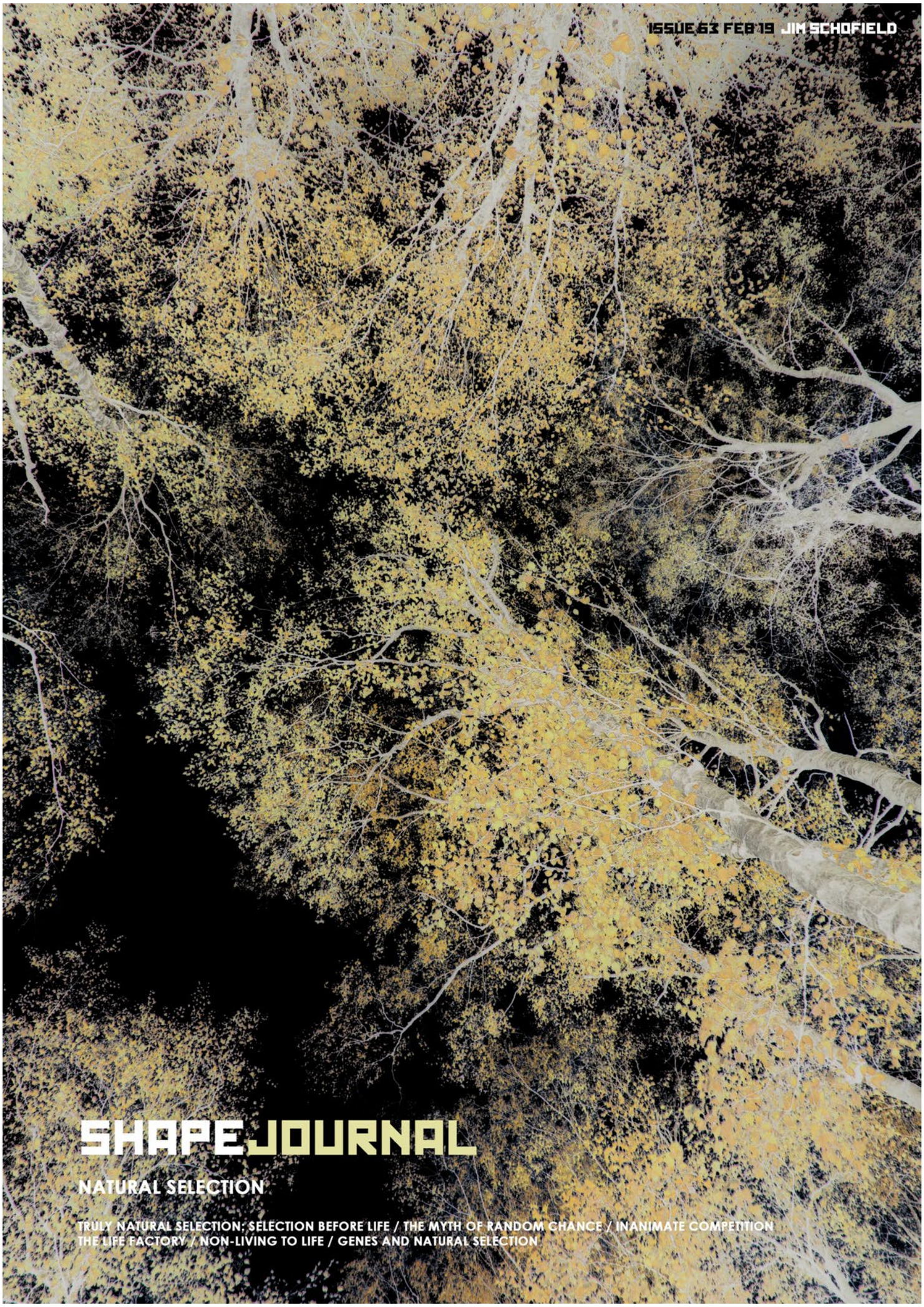
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Natural Selection

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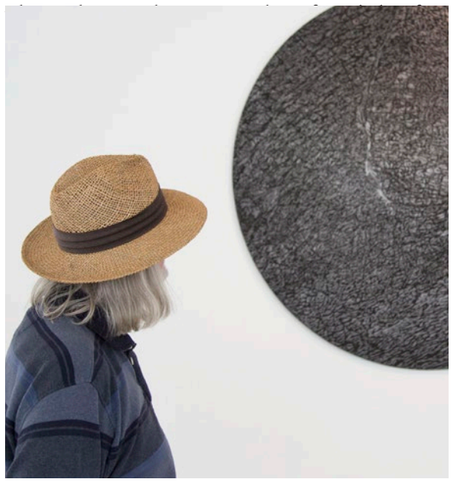
The Dialectics of Natural Selection

Introduction

by

Jim Schofield



Welcome to Issue 63 of the SHAPE Journal. This edition re-issues my work on *Truly Natural Selection,* on its 10 year anniversary, alongside some more recent contributions to this vital subject.

This series of papers extends Natural Selection beyond the Living World and into Reality in general.

It sees all "complication" not just as a summation of Parts, but as a necessary development of things, involving wholly new features, when it is usually, and correctly, renamed Evolution.

Where with Life we have the mechanisms of qualitative change as variation based on mutation, plus selection via competition, this more general form drives change via selection between competing *chemical* processes, and the significant transformation of context.

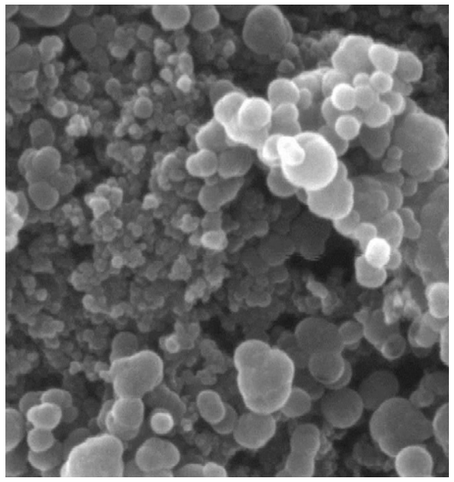
Fitness to survive, reproduce and prosper in the form which drives Evolution, is replaced in the more basic form by advantage to conducive, complementary processes and the successive transformation of the underlying situations entirely without Life being either present or necessary.

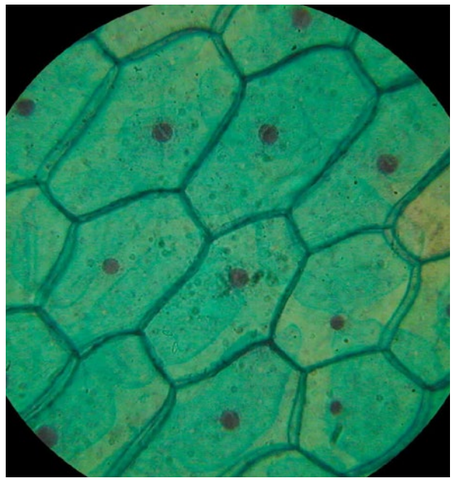
This view of Reality runs entirely counter to the famed Second Law of Thermodynamics, and therefore, requires physical explanation. We can do this in terms of context, maximally constrained stability, while competitive advances-in-order occur in quite different situations of unconstrained, maximum opportunity. And these alternating phases turn out to be the natural features of systems driven in cycles of any kind. The pattern of longer periods of relative stability, interspersed with short interludes of radical, qualitative change, is, in fact, the norm in the trajectories of such systems.

And the Key Events in these processes are the revolutionary episodes, which we call Emergences. Clearly, the most significant and undeniable of these has to be that which produced the very first Living Things. And this Event alone confirms that Selection in some form must have preceded Life! It was the source of Life on Earth.

Many important fallacies are addressed in these papers, including the usual mathematical definition of Probability, and its false use as a *Cause* of Life. And, most crucially, we address the concept of competition involving mutually conducive and mutually contending chemical processes, which are necessary for Selection in these circumstances.

The crux has to be the revolutionary Events called Emergences, which had clearly already occurred throughout the history of Reality, prior to the Emergence of Life, and which are generally ignored by most current Science.





Truly Natural Selection extrapolates Darwin's Natural Selection backwards into non-living systems, and the competition between simultaneously acting processes, involving both the consumption of resources, and the generation of consequent products.

Such active systems would invariably transform their own bases, and rampant positive feedback situations would always dwindle as necessary resources were used up, while other processes could accelerate due to the adequate production of their resources by other processes. Now, apart from such relatively independent processes, there will always be other relations between simultaneous processes, all the way from necessary sequences of dependant processes to either mutually-supporting, conducive processes, and at the opposite extreme mutually-contending and opposing processes.

So, even in such non-living mixes, the processes would directly effect one another and a kind of competition would most certainly ensue. And along with these, there would also invariably be the ever-present, one-way, Second Law of Thermodynamics type processes which would seemingly prosper on a wide range of products and effectively parasitically benefit from all available productive processes.

These ideas, in a totally holist way, were developed to extend concepts originally thought to be confined only to the Evolution of Life, first to its actual Origin, and thereafter to the whole spectrum of developments that have occurred ever since the start of the Universe.

And these ideas finally became a cornerstone of my Theory of Emergences, and a new dialectical view of selection and change in nature.

THE DIALECTICS OF NATURAL SELECTION

Truly Natural Selection

Selection Before Life

Selection sounds like something we do in the supermarket, as we guide our difficult trolley down the aisles, and choose what we want from the serried ranks of delectables. It seems to embody "choice" and preference, and hence is an individual subjective action, so that we reach the checkout piled up with exactly what we want or need.

But such a view of Selection is much too narrow and subjective (and homocentric) to be included in processes that are "what makes the World what it is".

There always have been, and still are, impersonal, "automatic" forms of Selection, which play a vital role in determining what the World will be, and just how it is constantly changing.

In the nineteenth century, perhaps the most profound form of this was revealed by Wallace and Darwin, in their description of the mechanism of Evolution – Natural Selection. No conscious intelligence was making any choices in this process. For Nature as a whole (as a system), selected out certain living forms in preference to others by their fully-demonstrated "fitness to survive" in their given environment. Those which "fitted" most closely their particular mode of existence to that context survived and reproduced more often than those that were not so well endowed.

And the twin activators of maintenance by heredity and variation by random mutation were sufficient to drive such a process, so that it, in time, transformed the whole World.

Before Life had too long a history, it had begun to transform things to such a remarkable extent that even most of the rocks, now existing beneath our feet, plus a goodly fraction of the global atmosphere, and finally, even the nature of the sun's rays when they reached the Earth's surface, were shown to be determined to a great degree by the multitude of Living Things (or once-living things).

Such Selection was, of course, nobody's plan, or even whim, yet it transformed *everything*!

Now my purpose with this paper is NOT to explain Evolution. I, along with almost all scientists, take that as given, and instead ask an earlier and more basic question.

"What is Selection, and how does it determine
the nature of *all things*, Living or not!"

For, we can return to the World before any Life was present, and still see the ever-present action of a more basic form of Selection at work in delivering that World too. Indeed, it was perhaps THE most important factor in preparing the way for the subsequent Origin of Life on this isolated planet.

My favourite arena of change for consideration is the so-called "Primaeval Soup" of the early, shallow oceans of the World. There, fed by the rains and the incessant mineral run-offs from the land, plus the heat induced and salinity gradient powered movements of the ocean currents, determined that a continuously varying mix of chemicals-in-solution were constantly stirred and moved about, and taken through cycles of temperature change. Stanley Miller's Experiment showed, without any

possibility of contention, that just such a situation could produce a variety of organic chemical processes – of associations and dissociations in many sequences, and even cycles, of processes, and in doing so produce many different organic substances.

But, not all of these processes were "best-suited" to the prevailing conditions, or their many changes at various times, and many different relations between adjacent processes would cause them to regularly appear and disappear.

Indeed, many different processes could well require the same resources, so they could be used up in one process rather than another. Hence, in such circumstances, even these inanimate processes could effectively compete for resources and generate various different products. So, efficiencies in such occurrences would increase the preponderance of one process to the detriment of its competitor.

In addition, the generation of products would also affect the situation. Products from some processes could turn out to be resources for other processes, so that a successful process may also influence the relative success of another by producing exactly what it required. Indeed, some occurring processes could be mutually conducive, in that they helped one another, or mutually contending, when they competed with one another, or even inhibited them by their products. Thus, processes could also be clearly contending too.

The crucial phase would have occurred when these processes proved to be mutually beneficial. Then, such mutually supporting processes would be greatly increased, while mutually contending ones would keep each other in check. Indeed, some processes could help or hinder in quite other ways by producing catalysts or inhibitors for quite separate, unrelated other processes.

So, even in a seemingly random soup of chemical reactions, a sort of selection would undoubtedly occur, if not regularly replenished from elsewhere.

One result for subsequent Living Things, MUST have been largely determined long before any Life came into existence.

Among the myriads of possible and actual processes, certain conducive pairs would surely prosper, while any directly opposing pairs would decline.

Indeed, individual processes which alone displayed no real advantages, could become engaged into Sequences, or even Cycles, which gave them and their containing systems major advantages over other simpler competing forms, and these would naturally increase dramatically at the expense of their less well endowed competitors.

Let us consider Probabilities in such a broth of incessant change (and most contributors in this field do).

Initially, all possible processes would seem equally unlikely.

I'm afraid that is not the true case.

NOTE: Perhaps it should be emphasized at this precise point as we are considering probabilities, and what the assumptions are concerning these rather common phenomena in Reality. They are perhaps one of the most abstract ideas that Mankind subscribes to. When I was teaching such things I, and everybody else, used things like dice to demonstrate what the subject was all about. The idea was that each and every face of a single die was equally likely, and the action of "shaking and rolling" was also completely random and unbiased. Therefore the probability of the occurrence of any particular face would always be 1/6. That the result must be one or another of these faces would be proved by merely adding the probabilities together.

Thus 1/6 + 1/6 + 1/6 + 1/6 + 1/6 + 1/6 would give 1 (or certainty). Similarly if two die were involved you could work out the probabilities for every possible score using exactly the same reasoning, so that, for example, the scores 2 and 12 would only occur once each out of 36 possible scores and the full set would be as below:-
2 3 4 5 6 7 8 9 10 11 12 SCORE
1 2 3 4 5 6 5 4 3 2 1 OCCURENCES(whichtotal36)
Hence all probable scores will relate to the certainty figure of 36 and will therefore sum to 1
The full set of probabilities would therefore be:-
1/36 2/36 3/36 4/36 5/36 6/36 5/36 4/36 3/35 2/36 1/36 for the range of scores.

Now this is the method for ALL probabilistic arguments, on whatever subject. All events HAVE TO BE equally likely, and the shuffling processes merely a purely random re-mix, for this sort of stuff to be appropriate.

SO, in Reality it is NEVER True! It only occurs in the purely abstract World of Mathematics, which I call Ideality. In the Real World all occurrences are NEVER exactly equally likely. Neither can they be abstracted from reality in any way, for every occurrence is not in splendid isolation, neither being affected, or affecting, its context. Quite the reverse is in fact the case. Every occurrence does affect the context and the more occurrences that happen, the more the context is changed. The whole basis of probabilities can only be approached in games, where great care is taken making the units required EXACTLY the same, and the "shaker" completely random.

When people use probabilities in Reality, and particularly concerned with *evolving* Life, you MUST totally ignore what they extract when it comes to probabilities. It will be rubbish! For, using the usual idea of probabilities, all possible cases will be taken as being equally unlikely.

Now if we start at the beginning, where none have yet appeared, the assessment that one of them will occur will NOT be very close to zero as you might imagine. On the contrary in will be 1 – certainty. I haven't stipulated a particular single case, so any case would do and the probability of such would be certainty. Thereafter, as each new occurrence of a member of the set joins the situation they will NOT be in isolation as is assumed in probability theory. They will undoubtedly change the context, and as more and more appear they will change it more and more. Now these will not be merely inactive entities standing around doing nothing. They are PROCESSES, all actually doing SOMETHING, so their effects on the situation will be significant. All the stuff I mentioned earlier about conducive and contending processes with come into play, as will sequences and cycles of processes, so the whole formal probability view bites the dust, and can tell us close to nothing about what will be going on. Such considerations as are employed in Probability Theory, only mean anything at all in the abstract: that is in Ideality alone.

Such probabilistic reasoning is what is used by opponents of Evolution, in that the impossible seems to have happened, not just once but many many times. They obviously know nothing about Evolution, but they know what they believe, and any weapon that will support their prejudice will be employed to "prove" their case.

As soon as we consider the sets of processes as are marshalled in Life, the probabilities seem (using the above abstract methodology) to prove that their resulting existence is totally impossible. Life is then seen as either a Miracle of Chance, or the Hand of some Supreme Being. Neither is true!

The mix could do no other than involve the sort of selections that I described above. Mutually conducive processes would become ever-more likely than mutually contending processes, and the MIX would change in composition. Having written many a "Life" program for a computer, with various system altering results, it is always the case that either ONE or a small set of conducive processes will soon dominate no matter what the original mix was.

It must be clear that probabilities, assuming equal forms and chances, will prove the actually occurring result to have been impossible, but if selection is seen as it really is, the probabilities of competing processes will CHANGE over time, until the unlikely actually becomes likely, even inevitable.

Now remember, this is NOT the famed Natural Selection of Darwin & Wallace! That is concerned when Living Things are actually evolving. What I have been describing here is an even more *natural* form of selection between prior NON-LIVING chemical processes. And this played a vital role subsequently in the actual Emergence of Life too.

At the heart of all Living Things is a series of chemical processes collectively called The Metabolic Pathways – a very *unlikely* set of conducive AND contending processes, which outside of Life (and using Probability Theory) are seen as extremely unlikely as individual processes, and IMPOSSIBLE as a functional set. Yet they did get together, and in Living Things they are both essential and INEVITABLE – indeed absolutely certain. They were successively selected in the way that I have outlined above.

Even before Life actually appeared, many of its necessary components were selected quite naturally by self-driving processes, which changed the game and dramatically converted probabilities to allow the "impossible" to happen. The usual lightweight explanation using randomness misses the real point.

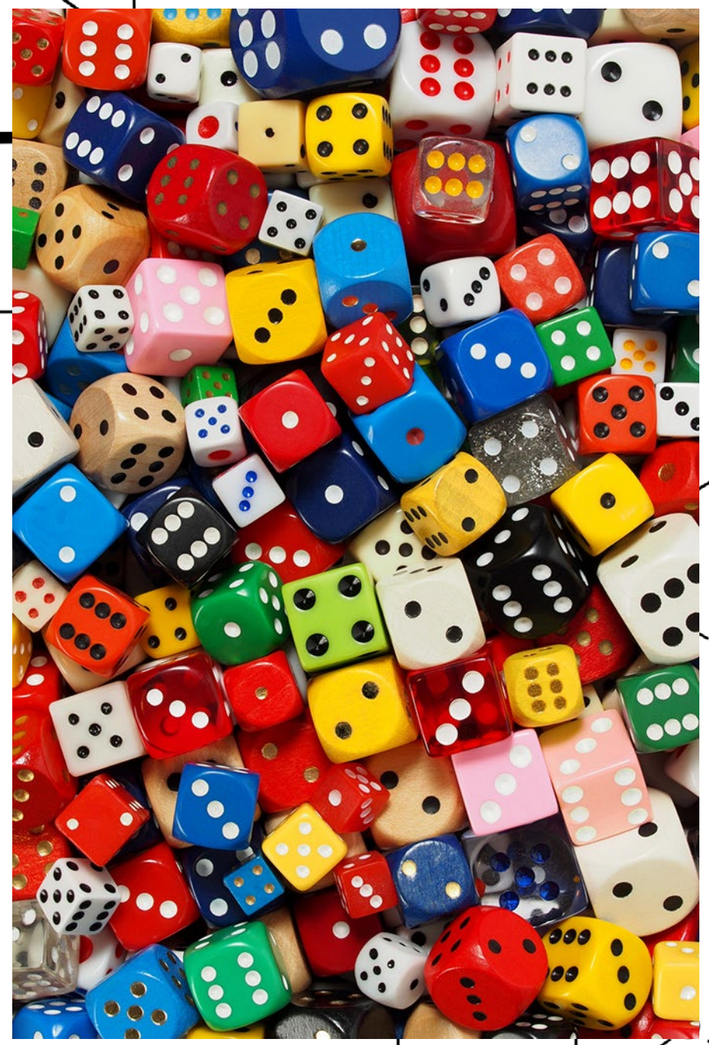
Life didn't happen by chance.

It happened because the processes involved were POSSIBLE and were then selected for quite naturally – they were BETTER, and more likely to survive than other competing processes, and therefore grew in significance until they were EVERYWHERE!

The probabilities of certain complications were always getting more and more likely for quite simple reasons. They were more successful than others in acquiring their necessary resources to happen and proliferate.

Now these first steps in addressing Natural Selection, are obviously still crude and undeveloped, but we know that Change not only takes place at walking pace, but occasionally also in vital cataclysmic avalanches, which we call Emergences.

To really understand Selection, we will have to trace its role INTO and THROUGH such interludes of cataclysmic Change.



The Myth of Random Chance

What is assumed in a situation of "chance" happenings by the purely formal ideas of Probability?

Let us consider a given sequence of dice throws.

To get the first result of the first throw, will involve a probability of 1/6 – for 1 out of 6 possibilities. Now, to add to that a second given result will, in the same way, incur another 1/6 chance. So as a leading given pair, the probabilities must multiply up the chances, so 1/6 x 1/6 will give 1/36. Carrying on with this reasoning for a required sequence of 10 dice throws, will produce an overall probability of 1/6 x 1/6 x 1/6 x 1/6 x 1/6 x 1/6 x 1/6 x 1/6 x 1/6 x 1/6 which gives a 1/60,466,176 chance for that sequence.

So, if every man, woman and child in the U.K. were to guess that sequence, the chances are that only ONE person would come up with the right result. Putting it another way, if one person made a guess at the sequence every year of his life, the chance at the end of this process of him having delivered, at some point, the correct sequence, would STILL be 1,000,000 to 1.

[It makes you wonder why anybody plays the Lottery, doesn't it]

Now, of course, this sort of situation is that which is attempted to be ensured for all lotteries. Great care is taken to ensure the perfect equality of the elements to be chosen, and in addition a totally equal chance in selection ensured by the most thorough mixing of the elements. Such methods work in a totally artificial World of the pure equality of Elements, and of Chance.

But, it is true NOWHERE else in the Real World.

Such set-ups have absolutely nothing to do with the real choices that have to be made by real people in the Real World, for a whole host of indisputable reasons.

First, we never have to choose from absolutely *equal* elements. This is a mathemetical formalism.

Why would we even have to choose if they are indistinguishable? Any one could be chosen with the same effect!

Secondly, our methods of selection will never be totally, and equally random.

FALSE TENET 1: We impose an essential simplification and idealisation upon studied circumstances to make them conform to unreal, ideal situations, which we know how to deal with - but they are therefore *never* real.

Once again, why should we bother to choose? If the elements are absolutely identical, why would be bother to go to such lengths to make the choice? Any will surely do! The answers to such questions have nothing to do with real choices in a real World, but a great deal to do with some artificial outcome being posited on such a "lottery". Vast wealth, as an outcome, is artificially attached to encourage punters to risk ridiculous odds "in the hope" that, as "someone must be chosen", it just might be them.

So, all over the World organisations make fortunes out of people being encouraged to pay for the chance to "be the one".

Now, the theory associated with all of this (as used by lottery devisers and game manufacturers) is never appropriate where choices really matter. They only work in the artificial world of pure equality of chosen elements ensured by perfect mixing or shuffling.

When we are dealing with the chances of events happening in the Real World, we can never use such a methodology. All the requirements for doing so are wholly absent, and, most important of all, the independence of the lottery from its environment is also impossible. Whereas the throw of the die does not modify the properties of the crab table, events in the real world they can, and do.

FALSE TENET 2: All properties are assumed to be independent of Context

There, it is as if every throw of the die modifies the table in some way, so that after a large number of throws the table is unrecognisable.

It isn't even flat!

Indeed, it could be so changed that it would have formed a valley down the middle, and would therefore direct all throws in a similar way. All prior "throws" in real world situations change the Context: it is why Evolution changes the World. All probability predictions can only be about perfect worlds. Indeed, there is a name for that world of perfect and pure Forms. It is sometimes called Ideality - its manipulation is more commonly known as Mathematics.

Now, it is interesting that in very special cases, the conditions of Ideality can be approached.

For 500 years of scientific endeavour has developed a system of investigation in which the whole situation is vastly and intricately controlled, to "nail down" almost everything as constant, to leave only a couple of the myriads of factors involved to be allowed to change.

This technique, which is supposed to reveal hidden, essential relations, in fact produces a particularly close version to part of the forementioned perfect World instead. In certain cases the use of the probabilities of perfect randomness and equal elements is approached, and the methodology of probability can produce useable results BUT only within the same manufactured and maintained circumstances.

And it also abandons any possibility of understanding, and replaces the real situation with a false, engineered alternative, which does behave in the probabilistic ways. Modern Sub-Atomic Physics, has now abandoned all attempts to explain, and has replaced that approach with one based entirely on probabilities, AND, most importantly on the UNREAL probabilities that I have described above - the perfect chances in a perfect World,

The most important failing in all such methods has to be the separation of the system from its Context.

In other words, the assumption of an eternal, unchanging context, which does NOT change, and certainly will never change in response to chance events.

In Reality, on the other hand, the true situation is always, when really addressed in full, HOLISTIC!

Everything affects everything else, and all events affect even their own producing contexts.

You cannot use the assumptions of pure probability in the real world without thereby distorting it.

The arguments against Evolution are all based on pure mathematical probability, and individual probabilities are multiplied up, as I have shown above, to produce astronomical chances-against, and these "prove" that the current World could NOT occur by such chance mechanisms.

Surprisingly, in this they are QUITE CORRECT!

The World could not appear as it is now by such means. But, instead of addressing just exactly HOW the actual DID occur, they instead say that it must have been *directed*: it must have been the working out of a considered design. It MUST be the hand of God! Of course it is no such thing! BUT, neither is it the working through of random chance.

It IS the working through of Selection: implicit selection, not by chance, but by fitness to prevail in given conditions. Darwin and Wallace realised a version of this Selection in the Evolution of Life, which they called Natural Selection. But that is a sophisticated, developed version of a more basic Selection that pre-dated it, that even directed non-living developments prior to the Origin of Life. Not only did, and do, living things develop, but so does Reality in general.

The Universe is NOT an eternal, unchanging thing, and neither are its laws.

It has a history and a trajectory of development, so that even Life and its subsequent developments are PART of the same overall trajectory of continuing Change.

Inanimate Competition

The points made in the first two papers of this series on Selection did not make sufficiently clear exactly how non-living processes can "compete" and even in some way, "succeed", and this omission undermines the whole thesis somewhat.

But, I suppose that I have been concentrating too much on new ground, and taken some fundamentals for granted in this exposition. Obviously, this must be remedied here!

From my previous work on Selection (purely connected with Living Things, and which was therefore entirely to do with Evolution), it is clearly necessary to transfer, and establish, crucial features which also apply to developments in general, and that must include non-living systems too.

In my other extensive writings on development, I have inevitably come round to a completely holist position, and therefore found that though everything does affect everything else, there are actually TWO different modes of Change involved in these relations: these are the Pin-heads (slow) developments in otherwise relatively Stable Interludes, and the Avalanche (cataclysmic) developments in Emergences.

And, it has also become quite clear that both these occur in non-living developments too.

Clearly, Darwin's conception of Natural Selection can only apply to competing and changing *organisms,* and with the necessary mechanisms to make it happen. But, in these musings on Selection in non-living developments, the elements that produce Selection will, most certainly, be different, yet still sufficient to drive a kind of Evolution. And it is perfectly clear to me from studies in Cosmology and Geology, that a similar two-paced process of change is present there too.

Non-living Emergences are clearly evident in such events as Supernovae, and even on Earth, the Origin of Life MUST also count as a fantastic development of non-living matter. How else could that remarkable event be seen?

The much slower paced developments are harder to pin down, though inevitable from a holist point of view, and also are the ONLY possible source for the changes that are the engine that will periodically precipitate rapid Emergences. These latter cannot happen out of the blue, but must be prepared for, and precipitated by, changes which gradually accumulate and undermine, threaten and finally overthrow any current stability.

The Key Arguments, already present in the earlier contributions, are surely those about multiple, simultaneous, chemical processes, which use resources and generate products. The crucial concept, which runs entirely counter to that which always sees the result of such multiple contributions as Random Chaos, sees things quite differently!

Instead of multiple factors producing ultimately random situations, the outcome is seen in terms of how such processes effect one another, and by these effects either multiply or decline in number. In such a mix, ANY relations between different processes, which make them more likely to occur, are said to be conducive, while those which inhibit each other, are said to be contending.

Now such relations DO indeed exist in abundance, governed only by the appropriate conditions. The question is, “How do they determine what happens to the mix?”

The very fact of the existence of a history of development of Matter proves that the result cannot be Random Chaos, but actual Order, of a kind.

No matter how slight, such processes can be said to compete or support one another, and, hence in such circumstances, which ones will proliferate, and which will decline.

It is clear to me that it will be the mutually conducive ones that will grow greatly in number.

And, as soon as we accept this, we see that the situation will ultimately be transformed. If one type of relation between processes is SELECTED FOR, these will proliferate, and actually transform the mix, and hence determine what are the most likely happenings. Certain forms will tend to increase until they actually dominate the situation as a whole, and some new, overall arrangement would inevitably appear. But, when it does, and creates a New Stability, this will NOT terminate all change.

It will (as in those which occur with Living Forms) merely seem to be wholly stable, but in fact will still contain contending (though minor) factors too. The holist view when matched to Reality itself, becomes developed into a more sophisticated form, that takes in development and the alternative phases of Stability and Emergence as unavoidable.

The Life Factory

Natural Selection Before Life?

Perhaps surprisingly, scientists have finally returned to Stanley Miller's famous experiment concerning the Origin of Life on Earth, but with the purpose of going beyond the limited achievements of that effort so many years ago (1952).

In an article in New Scientist (2797) by Katherine Sanderson, the ideas of Lee Cronin of the University of Glasgow were presented, which put forward a new slant on the Miller-Urey Experiment.

Along with the rest of the NASA-led sheep, he is persuaded that Life did not originate in conducive chemical circumstances on Earth, as was the basis for Miller's experiment, but in much more surprising places, such as the "black smoker" volcanoes at the bottom of the deepest oceans, or even at one of the many other unlikely places (that could crucially be found elsewhere in the Solar System, and even more distantly in the Universe, and hence justify the funding that NASA needs in order to investigate space in search of Life).

Now, Cronin's other new point is that there must have been a whole series of developments in the chemistry involved (in our case organic chemistry, but not necessarily there in other parts of the Universe) prior to Life. And in this he is certainly correct!

Of course, the actual mechanism for selection and development, or even "evolution", in these non-living things, could not be Darwin's definition of Natural Selection, for the processes involved in that are predicated upon Life already being in existence, upon reproduction, and upon competition between living organisms in an ecosystem.

So, some very different form of selection and consequent development must have occurred based upon an entirely different mechanism, to take some "organic broth" to a position in which all the necessary processes, which would later be included into Life itself, were made available, and became stable.

BUT both Cronin, and almost all others investigating this field, assume that Life was the direct result of the presence of such processes, which almost automatically shifted over into this New Form. This is not the only conception of what actually happened. Indeed the main alternative has Life emerging out of a precipitated catastrophe of dissolution of a prior stability.

So taking his conception of pre-Life selection and his idea of a direct precipitation of Life, he believes that he has a way of investigating such pre-Life developments. AND, significantly, that they could happen anywhere, and not just on Earth.

[It begins to sound even more conducive to NASA's imperatives, does it not?]

Cronin et al do indeed recognise an unavoidable pre-Life development period, in which, long before we could call it Life, there were other chemical processes "competing" for the same resources, and thus producing a strong selective effect on a sufficiently initially diverse mix of processes to lead to the dominance of certain sequences of systems of processes.

Indeed, though his method is to establish such processes as generally available, by experiment with his chosem Polyoxometalates, the same basic idea has already been

developed theoretically by this author (J. Schofield) using Organic Chemistry in his work on Truly Natural Selection (2009).

But, Cronin's experiment expects what he calls "autonomous developments" to occur right there in his apparatus, and considers that the only extras required to take things to significant levels, will be the external adjustments to various available parameters, and this is, I'm afraid, is doomed to failure.

This is because he assumes a continuous and incremental series of steps, travelling uninterruptedly through to the emergence of Life itself, and that is never how such revolutionary transformations actually develop in Reality. Such New Levels never appear surreptitiously and automatically, but only via what are generally termed Revolutions when studying social development, or more technically as Emergences, when studying radical change more generally.

Now, such Events did indeed happen throughout the history of Reality, and they were always the absolute opposite of continuous and incremental changes into the New. On the contrary, they are invariably initiated by a wholesale collapse of the till-then established Stability, as the Second Law of Thermodynamics types of dissociative processes grow at an increasing rate, until they pass a crucial threshold and precipitate a cataclysmic avalanche of dissociations. This catastrophe seems to be sending things careering backwards towards an inevitable total oblivion.

But it doesn't actually do that!

Research into such Events has shown that ONLY via such an almost-total dismantling of the prior stability, can the available processes begin to rapidly form new systems unhindered by the once-strong forces of that prior stability, which actually maintained the prior Level's continuing stability. Only when those conservative processes are finally gone, could the actual possibilities of unhindered active competition finally begin to form systems, which could ultimately be resolved into a single dominant system being finally established as the new Level.

Life was no automatic transformation, but a successful Natural Revolution, made possible by a prior, and almost total, collapse, of a preceding stability. Only when the old Level is dead can new constructive (opposite to the Second Law) developments actually succeed.

Without any idea of the trajectories within an Emergence, NO experiment could ever be conceived of (never mind constructed) to facilitate these necessary Events. Cronin will produce only a confirmation that selection is possible, but the whole dynamic essential for a revolutionary overturn will NOT be present, and as with Miller's magnificent attempt, it will not lead to real gains on the Origin of Life on Earth,

NOTE: This author's (J. Schofield) design for a new Miller Experiment is already available on SHAPE Blog.

Non-Living to Life

Mapping the Revolutionary Interregnum

It is impossible to give a precise time for the occurrence of the Origin of Life on Earth, because it depends on exactly how you define Life.

The usual definitions are so "complete" (and close to what we see as Life today) that what is being defined is often a very long way from any of the quite reasonable candidate events that occurred much earlier in this process.

Indeed, what is usually considered to be the absolute minimal requirement is so advanced that is a considerable distance from earlier candidate developments, even though these usual suggestions may be of very small organisms indeed.

Now, this researcher, having developed a definition of the Truly Natural Selection process, in which still non-living entities already had an engine for their development, while at the other end we have Darwin & Wallace's original Natural Selection idea, so there has to be a rich and long-duration interlude between these two forms of selection, which started with relatively simple non-living structures, and ended with Life itself.

Surely, we need to define this crucial episode in some detail, if we are to actually define the Origin fully? And, to tackle such a profound trajectory, the usual means we normally employ within naturally-stable, or artificially-constructed & maintained situations will never suffice, for the crucial steps will most certainly take us across into a series of new Levels, via what are termed Emergences.

Hints have been noticed, particularly in the re-design of Miller's famous experiment, but some trajectory of the sequence of phases involved needs mapping out, with the Theory of Emergences as the absolutely essential guide.

After all, this very important meta-theory seems to cover literally all developments, not only in non-living and living entities, but also in human thinking and its social organisation and history too. It must, therefore, be the first port of call in tracing out an initial trajectory in this relatively virgin area of study.

The major contribution, from the re-designed, new version of the Miller's Experiment, simply must start with wholly pre-life, purely-chemical processes, and systems-of-processes, as investigated by this researcher in what he terms Truly Natural Selection. But, of course, carried-out in the context of the essential role of inactive structures, delivering not only conducive flow pathways through different conditions, but also protective niches and other locations where tenderer and easily-dissociated phases could nevertheless, at least for a time, succeed.

And, in this task, the Theory of Emergences alone can give us Major Crises, as the key, precipitating events for subsequent significant qualitative changes to occur. So, this task had to be one of suggesting intermediate-phases, between our two known trajectories, which would enable the conditions for Life to finally emerge.

Now, it would necessarily be strictly holistic – allowing absolutely none of the assumptions and principles of a pluralistic approach to be involved.

And, the most important principle will have to be the self-changing of context, by whatever processes or systems got established there, to both precipitate crises, and then allow Emergences to ensue. And, in these developments, there will be absolutely NO purposes or directed processes towards some intended end involved. No supernatural or even Lamarckian imperatives will be contemplated!

We will have to trace real development via self-produced potentials in a purely holistic-scientific way.

No matter how ingenious an overall set of changes are, they will be driven solely by generated opportunities, whether created in a development, or vanishing as in a crisis.

It is clear that this investigation will have to precede the initial constructed version of the new-improved Miller's Experiment set-up, and will necessitate the installation, within it, of the first versions of inactive channelled pathways, to facilitate the deemed-to-be-appropriate sequences of reactions, and no matter how successful we believe we have been in this first attempt, the results from that will undoubtedly always demolish some of our initial surmises, as well as confirming others as reasonable, and hence these findings will certainly force significant changes, for a second -and-subsequent versions of the Experiment.

Also, for the first time, attempts will have to be made, to trace out the various simultaneous processes – both those affecting one another, and those that do not. And, adjustments may well be made in later versions merely to be able to draw conclusions about the mutual interactions of parallel processes in slightly different circumstances.

Indeed, with this new kind of experiment, the development of ideas will go hand-in-hand with the changes in the experiment's set-up and even resources, as they are changed to discover the most appropriate analogistic model that can be developed. NOTE: The main experiment, with its distributed, time-based sensors, will also take samples for analysis elsewhere - in separate, ancillary analytical experiments, to identify new products as they emerge, and associated with the various, identified and time–positioned processes.

The availability of other necessary inclusions into the resources of the experiment, perhaps those that in Reality will have come from some kind of volcanism, may well also prove to be essential and occurring at a particular stage in the overall process. And, it is anticipated that discoveries, which are produced in the apparatus (which will need to be dismantled to gain access to any deposits, in order to identify them via analysis after each trial has been completed of a particular version.

And, secondary experiments outside the main one, will always be necessary to see how certain occurring substances have been produced, or to determine what additional substances might be necessary to make them happen.

Indeed, such research, as is being suggested here, could never be single one-offs, or specially-arranged-for experiments, but, on the contrary, would constitute a whole set of related investigations, by one means or another, attempting to reveal holistic, multi-strand, and mutually-affecting processes - acting both simultaneously and in series of sequences.

Indeed, experiments into "sols and gels", proto-membranes and conducive substances of various kinds, will have to be investigated outwith the main experiment, to facilitate its constant improvement.

A crucial part will be how seemingly permanently established Stabilitues - systems of processes, are initially, then terminally undermined. For, in the kind of trajectories we insist are the most important in this research, it is only via the demise of such conditions, that preveiously possible-but-prevented processes can successfully play their roles in further developments.

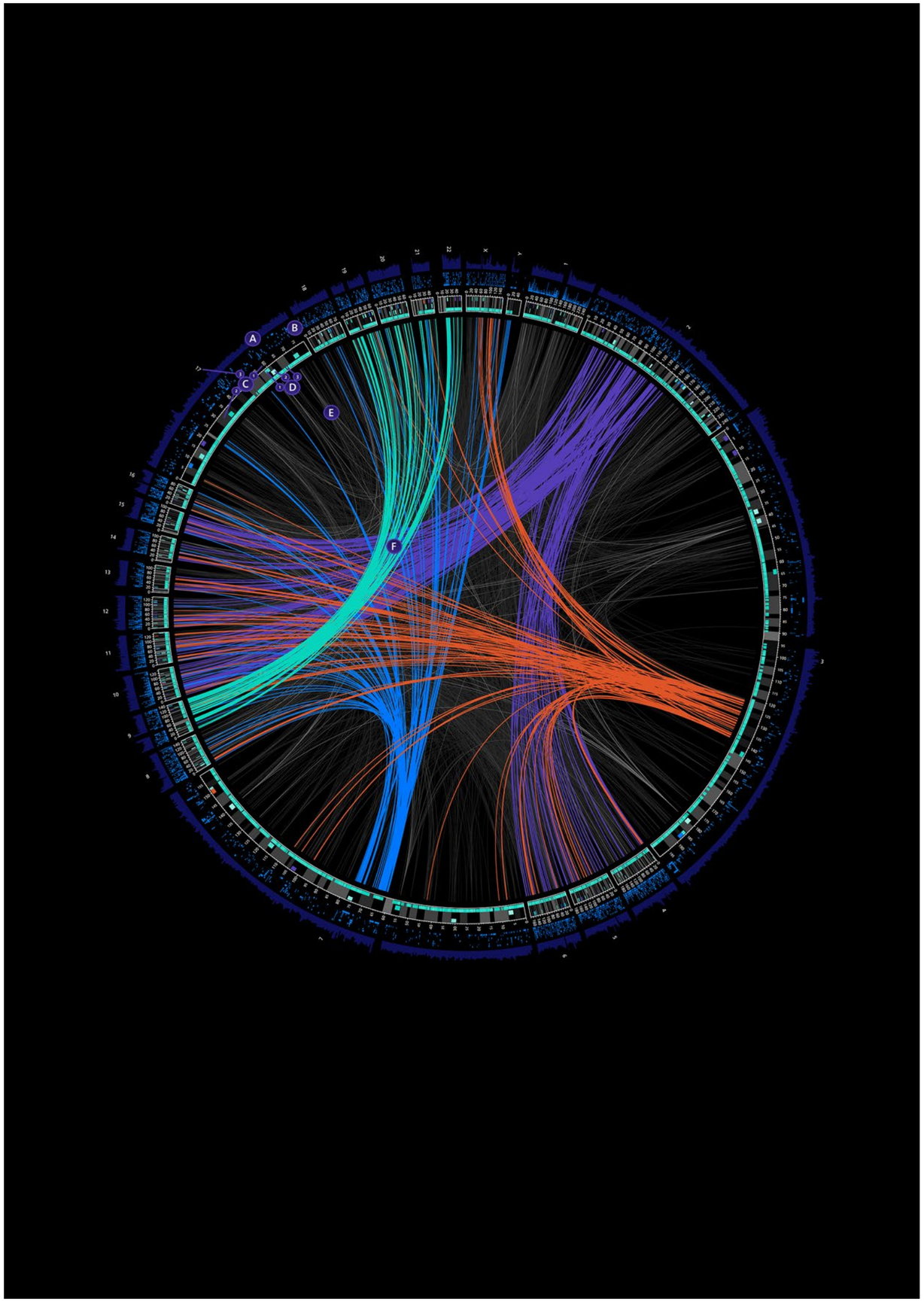
Even when still-well-within the non-living part of this development, I am convinced that remarkable interludes will occur, which will transform those situations radically. I am thinking of something akin to Adaptive Radiation as in Darwinian evolution, where a certain occurrence of circumstances – perhaps following an almost terminating crisis, delivers a situation in which a whole diverse set of developments are made possible by the elimination of significantly constraining prior systems, which had previously prevented them from happening.

In such circumstances, many different and rapid developments could occur, and inevitably transform the environment. Such productive phases, following crises, would be inevitable, and well worthy of detailed study.

The incremental purely-chance path of traditionally-seen developments is just too dispersed to get anywhere at all.

Even with pre-Life, chemical reactions, the occurrence of run-away change will have occurred, and redirected subsequent changes, via a significantly-changed context.

Finally, it cannot be stressed too firmly, that this must be a holist investigation. Any pluralist side-experiments in traditionally controlled environments, must now be seen, theoretically, solely as indications of what kinds of processes might occur in a truly holist mix. So, the primary purpose would be to adjust the inactive, channelling structures and pathways, so that the purely-investigative pluralist processes could have a chance of playing a different and real role in the main holist experiment.



Genes and Natural Selection

On watching a *Carta* video upon accelerated regions of change in Human and other species' genomes, I realised a particular factor that wasn't as emphasized, as strongly I would consider absolutely necessary.

For, the valuable research being discussed was in extensive data from available genetic materials, and hence concentrated upon the so-called "developments" across different examples, substantially-separated in the time that they existed.

Now, though this is valuable, there is no evident causality linking such supposed "adjacent" steps in the process, except a negative, exterior causality, that must have removed other changes or even prior retentions, in that genetic position, via Natural Selection, as not good enough to benefit by sufficient reproductory success as compared to others which had, so that strand would ultimately die out.

But, what if that gene was to do with possible processes and controls involved within that genetic material as a whole?

We are also told of replications, and movements of position of a particular gene, or even a physically connected sequence of genes, as well as "switching" functions for functional-processes-elsewhere, due to other genes.

And there must also be some genetic control mechanism for rejecting a damaging mutation, immediately it occurs: what could that be? It too is likely to be coded for within the genetic materials.

So, it appears that apart from Natural Selection, for choosing which mutations persist, there must be others associated with the "upkeep" of the genetic system, as a viable and reliable process.

So, the revealed features collected and studied will have "system reasons" for retention, as well as, very much later, Natural Selection.

And, at least some of these will be vital in what is retained, for genes are usually parts of whole systems within the genome.

Now, as with the fossil record, the gene record will also be full of the same sort of gaps - intermediate processes actually linking the two known and presented cases. Indeed, as entirely internal mechanisms to do with the integrity of the system - they will never appear in the genetic records available, for they will be bankers not changing much, or even being so important as to have replicas as back-ups.

Indeed, it poses the question as to whether computer simulations might be the only route to investigating such intermediary processes - for, after all, they are not to do with ultimate function of the gene in the organism, but with its local viable system mechanisms only.

Having spent a considerable part of my career delivering such computer programs, a well informed expert in the genetic mechanisms involved could adequately equip someone like myself to deliver what was needed - but the discipline expert must always be in charge, and not the programmer.

Unacknowledged Philosophical Bases

Flawed Foundations always lead to Catastrophic Collapses

On YouTube there is an hour-long discussion between Robert Wright, a buddhist expert in Philosophical Psychology, and Jeremy England, an orthodox Jewish physicist, whose remit was the development processes that must have occurred prior to the Emergence of Life within wholly non-living circumstances, but which, nevertheless, produced a series of developments that ultimately resulted in the very first living entities.

You might expect what the scientist's premises were, but, on some fronts at least, you would most likely be significantly mistaken.

Whereas, your preconceptions of the bases assumed by the philosophical psychologist might be assumed to be less rigid and materialist, but in fact the clearly-evident, major philosophical flaws actually came from this latter side of this discussion, and effectively tried to defeat the scientist's current unconventional researches with either Classical or even Copenhagen premises, usually widely employed in Physics.

It was the inverse of what I expected, anyway!

Now, as a philosopher and a physicist, myself, I have spent some considerable time tracing the development of philosophic stances from their clear inception with the earliest Homo sapiens - in the almost 180,000 years-long Hunter/Gatherer Phase, of their means-of-life, wherein only Pragmatism, in which. "If it works, it is right!" was Mankind's single available intellectual methodology.

But note, this limitation didn't stop this physically ill-equipped descendant of Apes, successfully spreading itself and taking-over all of the then accessible World.

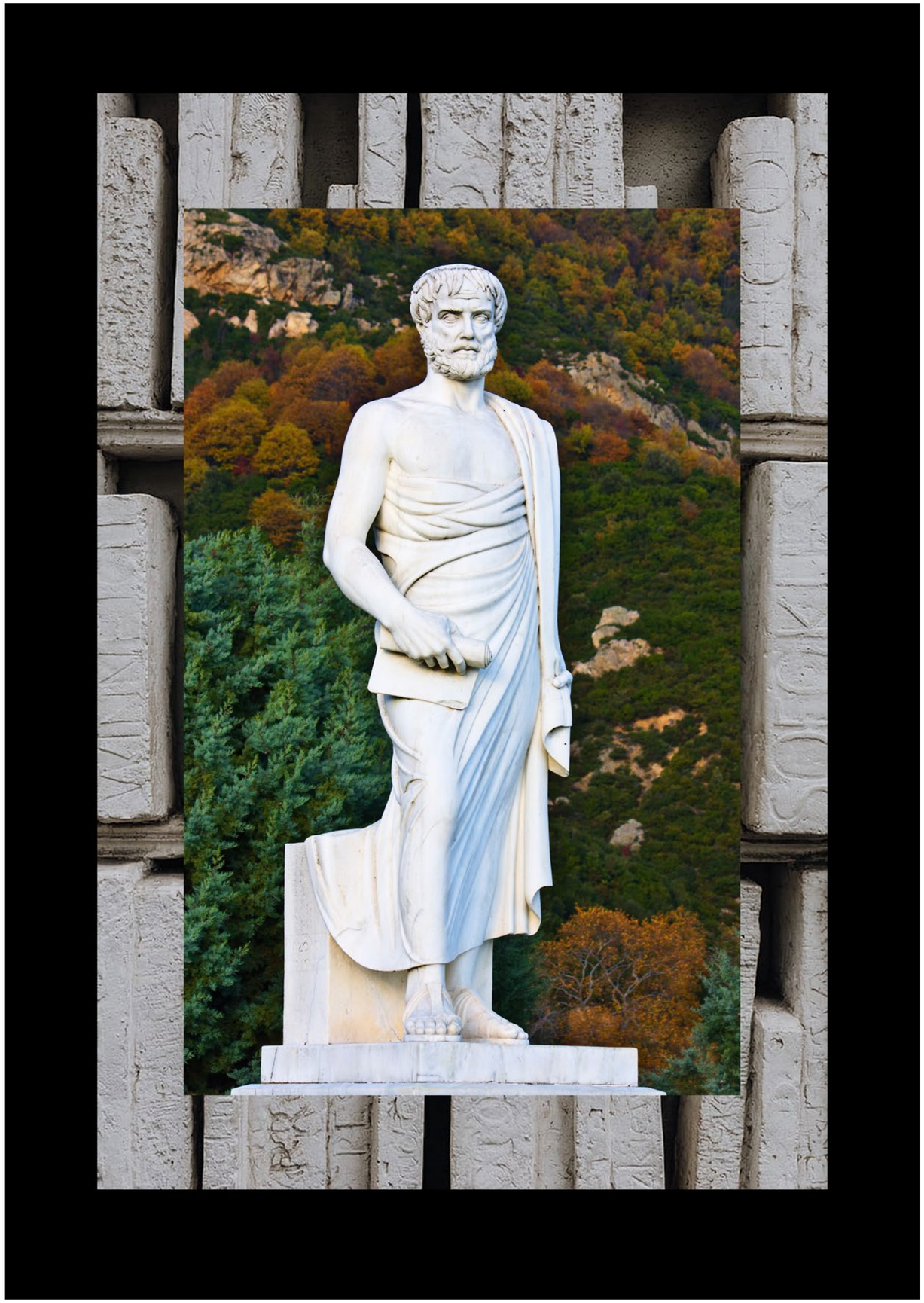
And, this situation only stepped-up in tempo with the remarkable Neolithic Revolution, wherein permanently-static domiciles replaced the prior constantly-wandering mode-of-life, involving only very temporary, moveable homes, and which was only initially transformed by the methods and social relationships involved in Farming and Animal Husbandry. And, thereafter, very quickly also led to a wide range of new skills including pottery, weaving, and ultimately metallurgy, and a vast development of regular social relations and communications, finally achieving what we term Civilisation.

Then, around 2,500 years ago, in Ancient Greece, the intellectual foundations were dramatically changed, initially by the development of Mathematics (Euclian Geometry), and thereafter by Formal Logic, both of which brought in Idealism (via Plato), but within a generation also had also, via Aristotle, included Materialism too.

But, of course, these were far from delivering a coherent and consistent set of alternatives: they were, instead, specific to given situations and with only ever strictly local applicability.

So, all three stances were used "as and when each was appropriate"! The overall stance was a remarkable-and-piecemeal amalgam of Idealism and Materialism - held together by Pragmatism.

Nevertheless, many only-glimpsed relations were somehow grasped from Reality, which, more often than not, actually failed when they were attempted to be applied in the real World-as-is. And, it was found essential to purposely limit and maintain a much simpler situation, in order to "hold Reality still", in various different appropriate ways, in order to extract any useable relations at all.



Now, perhaps surprisingly, this did not stop effective use!

As long as the precise conditions-of-extraction were exactly replicated, then the relation could be effectively applied.

But, to allow these relations to become eternal Natural Laws, which was always assumed, an absolutely essential tenet then just had to be crucially attached to such processes.

It was the Principle of Plurality, which stated, categorically, that all such Laws were always totally separate from one another: they were eternal and could never be modified in any way.

All complex situations were onceived of as merely complications of some subset of these laws, in various different proportions. Individual Laws were totally un-modifiable!

And, this was also instituted for the, also new, processes of Formal Logic too. For, the model for both had been the precursor achievements within Pure Mathematics, where the absolutely essential idealisations that were always used DID indeed legitimately conform to this Principle.

The Crisis in Physics, which led to he Retreat that became Copenhagen, was precisely down to this contradictory amalgam of stances, which became totally untenable in Sub Atomic Physics, long before its evident emergence in non-investigative, and primarily cerebral-only disciplines - like Wright's for example.

In other words, and perhaps surprisingly, my critique of both Classical and Copenhagen Physics turns out to be also exactly correct in damning Wright's stance, as it too is totally pluralist (whereas, as a Buddhist, you would assume him to be a holist, surely?).

So, it seems productive to concentrate upon England's apparently progressive diversions from the usual preoccupations of the vast majority of physicists, and primarily address where he is diverging from the current consensus, and seeking to reveal how Physics could have played a role in the Revolutionary Origin of Life, before criticising his short-comings.

The Wright-England Debate

On watching the video of this hour-long debate, for a second time, I began to discern the debaters' differing grounds, from which the various areas dealt with were tackled. So, perhaps, the main contribution here should start by revealing these, in contrast to those of myself.

Wright, as the interviewer, was obviously the major determinator of what was discussed, and also set out what to him were the probable bases common to them both. The primary basis was clearly assumed by him to be Thermodynamics, and, in particular, its Second Law, about the Universe running down. He, secondly, also was clearly a subscriber to a belief in Eternal Natural Laws (an assumption of Plurality) though all this was never overtly spelled out (it rarely, if ever, is).

Finally, whenever his set of bases weren't able to take things further, he would switch the ground, sometimes quite dramatically, into areas where he felt more confident, or to where he thought England's position might be less defensible [Something like "Yes.. but" arguing, but not quite as blatantly dishonest!]

Nevertheless, as long as the observer of this discussion disregarded Wright's God-like stance the responses of England were able to show what he and his colleagues are researching, and some of the strengths and weaknesses of his grounds too.

His area of study is pre-life physical developments, that were conducive to the ultimate Origin of Life in specifically conducive situations, and with already-existing natural processes. He chose, as a physicist, to follow the usual assumption of Physics being the most basic science, and looked only for physical processes that were so endowed.

Now, the writer of this review has also addressed a similar set of questions, but, instead, based them upon pre-life *chemical* reactions. Now, in the Wright-England discussions the whole question of a non-living process as being similar to Darwin's Natural Selection concerning the evolution of living things, could not be avoided.

All, including this writer, agreed that the reproduction and competition of life forms, especially with their changed genetics, could not be replicated in pre-life conditions, but by restricting the discussion to Physics, the gap, to Natural Selection, was *so large* that a very different approach had to be taken - basically also thermodynamic, but with England playing down the usual abstraction, and preferring "work" instead.

Now we never got to hearing about his physical examples, which would have been crucial, but nevertheless, absolutely no route to Life was evident.

In the writer's own researches, however, concentrating upon pre-Life Chemistry, rather than Physics (starting from Physics misses out crucial Emergences and new levels of reality), much more similar processes to those in life could be addressed.

And, something akin to competition could be included, where different processes required the same resources. Indeed, the "competition" for such resources simply boiled down to a preponderance of one process over its competitors, along with differences in the speeds of such rival processes.

In addition, sequences of processes into "conducive strings", and even "conducive cycles", made revealing links to what is already known of Metabolic Pathways in Life.

And, with all these considerations, situations such as dominances and paucities of required resources, showed how mixed populations of multiple processes could

change and even lead from dominance to paucity, and the dynamics of alternative developments and different dominances.

Of course, this clearly relevant set of investigations wasn't involved in the Wright-England discussion.

But Jeremy England did reveal a much sounder attitude to so-called Natural Laws, as being "arranged for" by the involved specially-tailored domains, and consequent methods of investigation, and also, therefore, depended upon as man-made models, in those given circumstances.

Nevertheless, the errors of Plurality undermined both sides of the discussion, for neither went beyond Law, and certainly didn't address the essential role of Emergences in developmental creation of the wholly new.

What was implied was that such miracles as Life simply arose naturally from adequate complexity, rather than only being possible following major crisis and collapse, the only situation in which the radically New could possibly emerge unihibited - a veritable Revolution or Natural Emergent Interlude.

I have spent many years upon such studies, formulating the concept of Truly Natural Selection, for the non-living era, and ending up with a Theory of Emergences.

It is clear that this discussion never approached these relevant topics. Until it does, the answers will not be found.

Robert Wright & Jeremy England [The Wright Show] (full conversation)

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