vertebrates' ability to deal with new pathogens never before encountered. They are antigen-independent mechanisms involving cut-and-paste rearrangements of gene segments: V (variable), D (diverse) and J (joining). This immune system real-time reprogramming is nothing less than ingenious. Small scale PGRs also provide disease resistance in humans. A single nucleotide polymorphism in the HBB gene (HbS) provides resistance to malaria [159]. This region had 2.6 times the variability rate compared to genome wide variation. In the absence of a malaria threat, the HbS gene can switch back to the usual HBB gene. The adaptive capability is predictable and genetically produced. The APOL1 gene has a similar SNP that confers resistance to sleeping sickness caused by *Trypanosoma*. This polymorphism occurs more frequently when needed for disease resistance [160]. These "mutations" are not only *nonrandom*, they are purposeful, repeatable and predictable polymorphisms highly suggestive of programmed genomic Mundane Proximate Teleology.

The problem with traditional Physicalistic Naturalism

The major problem with philosophic metaphysical

naturalism's governance of science is that it insists on relegating contingency to Chance Contingency alone. It ignores, stubbornly denies and winds up effectively disallowing Choice Contingency, at least within natural science. "We can't admit Choice Contingency into science. That would be too teleological." Yet very real Choice Contingency is manifest on earth in every direction we look. Why should science not be allowed to investigate Choice Determinism along with every other aspect of down-to-earth reality? The only answer is people's purely philosophic persuasions and metaphysical prohibitions, not anything scientific. Physicalism's philosophic presupposition constructs a hopeless roadblock to understanding function, biofunction especially. Naturalism's attempt to attribute everything to Chance and Necessity leaves it totally unable to address the reality of choices with intent, purposeful controls, and the valuation and pursuit of "usefulness." Naturalism fails miserably as a worldview because it cannot include within its defined perimeter all of the very real pieces of reality's puzzle.

Naturalism precludes science from investigating reality's most monumental force. It makes off-limits the admission that life is programmed by efficacious executable choice commands that are cybernetically processed. This fact, along with other nonphysical formalisms, constitute the majority of what makes reality really interesting. Naturalism conveniently washes its hands of having to deal with the Choice Determinism of Engineering. One cannot look in any direction without seeing the product of highly functional engineering. Whether this is philosophically labeled "teleological" is irrelevant. The failure of science to investigate "Mundane Proximate Teleology" is inexcusable. It has nothing to do with ultimate metaphysical questions of transcendent teleology. Scientists have no problem practicing Methodological Naturalism even though they may question Metaphysical Naturalism as an all-encompassing philosophical worldview. Why can't they study Mundane Proximate Teleology apart from pursuing ultimate transcendent metaphysical questions?

Engineering exists in the everyday empirical world. Engineering produces real physical effects. That means that engineering is as natural as abiogenesis is claimed to be by philosophic naturalists. We can't exclude engineering or life from investigation just because philosophers declare it to be "teleological" in a transcendent metaphysical sense. Much to our chagrin, "teleological" has long since been proven to be perfectly earthly and "natural" by "natural science" itself. This is especially true of biology. Earthly life is clearly teleological. Yet we claim it to be naturally evolved, "self-organized" (a logical impossibility) and spontaneously "emerged" despite a total lack of empirical or rational support for either of these pipe dreams. In a highly significant 2025 abiogenesis paper [30], all three classes of prebiotically relevant condensation polymers (polysaccharides,

polynucleotides and polypeptides) are shown to be subject to the time constraints defined by t/N , where N is the number of monomers (mers), and t is the dimer decay time constant. This means that the longer the polymer, the shorter the half-life. Most functional RNAs in cells are much longer than 200 mers. Their half-life would be even shorter than the 4 hour half-life of a 200-mer RNA. How are highly prescriptive long informational RNAs supposed to have evolved into existence over eons of time when their half-lives are only an hour or two long?

Still another chicken and egg paradox

Which came first, non-trivial function or life? Refined function is a “biosignature.” Its only known source is life. Yet life cannot exist without prescribed extraordinary biofunction. Life and function are inseparable. How did the “differential survival” of evolution produce any organism in the first place, let alone the *fittest* already-living organisms? Something has to be already alive for it to differentially survive better. Prescriptive Information has to first exist before it can mutate. Spontaneous genetic alterations, whether random or physiodynamically nonrandom, do not and cannot write code. Programming requires purposeful choices. The transition from Darwinism to Neo-Darwinism failed to solve this problem. Neo-Darwinism is worthless to answer abiogenesis questions because nothing was alive yet to differentially survive. Selection of the fittest phenotypes tells us nothing about how those phenotypes were genomically prescribed. Evolution cannot explain the origin of Prescriptive Information made possible by the programming of formal logic gates [62, 63]. Evolution cannot explain the cause of representationalism wherein physical symbol vehicles (tokens such as nucleosides) are actively selected by formal Material Symbol Systems (MSSs) to give syntactical orders (efficacious executable choice commands) [161-165]. Physicodynamics cannot generate sophisticated function. It is blind to function. Chance and Necessity do not value or pursue function. We do not empirically observe non-trivial function independent of life. Life itself manifests incredible function at the subcellular, cellular and supracellular level. We do not observe life independent of function. Only life can produce the biosignature of formal functionality. Life itself is the ultimate in functionality.

Three essential elements of function are observed in all known lifeforms:

- 1) Programming with efficacious executable choice commands,
- 2) The actual execution and processing of these choice commands
- 3) The generation of the nanocomputers and sophisticated molecular machine devices needed to do this processing.

These processes comprise the cybernetics of life.

Cybernetics refers to control. Life is controlled, not constrained. Life controls its formal computations. They halt: they successfully finish their computational tasks. Natural science insists that abiogenesis and current life are altogether natural. Biology is a natural science. We therefore expect to be able to study *all* aspects of life as natural phenomenon. This must include life’s clear purposeful controls. We must redefine “natural” to include the choice determinism of subcellular life and life’s biosignatures. This is Mundane Proximate Teleology.

Consider the many Mundane Proximate Teleological formalisms of physics, chemistry and biology:

The purely abstract, nonphysical, conceptual mathematical laws of physics and chemistry that fully govern physicality[1, 3, 13, 14, 22, 27, 31, 61, 62, 65, 91, 161, 163-176];

The formal organization of the periodic table[177];

Synthetic chemistry’s need for strict choice-based controls at every constructive step [23, 24, 26, 30].

The fact that physiodynamics is blind to and cannot pursue or achieve formal “function” of any kind [17, 44, 45, 55, 58].

The source of life’s efficacious executable choice commands [17, 43-45, 55, 58, 138]

Outright digital syntactical programming of those sequential choice commands [45, 58, 65, 138, 161, 169];

The representationalism of nucleosides as physical symbol vehicles [161, 167, 178]

The use of coded representational symbol systems to prescribe and orchestrate biofunction and biosystems[161-163, 170, 173]

The prescience of which linear digital prescriptions will produce the minimum Gibbs-free-energy protein folding only after transcription and translation into completely different languages[61, 161, 163, 167, 169];

The cybernetic processing of life’s indisputable programming[43-45, 55, 138, 179];

Life’s innumerable halting computations processed by extremely sophisticated subcellular nanocomputers and molecular machines[180-183];

Homochirality and its chiral-induced spin selectivity so critical to metabolism and transport within the cell[23-26, 30, 113, 114];

The source of any meaningful instructive RNA abiogenic template, as opposed to nonfunctional stochastic ensembles [62, 184]

Orchestration of homeostatic metabolism far from equilibrium [16];

Highly selective active cell membrane transport [102, 105, 185]

The source of the *initial* genomic Prescriptive Information (PI) that only secondarily mutates [17, 45, 55, 58]

Active “decision node” selections (e.g. of certain nucleosides next to polymerize in the generation of genetic choice commands [28, 65, 169, 184]

The source of biological controls and their formal adaptive algorithmic optimization via prescribed polymorphisms [140, 142, 143].

The formal organization of the triplet codon table [186]

The formal organization of the superimposed translational pausing table so critical to protein folding [118]

The essential role of transcription factor proteins in regulating gene expression through binding to specific DNA sequences to control transcription[187-192];

Translation into a completely different language [193-196]

Aminoacylation using independent tRNAs[197-199];

The engineered construction and sophisticated function of ribosome computers [200-203]

The highly tailored and specific protein catalysts needed for every biological task [204, 205]

The ingenious rules of lncRNA functionality [206-210]

The sophisticated function of all the other RNAs [139, 211-215]

The aid of independently prescribed chaperone/foldamer proteins [216-218];

The invention of a heritability system [219, 220]

Efficaciously-set logic gates “set in stone” long before computational halting could confirm any phenotypic usefulness[45, 55, 58, 138, 179];

Purposefully steered 13-step biochemical pathways of little use until the 13th step[221-223];

Biosystems of highly integrated circuits of configurable switch-settings[13, 15, 165, 170, 174];

Ingenious molecular machines walking on two legs carrying many times their own weight in cargo (like ants) [224];

Epigenetic controls and regulation that will never be reducible to mere constraints[225-228];

Superimposed coding languages in the same sequence of physical symbol vehicles [229]

Codes read in the opposite direction of the same sequences (reverse complement reading in DNA/RNA sequences), producing different proteins [230]

Life’s ability to overcome the 2’5’ chemical propensity problem to achieve the needed 3’5’ nucleotide bonds [24-26]

Protein/Protein interactions [231-233]

Molecular/chemical evolution’s requirement of active selection, not passive, secondary natural selection[56].

The inability of even dipeptides, disaccharides, and lipids to polymerize in a prebiotic environment [30].

The incredibly massive phase spaces from which prescriptive polysaccharides and lipids must be selected [26, 30, 117]

Genes within genes[234];

Specifically chosen transcript variants[235, 236];

Disparately located exons acting together as a single gene[237];

The same gene producing many different proteins [237];

Extensive nonrandom, yet non-militated-by-law alternate exon splicing into multiple genes[238];

Shared promoters[238];

Diverse connections between genes and gene networks[239-241];

Regulatory long non-coding RNA genes, each with multiple types of control;

Enhancers chosen from disparate sights [242-244];

The same three neurexin genes producing thousands of different transcripts[245-248].

Allosteric and orthosteric activators or inhibitors changing enzyme or receptor conformations [249-253]

The use of telomer shortening and telomerase to control the timing of cellular death [254-256]

The 4-hour half-life of even small 200-mer RNAs and 13-day half-life of polypeptides that absolutely kill all “eons of time” evolutionary models [23, 25, 26, 30].

The choice of epigenetic methylation sites on DNA [257-260]

The choice of acetylation sites on histone proteins that determine DNA coiling [261-263]

The placement and selection of promoters for appropriate metabolic tasks [264-266].

The selection for use of very disparate and distant enhancers [244, 267-269].

The functional choice of the number of tandem repeats to use for adaptation [270, 271]

The feedback of transcription factor protein influence onto the DNA that produced those proteins [272-275].

The existence and role of micro- and mini-Satellites [276-279]

The extraordinary polysaccharide phase space selections that are so essential to life [24-26]

The highly specific phospholipid contributions [24-26]

The absence of conserved genetic evolutionary histories for so many highly functional ORFans/OGs [280-282].

The specific functionalities of intrinsically disordered proteins (IDPs) even though they lack physycodynamic order and structure [283-285]

Agency and Teleology

Agents are beings that are capable of making purposeful choices. Agents alone value and pursue “usefulness,” function, utility, and pragmatism. But agency is not limited to higher intelligence. Monera and Protista exhibit agency in choosing to avoid noxious stimuli, or choosing to approach food sources. Philosophy tends to define teleology differently from theology. The philosophic concept of “teleological” events explains them in terms of the purpose they serve rather than of *the cause* by which they arise [286-293]. Sometimes purely physycodynamic effects can *seem* to provide purpose. But most often we humans are the ones merely ascribing to some physical event purposive value or function. Mere physycodynamic events have never been observed to manifest the slightest pursuit of or ability to produce non-trivial utility.

Any purpose served by physycodynamic causation alone is always trivial. Non-trivial purpose can always be traced back to deliberate, formal Choice Causation. Traditional natural science has always been permitted to get away with discounting obvious teleology in biology to happenstantial mutation followed by secondary natural selection of the fittest phenotypes. That must end. Many mutations have now been found to be nonrandom. But not all of these nonrandom mutations are physycodynamically caused. Purposeful, repeatable and predictable polymorphisms are actively reprogrammed as real time adaptations (Programmed Genomic Rearrangements [PGRs]) [18, 46-54, 148-159] PGRs clearly demonstrate Mundane Proximate Teleology as a part of down-to-earth every-day reality—the legitimate subject of natural science investigation. Refined function arises only out of the purposeful choices of agency. Natural science cannot talk about the purpose served by a certain sequence of nucleotides without addressing *the cause* of polymerization of that particular sequence of nucleotides. If that syntax is highly efficacious, it was prescribed by agency according to formal rules, not the laws of inanimate physycodynamics.

What does the choice causation of Monera and Protista have to do with ultimate metaphysical questions? Should bench science care? Common everyday agency is what we

repeatedly observe in Monera and Protista on earth. Science is obliged to study and discover the cause and effects of such routine proximate agency on earth (Mundane Proximate Teleology). We need to stop allowing philosophers to handcuff us. Ultimate metaphysical questions should not be allowed to compromise down-to-earth bench science. The contention of natural science is currently that Monera and Protista self-organized and emerged into existence from natural processes. If Monera and Protista are natural, their agency and teleology is natural. Should we exclude the study of Monera and Protista behavior because they are agents, or because their choices are too teleological for our purely philosophic worldview to accept? Should we bury our heads in the sand because what we repeatedly observe is not allowed by our metaphysical belief system? *Perhaps we should instead question our metaphysical belief system.* But that is not the business of bench science. That is the fair domain of philosophy. Metaphysics is “none of our business.”

Is it not also the contention of current natural science that humans evolved from Monera? If that is correct, then human agency is altogether natural along with Monera agency. We have no excuse to isolate out human engineering from the other natural sciences. Engineering ability and accomplishments are nothing more than a biosignature of the life that we claim evolved, and which is therefore perfectly natural. Given the presupposition of physicalistic naturalism, both amoeboid and human agency must be viewed as “natural.” Traditional metaphysical naturalism has no choice but to view agents, whether amoeboid or human, as the product of nothing more than Chance and Necessity. That was supposed to dispense with Choice Causation that the current naturalism seeks to evade. Psychologists, psychiatrists, sociologists, prison reformers, social workers, etc. might have a problem with disowning Choice from down-to-earth reality. Their very prescription to patients is to emphasize, “You can choose!”

We don’t realize that we have already presupposed agency and teleology on earth before ever embarking on the scientific method. None of the major components of the scientific method are physical. They are all abstract, conceptual, nonphysical formalisms. The scientific method can only be practiced by agents. Naturalists take great pride in being agents when collecting their Nobel Prize. But they simultaneously try to argue a position of physycodynamic causation of agency and the all-sufficiency of “natural process” that kills agency and robs them of any basis for prideful agent accomplishment. We are teleological agents, *and* we are “natural.” Current physicalistic naturalism has no choice but to “deal with it.” But the inconsistency and hypocrisy must end. Physicalism is dead. As long as we continue to claim that we arose from nothing but natural process, we, our agency and teleology are “natural.” This is the basis for including “Mundane Proximate Teleology” within natural science. And it is fair game for natural science’s investigation without interference from metaphysicians.

We observe every-day Engineering science causing all manner of wonderfully useful physical effects. Metaphysical naturalism claims these effects were caused by the biosignature of agency produced by nothing more than physycodynamic “emergence.” The problem is, scientists have never observed such a thing. The blind belief of Chance and Necessity producing agency is totally without empirical support. No scientist has ever observed “self-organization” or “emergence” of any formalism from physycodynamics on the near side of The Cybernetic Cut [13-15]. Levin and Resnik [294] in a two-part series investigate what makes a system describable by teleological and mentalistic terms such as intelligent, goal-directed, cognitive, and intentional. Their interest is in teleology in the life sciences and in what all active agents have in common. They emphasize empirical testability, fecundity in discovery of new capabilities, and operationalization of terminology by reference to conceptual and empirical toolkits known to be effective for a given system. They argue that an approach to teleology in biology is needed that is informed by mentalistic concepts, such as intelligence, cognition, and intentionality [294].

Traditional physicalistic naturalism is not science. It is bad philosophy

Physicalistic naturalism has disallowed any mention even of Mundane Proximate Teleology. Any mention of agency or teleology has always been prohibited. Yet we all observe it a hundred times per day. How did such a faulty preclusion become Science’s most fundamental axiom? In short, the answer is the very metaphysical imperative Einstein warned against [12]. When first in love, natural science and biology were happily wed. Life was seen as purely physical. But the marriage became increasingly troubled as it became abundantly clear that life is far more formal than physical. *If “natural” is going to continue to be limited to physycodynamics, biology cannot continue to be considered a natural science. It must be excluded from the old “natural science,” the same as engineering science was.* Unless “natural” is redefined, the marriage will end in contentious divorce.

By far the worst Kuhnian paradigm rut in the history of science

Limiting scientific inquiry to physicalism was the most serious error in the history of science. It led to a far more catastrophic Kuhnian paradigm rut than Ptolemaic astronomy. If we had consistently maintained the old definition of “naturalism,” it would have precluded progress in every major science. Fortunately, we ignored our inconsistency and hypocrisy. We practiced our mathematics in physics, our tight controls of synthetic chemistry, and our study of programmed and cybernetically processed genomics even though not physicalistic, but choice-based. While ostensibly

excluding teleology from science, we quietly let it operate under the table because we had no choice. We tried but failed to naturalize teleology into teleonomy. Teleonomy failed because we stripped it of the very Choice Determinism that was needed to explain every-day mundane formalisms. With the new proposed redefinition of “natural,” natural science is now free to investigate and elucidate *any* earthly/intra-cosmic mechanism. And why shouldn’t this be the case? If life, for example, is not natural, what is? Life is everywhere on earth. Extremophiles are found in every conceivable environment. Of course life is natural! Life is as natural as rocks, dust, water, and air. Admittedly, life is unique [31], but that does not mean that life is not natural. Everything in the cosmos is natural. Science has a right and a duty to study it, teleological or not.

Can pad-locked absolutist minds ever be opened?

We need to ask, “Is ultimate metaphysical teleology necessarily synonymous with everyday down-to-earth teleology?” Do we not see the daily proof of Mundane Proximate Teleology in every direction we look? Our ultimate metaphysical concerns are causing us to live in denial of earthly reality in our scientific pursuits. A serious conundrum results. In disallowing any discussion of Mundane Proximate Teleology, we eliminate from scientific investigation 9/10’s of everyday reality. A great deal of logical self-contradiction ensues when the pre-assumption of physicalistic naturalism is incorporated axiomatically into the very definition of science. If we were logically consistent, we would not even be able to practice the scientific method.

The challenge

Little has changed since “The Capabilities of Chaos and Complexity” was published in 2009 [170]:

“The capabilities of stand-alone chaos, complexity, self-ordered states, natural attractors, fractals, drunken walks, complex adaptive systems, and other subjects of non-linear dynamic models are often inflated. Scientific mechanism must be provided for how purely physycodynamic phenomena can program decision nodes, optimize algorithms, set configurable switches so as to achieve integrated circuits, achieve computational halting, and organize otherwise unrelated chemical reactions into a protometabolism. To focus the scientific community’s attention on its own tendencies toward overzealous metaphysical imagination bordering on “wish-fulfillment,” we propose the following readily falsifiable null hypothesis, and invite rigorous experimental attempts to falsify it:

“Physycodynamics cannot spontaneously traverse The Cybernetic Cut [13-15]: physycodynamics alone cannot organize itself into formally functional systems requiring algorithmic optimization, computational halting, and circuit

integration.” A single exception of non-trivial, unaided spontaneous optimization of formal function by truly natural process [as traditionally defined] would falsify this null hypothesis.” No such falsification of this null hypothesis has ever been published. Neither “self-organization” nor “emergence” of non-trivial formal function has ever been observed. Both are “pipe dreams.” Can we falsify any of the following four sets of null hypotheses:

“None of these four alleged causes,

- Spontaneous combinatorial complexity [295, 296]
- The “Edge of Chaos” [164, 174, 297-300]
- Irreversible nonequilibrium thermodynamics [301-306]
- Assembly Theory [59, 66-70, 72-76]

Can generate any of the following:

- A. Mathematical logic
- B. Algorithmic optimization
- C. Cybernetic programming
- D. Computational halting
- E. Integrated circuits
- F. Formal Organization (distinguished from mere self-ordering phenomena)
- G. Material symbol systems (e.g., genetics)
- H. Codes according to rules, not laws
- I. Any goal-oriented bona fide functional system
- J. Language
- K. Refined formal function of any kind
- L. Utilitarian work”

Not a single one of these null hypotheses has ever been falsified. The firm prediction is made that 20 years from now none of these four sets of twelve null hypotheses will have been falsified. Why? All twelve of each of the four sets require Choice Causation and Mundane Proximate Teleology. Unless the “natural” of “natural science” is redefined, falsification is logically impossible.

Conclusion

Is traditional physicalistic naturalism on life support? No, it is not. *Traditional physicalistic naturalism has already expired!* It was murdered by a conspiracy of four members of its own immediate family. The “natural sciences” of Mathematical Physics, Synthetic Chemistry, and Molecular Biology and four-dimensional Genomics (along with Epigenetics) did the dirty deed. Prebiotic/molecular/chemical evolution’s absolute need for active selection (Choice Causation) [56] provided the weapon. Nothing was alive yet to differentially survive—to provide passive secondary natural selection. Four-dimensional Genomics

and Epigenetics, especially, stabbed the old physicalistic Metaphysical Naturalism in the heart. “Et tu, Brute?” [307]

The prior definition of “natural” arose out of the very metaphysical intrusion into science that Einstein warned against. What is needed is “The New Naturalism” freed of philosophical shackles. Bench scientists need to evict pretzel-brained philosophers from the lab so they can get on with the full investigation of earthly reality unimpeded. If what we repeatedly observe is Mundane Proximate Teleology in the everyday real down-to-earth world, then Mundane Proximate Teleology should be included in the scientific study and progressive understanding of that reality. Teleology cannot be just declared “off limits” to natural science for purely metaphysical reasons. Instead of booting life and modern biology out of “natural science” because of its obvious formal choice-controls, we need to boot the old purely metaphysical materialistic naturalism out of science instead. Then, science will be free once again to study the whole of ontological being, including Choice Causation.

Physicalism’s age of dominance has been stymied and now terminated by the role of abstract numerical constants, the fine-tuning of the universe, the governance of mathematics over physicality, synthetic chemistry’s extreme control requirements needed to produce almost any component of the cell, and the initial genomic infogenesis that had to exist before life’s Prescriptive Information (PI) could ever mutate. “Life” is defined as the active ongoing Processing of Efficacious Executable Choice-Commanded Causation and Control (EECCCC) [43, 44]. Physicalism is blind to non-trivial function and every aspect of this long-awaited testable, potentially falsifiable definition of “life.” [43, 44]. The definition is fully applicable to all kingdoms of life. The definition is even applicable to astro/exobiology. It should be used by NASA to decide whether it has actually finally discovered extra-terrestrial life. Science cannot afford to view mathematics and all formalisms as being unnatural or supernatural just because they are “teleological.” With the old physicalistic naturalism, off limits is mathematical physics, synthetic chemistry, genomics, epigenetics, biosignatures, bioengineering, consciousness, self-awareness, non-trivial function, meaning, purpose, esthetics, ethics, and *all* forms of engineering. What is left for honest scientific investigation without practicing utter hypocrisy?

Genetic pathologists spend all day long studying innumerable deleterious mutations. At some point, they have to ask how any efficacious programming was written in the first place to then mutate [58]. Typographical errors do not write PhD theses. Spontaneous mutations could not have programmed genomes. What is this shell game we are playing in the name of respectable science? By excluding Choice Determinism, we have only shot ourselves in the foot. Pardon the mixed metaphor, but we have accomplished nothing but tying our hands behind our backs in trying to explain what

we clearly observe in every direction of common everyday reality. Science cannot run from Choice Determinism just because philosophic physicalism believes it to be too “teleological.” “Sez who?” We need to order philosophers out of the lab. We also need to understand that “teleonomy” is a grossly inadequate replacement for teleology. Teleonomy is no more explanatory of life’s efficacious executable choice commands than Chance and Necessity [176]. Teleonomy was stripped of the one thing it desperately needed to explain most of ontological being: Choice Determinism. Mundane Proximate Teleology is “natural.” It can and should be fully investigated by natural science.

Bench scientists can admit to the reality of every-day down-to-earth Mundane Proximate Teleology as long as it is dichotomized from questions of metaphysical ultimate transcendent teleology. Refusal to define Mundane Proximate Teleology into the word “natural” will require our excommunication of Mathematical Physics, Synthetic Chemistry, Molecular Biology and Genomics from the natural sciences, as we did with Engineering Science. It would be far better to climb out of the very deep Kuhnian paradigm rut [57] and admit that metaphysical physicalism is greatly impeding scientific progress.

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