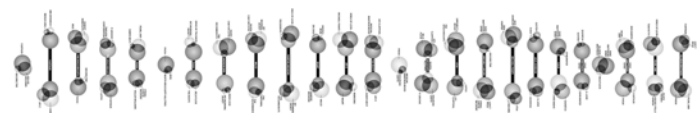


SHAPEJOURNAL

THE EVOLUTION OF MATTER
AND THE ESSENTIAL TRANSFORMATION OF SCIENCE TO COPE WITH IT

WHAT MAKES REALITY? / PLANS FOR A NON-INTERVENTIONIST SCIENCE



hydrogen 1 H 1.0079																		helium 2 He 4.0026					
lithium 3 Li 6.941	beryllium 4 Be 9.0122																	boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180
sodium 11 Na 22.990	magnesium 12 Mg 24.305																	aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948
potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80						
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29						
caesium 55 Cs 132.91	barium 56 Ba 137.33	57-70 ★	lutetium 71 Lu 174.97	hafnium 72 Hf 178.49	tantalum 73 Ta 180.95	tungsten 74 W 183.84	rhenium 75 Re 186.21	osmium 76 Os 190.23	iridium 77 Ir 192.22	platinum 78 Pt 195.08	gold 79 Au 196.97	mercury 80 Hg 200.59	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]					
francium 87 Fr [223]	radium 88 Ra [226]	89-102 ★ ★	lawrencium 103 Lr [262]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	ununnium 110 Uun [271]	ununium 111 Uuu [272]	unubium 112 Uub [277]	ununquadium 114 Uuq [289]										

* Lanthanide series

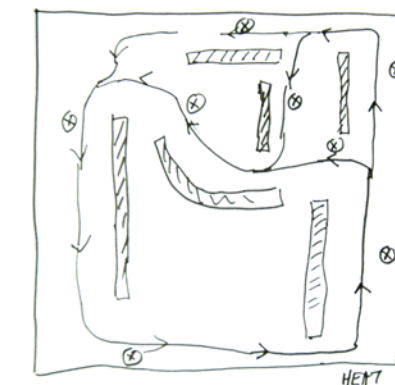
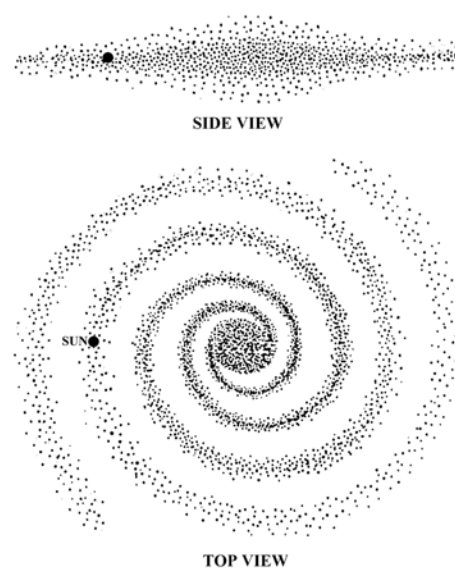
** Actinide series

lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm [145]	samarium 62 Sm 150.36	europium 63 Eu 151.96	gadolinium 64 Gd 157.25	terbium 65 Tb 158.93	dysprosium 66 Dy 162.50	holmium 67 Ho 164.93	erbium 68 Er 167.26	thulium 69 Tm 168.93	ytterbium 70 Yb 173.04
actinium 89 Ac [227]	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]

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Shape Journal
Special Issue 23

The Evolution of Matter

And the Essential Transformation of Science
to Cope with it.

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2. Main Paper

A: What Makes Reality?

B: The Beginnings of an Alternative

C: Revealing the Constructive Side of Development

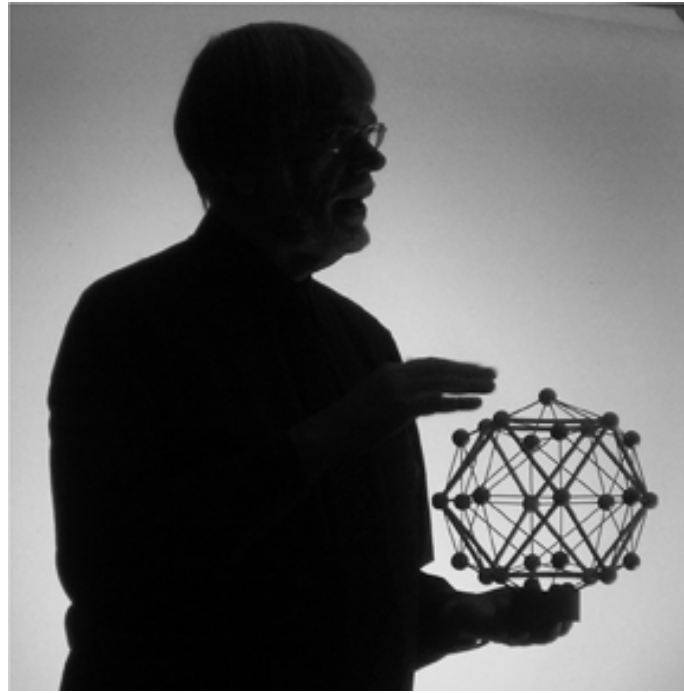
D: First Steps in a New Scientific Methodology

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(Non-Interventionist Sample Analyses)



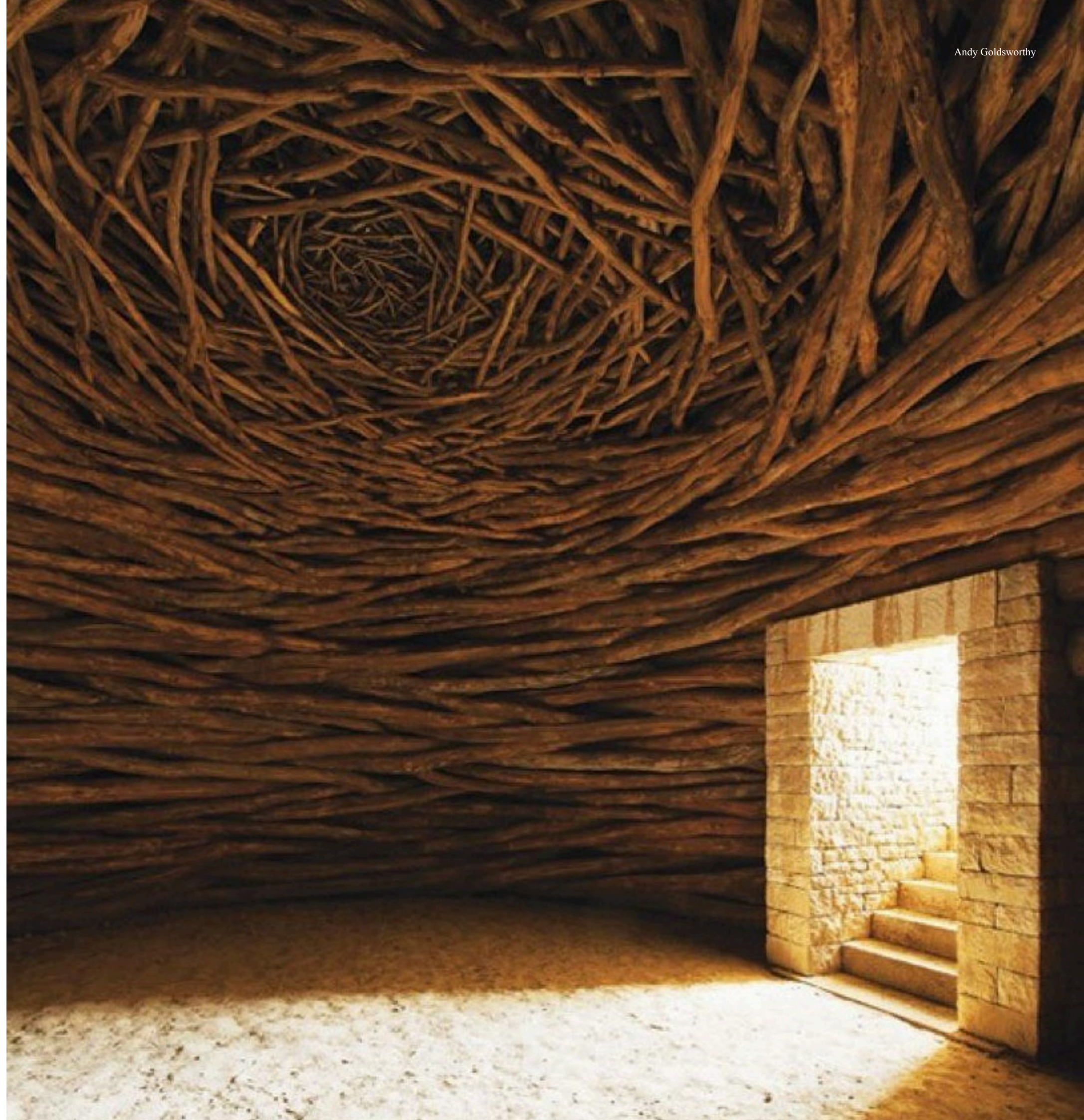
Preface

A Holisitic Standpoint

Welcome to the 23rd Special Issue of the **SHAPE Journal** which features a single paper on the Evolution of Matter.

This rather long and meandering paper, though originally intended merely as an argument for the existence of the Evolution of *all* Matter (as well as Living Things), rather rapidly had to address a wholly new, Holistic standpoint for scientific investigation and explanation, and thus was inevitably diverted into delivering at least some important contributions to that area. For the usual standpoint in Science is NOT holistic, but pluralistic, and though perfectly suitable in areas in equilibrium, is entirely unsuitable for dealing with systems in qualitative change. Now, as it very quickly became a rather extended piece, it could not be allowed to deal fully with all aspects so generated by this alterative stance. So, they have been somewhat truncated, with the suggestion, for those requiring a more comprehensive treatment, to address the much fuller accounts published in the 50 issues of SHAPE Journal on the Internet by this author.

Jim Schofield Aug 2013





The Evolution of Matter

And the Essential Transformation of Science to Cope with it

A: What makes Reality?

How is it so complex, yet seemingly so full of change?
And conversely, why is it often so stable and even predictable?

Attempts to explain these features have been, historically, either religious or mechanistic, but have rarely got even close to a comprehensive, producing imperative, residing solely within concrete Reality itself.

(i) The Attempt to Reveal this Real World Imperative
Clearly, even leaving aside the real conundrum of Life's origin, things both build-up and deteriorate, **all by themselves**.

But, being “of Life” ourselves, and perhaps its highest and most conscious expression, we human beings could not stomach a Reality that moved itself – certainly not when we, ourselves, have so clearly planned and carried out many purposive undertakings from the earliest moments of even our pre-human hominid ancestors. We, therefore, naturally endowed some Super Being, in our own image and with such capabilities, who must have planned and then directed things overall. We could conceive of no other agent of positive change!

(ii) Construction as well as Dissociation
Yet, when Mankind began to seriously and systematically study, and even experiment with Reality, they soon were aware of ever-present forces of dissociation. For, unless maintained, all their own constructions would quickly deteriorate and decay, and given time, finally vanish without a trace! Yet, this amalgam of deteriorations, which we termed, collectively, The Second Law of Thermodynamics, was not, in any way, balanced by a similar and evident process of natural *construction*, growth and even development.

(iii) Assumptions of Permanence & Stability
Yet, our usual categories, employed in considering Reality, were always fixed and unchanging, and our named things did not change. Even our systems of explanation were predicated upon eternal, and evidenced by Formal Logic and Euclidian Geometry.

We had no real idea of a natural opposite to dissociation. But, very clearly, in this we surely must have been mistaken. There has to be a built-in associative imperative in Reality, and though applicable everywhere, and to every single thing, the nature of it can surely be revealed – for Life itself must be the key!

Yet, against the much slower-moving backdrop of the inanimate and non-living, we considered that ourselves, in particular, and to a lesser extent, all of Life, had to have involved the insertion into Reality by the supernatural Hand of God, which injected the necessary imperative into an inert and permanently static non-living World.

B: The Beginnings of an Alternative: Darwin & Wallace

Yet, Man himself, or to be more accurate, exceptional individuals, like Darwin and Wallace, rejected the principle of the eternal nature of living species, and postulated that they had definitely changed – they had evolved from lower, or at least different, forms into what existed “now”.

(i) The Evolution of Life

They postulated Evolution – the unavoidable change and development of living species over time, and they finally proposed a natural mechanism to bring about these changes – Natural Selection.

Now, though this was, in time, generally accepted, it was limited as a developmental imperative only to Living Things. Life was the exception, and could still have been set in motion by a supernatural intervention. The rest of Reality was not included! It may be seen to change over time, but not in any developmental way. It was considered to change without “purpose”, and certainly without any “progress”. It just rolled on, with the same general forms obeying the same immutable laws, and never got anywhere. Its stability in everything from the very small to the very large was evident, and hence unquestioned.

(ii) Evolution of the Earth: Geology

Geology, however, which came before The Origin of Species idea, had proved the constant, though incredibly slow, processes of change in the very ground beneath our feet, and even the occurrence and disappearance of ancient seas – the bottoms of which could later appear at the very summits of high mountains. But, overall, non-living Reality was not considered to have developed!

Yet, even there we were wrong again! Stability is not the “natural state”, to only be overcome by external interventions. On the contrary, it is a temporary conclusion to changes, which have both destructive and constructive elements. Stability turned out to always be a temporary, even if long-lasting balance between these actually existing opposite imperatives, and can be, and always is, in the end, dissociated!

Indeed, the geologists not only revealed slow changes, but also some incredibly fast interludes of devastating transformations, which seemed, when happening, to be destroying everything. Yet, even these, always subsided into the usual, and much longer, periods of stability, when the opposing forces formed systems, which were both self-regulating and self-maintaining.

Now, just how these came to be, and why they finally settled down, were unknown, but terms like Orogenies – mountain-building periods, were recognised and named as the producers of major changes in the nature of sections of the Earth’s Crust.



(iii) The Development of the Solar System

Much later, in the period of Space Exploration, discoveries concerning the planets of our Solar System, revealed significant differences that would never be the case in a supposedly permanently stable, non-living system. The strong magnetic field of the Earth, for example, was totally absent in Mars, and the moons evidently accompanying literally all the planets, were surprisingly very different from each other, and sometimes actually dissociated into thin, concentric rings made up of very small fragments of ice or other solid matter as with several of the outer giant planets (Saturn being the most obvious).

(iv) The Development of the Universe

And, even earlier, astronomers had already noticed differences in the stars, which they finally realised, were suns like our own, but represented a truly vast range of different states. The plotting of all known stars on the Hertzsprung-Russell Diagram inferred an Evolution even of these totally non-living “incendiary entities”. Non-living Matter was certainly not eternal! It too, somehow, developed, though how that actually occurred was still a mystery.





(v) The Contribution of Nuclear Physics

Slowly, a general trajectory of changes in all stars was put together, and, in terms of known (earthbound) experiments, in Sub Atomic Physics, the possible “Phases” of the lives of stars could be postulated. For physicists had observed and even measured the changes of one element into another – previously considered impossible, and from this knowledge all sorts of theories and experiments studied such transformations, and considered how they might have first occurred.

The Atom Bomb and the Hydrogen Bomb confirmed that the actual creation of elements was possible, and the conditions required seemed to occur naturally only in one kind of place – within stars!

Somehow, a dispersed cloud of gases could aggregate into a massive, single concentration, and, at a certain critical point, would light-up into a light and energy-emitting star. We could even suggest different life-cycles depending upon the final size of these entities, and each and every single Phase, always terminated in some cataclysmic, short-period change, which usually involved a wholesale Collapse, and/or Explosion! Indeed, a single star could finally end such a process with an explosion of truly cosmic proportions in what is termed a supernova.

(vi) The Role of Supernovae

Yet the dispersed result of such a death, not only could start the whole cycle again from the beginning, but it would also be very different! Products created within the various “living-phases” of such stars, would now transform the detritus produced by the explosion, and any new stars, produced from this, would be different In addition, and very significantly, there would also occur entirely new aggregations composed sometimes largely of the new heavier elements, which we would call planets. And it is these that can produce the chemical processes essential for Life. Without such supernovae, therefore, there could be no Life.

So evolution, of an important kind, certainly existed long before there was any Life anywhere, and one amazing production of that development was, of course, Life itself.

(vii) Do the Individual Particles of Matter themselves have a History too?

Indeed, once this was evident, a whole new sphere of investigation could not be avoided. The question had to be addressed – “Had Matter itself always been the same in its “ultimate, fundamental components, or had it too evolved?” The obvious answer had to be that it had indeed a history of development too!

Surely we cannot, as our current Sub Atomic Physicists tend to do, assume that eternal elementary particles have always existed, exactly as they are today, and are the sole source of everything that now exists merely as complications from the bottom up of such eternal units.

(viii) Is There a General Pattern to Evolution at all Levels?

Because of the above findings concerning developmental changes, they too must have come together from earlier manifestations, and grew until they also became unstable: the usual cataclysms and transformation must have occurred there too, resulting in wholly new-built stable entities, for a time at least. There must be a prehistory of our current most fundamental particles of matter – assuming them as eternal just doesn’t wash!

Now, though it was Sub Atomic Physics that was the source for many cosmological theories, the new sources of detailed information – the stars themselves, impelled cosmologists to attempt to erect histories of these, and observations even implied that the galaxies (Island universes of stars) were moving away from each other at colossal speeds: there seemed to have been an explosion of the size that included the whole of the Cosmos, and which both produced and impelled all these galaxies away from the centre of that cataclysm.

C: Revealing the Constructive Side.

(i) The Assumed Descent to Chaos

So, what is absolutely clear is that we cannot continue to stand solely upon one single dissociative leg – namely the Second Law of Thermodynamics. For when we do, it is no surprise that the only possible historical consequence can be the final end of everything as that law dissociates everything into the lowest possible common denominator - total random noise.

The surveyors of the future of the Universe do indeed describe a scenario in which all the stars finally go our one by one until nothing remains but inert matter getting nowhere. Such a scenario, somehow, manages to ignore the admitted history of the Universe, which, if anything, has been a relatively constant increase in Order culminating with Life and even Consciousness.

The domination of that Second Law is a prejudice of an *engineering* attitude to Reality, considering everything only from the standpoint of controlling and manipulating Reality to some intended purpose, and ignoring the self-moving wonder of the world actually making, and renewing itself constantly. It reveals a preoccupation with Rust, and a wilful ignorance of Development and Evolution as truly natural, self-moving processes.

(ii) The Law of Increasing Order

So, we have to address the unexplained evolution of Reality in terms of the exact opposite of the Second Law: we have to define, describe and explain the factors which build, widen, develop and evolve to give what we know we have. And that is most certainly not an inconsequential by-product of the “really important forces” of dissolution and decay.

(iii) How Stability Occurs

Indeed, this is not a mere prejudice for Progress, but a much more even-handed and objective attempt to deal with Reality as it changes, and crucially, philosophically, to explain Stability in terms of a balance between the factors which tend to dissociate, and those which construct New Order. If anything, the neglected side of this dichotomy must be crucial, for without it the Universe would never have changed. It would have started in total chaos and remained so forever!

But, to lay hold of that constructive, developmental side will not be an easy task, for behind almost the whole of Mankind’s recent history, we have allocated all organising and building up to Man himself, and all dissociation, rust and breakdown to a totally negative Nature.

(iv) A Philosophic, Qualitative law?

Now, to define the task, it will be helpful to look first at the unusual nature of the Second Law. For it is unique. Though it defines Entropy as a quantitative thing and has its only possible direction in an undirected World as downhill, it is still a philosophical Law.

It is in fact an amalgam of every possible kind of dissociative process, unified by the abstract fig-leaf of Entropy.

Surely if dissociation can be given such an all embracing stature, then the processes that all move things in the exact opposite direction, can be given a similar all embracing nature too? And unless you see Stability as desirable and dissociation as its opposite, the only intelligent alternative must be to see Stability as the possibility of a kind of Order achieved by a systemically achieved balance between development and dissociation.

We have to explain Stability! Why should we have periods of little qualitative change, instead of an accelerating decline, which would surely be the trajectory in a Universe dominated only by dissociation? For stability not only counters dissociation, but also development too. Stability is extremely conservative, opposing both decline and progress Yet any attempt to define the positive developmental side of Reality is condemned, while the opposite commitment to continuous decay is considered acceptable!

Nevertheless, we have to focus on the developmental occurring at all levels of organisation and deliver it as an abstract imperative, like the Second law is a negative imperative.

Of course, neither abstraction is actually *true*, but to start there is much more objectivity than the current pessimism.

But, of course, neither of these are overarching Formal Laws at all, but appear in the multiple instances of concrete comings together of entirely natural and indeed concrete processes.

Nevertheless, to Mankind, being as it is, such a general, constantly-repeated overall conjunction of processes must be dealt with in this way to get a firm handle upon it (as they have already done for Dissolution with the Second Law).

We must at this time identify the opposite of the Second Law. And, right away, we have to leave the paradigms of quantitative and pluralistic Science, and the laws based upon that standpoint and methodology, for very different Qualitative Methods and consequent Laws, the most renowned of which is certainly Darwin and Wallace’s Natural Selection.





D: First Steps in a New Scientific Methodology

(i) A Non Quantitative Kind of Revelation

For, we must be very clear that this was not merely a new view of how species occurred, but inferred a wholly revolutionary method too. For though measurements could be made, the results were not some sort of quantitative relation, which could only describe the pattern or form involved. This Theory was very different. It was about the creation of the New from the Old: it was about qualitative, developmental change and Evolution!

So, if this is to fundamentally define a new way of doing Science we must commence with it to define a necessary methodology and “form” for this New Science, that must include such changes at its very heart.

Now, as already mentioned, the implication is that we have to depart from the currently employed scientific methodologies, for we cannot reveal these new sorts of laws by these methods. Let us first clearly lay out what we usually do!

(ii) First Defining the Current Method

When in Science we are presented with many holistic and multi-directional factors, which together constitute Reality, we can only make any sort of progress by selecting, isolating and filtering our chosen physical area of study, to purposely make ONE factor at a time clearly visible and extractable. WE therefore always take a complex and mutually-determining Whole, and drastically modify it in order to Analyse it.

This universally employed method is termed *pluralistic*, because it is grounded in a belief in the Principle of Plurality, which sees all relevant determining factors as separable – that is independent of their occurring contexts. And this legitimises the quite drastic farming and transformation of context to facilitate the extraction of a single factor. And when extracted from its context as a purely formal relation, we then assume that we have in our hands, exactly one of the factors that were acting in unfettered Reality. It just isn’t true!

(iii) The Values and Weaknesses Involved

Now, such a “condemnation” may seem to scupper the whole scientific methodology, because what we get by such methods is NOT the Truth. But, in fact these methods are far from totally useless. For as long as the same Domains, which were set up for their extraction, are also employed in their use, they do indeed deliver: we can use them to predict within the Domain – but only there! What we have is NOT, as we assume, generally applicable!

And, even more important, it is misleading as to what actually happens in naturally existing, unfettered Reality. And crucially, it is very misleading for explanation!

So, what does the usual method amount to? We cut-up Reality, and then manipulate individual pieces of it to reveal particular factors one-at-a-time. But, in so doing, we necessarily modify those factors, as they are NOT, as we assume, unchanging and eternal, but actually the result of a whole set of the many mutually-affecting factors and processes that constitute their actual context.

(iv) The Consequences of Plurality

What we obtain, therefore, are a set of separate factors, each predicated upon its own tailor-made Domain (or purposely farmed context). To effectively use these discoveries, we have no choice but to abandon nature’s way of producing its effects, and instead turn our planned productions via a sequence of separate, and differently arranged, processes, each one separately confined to its own necessary Domain. We ape an actually simultaneous, multi-factor orchestration in unfettered Reality, into this marshalled and modified step-by-step sequence. And, of course, these two are never the same!

(See Appendix for relevant Diagrams)

(v) Comparing with a True Holistic case: Miller’s Experiment

Let us take another famous example of Holist Science to demonstrate the crucial differences.

Stanley Miller wanted to emulate the actual physical (meteorological) and chemical processes in the conditions of a particular Phase in the history of the early Earth, that simply had to have played a part in the known-to-have-occurred Origin of Life. So, he designed and set up a totally sealed-off apparatus, containing what he knew of the mainly atmospheric, but with some surface and even external conditions, and by adding heat (as from the then sun) and electrical discharges as would occur from lightning, he set in motion a natural cycle of processes, with ONLY these contents, and no other external factors.

After only one week, the liquid water at the bottom of the system had turned a “reddy-brown”. Something NOT in the original mix had been produced, as was now in the water. On carefully dismantling his apparatus and analysing a totally uncontaminated sample of this changed water, he discovered that it contained amino acids – some of the most important building blocks of Life!

(vi) The Evident Weaknesses in This Method

But, the very necessary isolation of the system from the current very different conditions meant that there was no way he could determine exactly what had been happening within his emulated World. Clearly, with the holist standpoint, which he held, among those processes, there must have been many that were simultaneous, and mutually affecting of one another, and will have elicited the possibility of several consequent new sequences. The internal contents were being both used and added to, which would allow wholly new possibilities at each new defining Phase of the processes. The contents were NOT constant at all: the very processes involved continually changed them, so that from an original nexus of processes, all acting at once, the situation changed – wholly new products appeared which allowed wholly new processes to be initiated. The situation was self-modifying, along several different and simultaneous sequences. Finally after an unknown series of such Phases, amino acids came to be produced.

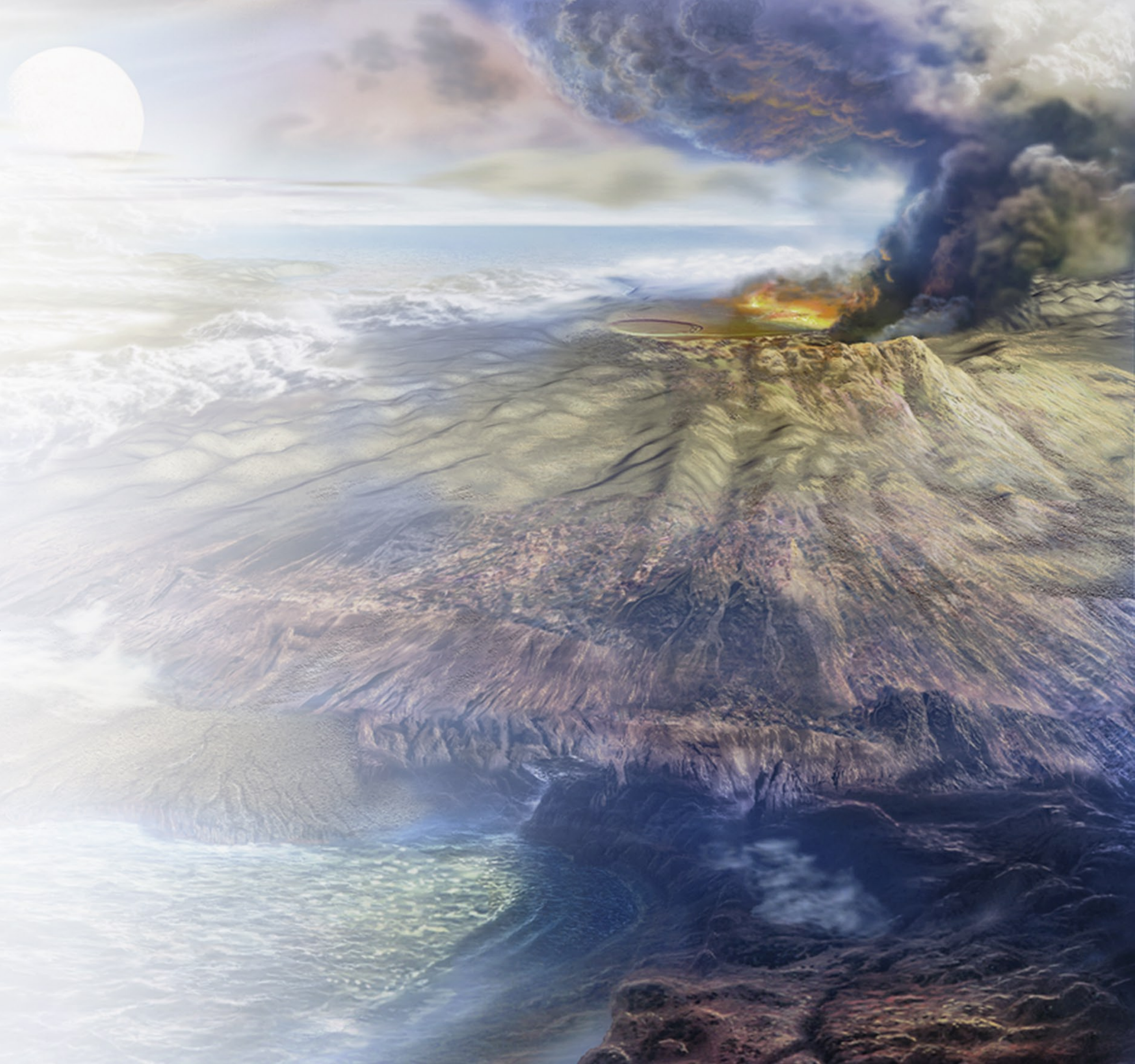
Yet, in spite of the obvious significance of this experiment and the important conclusions that could indubitably be drawn from its results, it did not lead to any consequent follow-ups. Too much remained unknown, and the much more successful, useable and well-established pluralistic alternatives, delivered better outcomes for fame and use. Though Miller’s experiment proved the holistic nature of Reality, and the importance of this fact in the Origin of Life, it could deliver neither Analysis, Prediction nor Production, and these were the only accepted primary criteria for the investment of time and effort, and holistic Science was shelved as unproductive.

Yet both Darwin’s methodology and Miller’s work were clearly holistic, and answered questions not even poseable by the standard pluralistic methodology of the vast bulk of Science. Though it was crystal clear that the holistic stance did indeed mirror what was happening in developing Reality, it could not as yet deliver a generally useable methodology.

(vii) Applying lessons from Darwin to Miller’s Experiment

The question still hung unanswered in the air! “Could we, as Darwin had done for the Evolution of Species, trace a similar imperative within Miller’s Experiment?”

The Answer turned out to be, “Yes!”, but other more recent discoveries in methodology were needed to takes things forward.





E: Updating Miller’s Experiment

The surprising answer is, that though we could not do it then, we certainly can now. Tim Hunt in his Nobel Prize-winning studies of the development of sea urchin fertilised eggs, showed the way, and it is clear that using his techniques, we could indeed take series of time-based samples within such an Experiment, without in any way interfering with the important isolated processes themselves.

(i) Theoretical Advances

But also, in addition, Natural Selection could be extrapolated back to be applicable to non-living, yet competing processes. The actual mechanisms would, of course, be very different, but the essential element of competition could be applicable between non-living, chemical processes happening simultaneously, and requiring the exact same resources. The crucial advantages of one process over another would have very different causes, but the results would be comparable.

Certain processes, or more correctly, related sets of processes could both dominate, and play a role in transforming the actual context in a given situation. Indeed, a Truly Natural Selection of non-living processes could indeed occur, as this author has proved in a series of contributions to SHAPE Journal.

(ii) Methodological Advances

And, it was in a re-designing of Miller’s Experiment that the foundation of a new Holistic Science Methodology was begun. The crucial changes were the inclusion of time-based analysis sub experiments, carefully designed to NOT interfere with the main holistic flow of the central experiment, but organised to produce the changes of content and conditions that occurred as the various Phases came and went within the apparatus.

(iii) A Delivering Holistic Method for Miller’s Experiment

Such information could not deliver the full range of processes taking place at the various times and positions within the system. But as every piece of information was linked to a given time and place, it could be possible to surmise what might have been happening, and hence how the substances present as well as the conditions might be determined.

And also, where what was achieved by an initial run was shown to be insufficient, redesigns of the flow system through the apparatus, and the positions of the sampling set-ups could be moved until the most useful information was finally achieved.

Such a system, as Hunt had proved with his discovery of cyclin in the divisions of embryo cells, could, if perfected, overcome the “black box” shortcomings of such experiments, as in Miller’s original set up.

This new version of the experiment will attempt to mirror the actual unconstrained holistic processes, without the damaging restrictions of the usual pluralist methods, for it could localise where and perhaps why certain changes occurred at particular times in the running of the experiment. The real essence of such a redesign, though no changes would be made in the unconstrained natural processes, would through channelled movements of the gases and liquids through definite pathways connecting crucial areas of events such as heat application, condensation of water vapour, flows of liquid water and finally the position of the electrical discharges. Such channelling, though it would not change the reactions taking place, would allow causalities and sequences to be established.

It is quite clear that any original form of this new version, would be unlikely to immediately deliver what was required, but repeated re-designs, on the basis of evidence gathered in a previous run, or the lack of it, could direct modifications to improve what could be established.

Needless-to-say, such a system would also allow differing contents to be tried out, and even additions to the various areas of interest. Indeed, a flowing of liquid water over various kinds of substrate could also be tried out.

F: Conclusions

Now, as will be evident from the account detailed above, though it is clear that everything does indeed change, develop and even evolve, the chapter and verse demonstrating this for the vast majority of phenomena, and the entities involved, the crucial realisation of a new Holistic Methodology has been commenced, and has already, still in its infancy, produced breathtaking breakthroughs in Scientific Investigations – the basic standpoint and method is becoming clear.

Clearly, the process is still at an early stage, and can only be confirmed and extended in actual use.

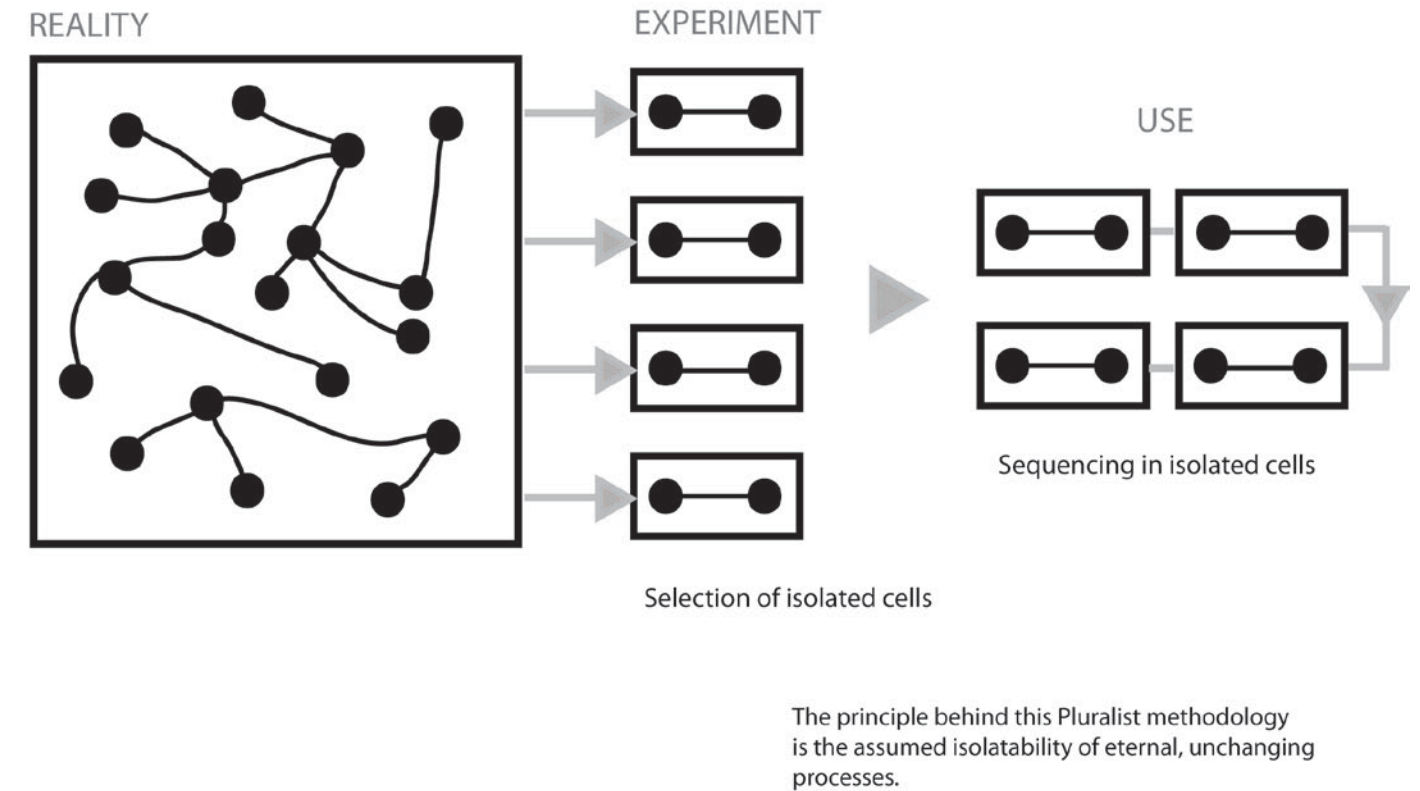
The new version of Miller's Experiment shows the way, and must be both implemented as designed, and developed to stand as a template (or paradigm) for general application over the whole range of phenomena, wherein qualitative changes are occurring.

Yet, the old Pluralistic Method will still be retained, but without the philosophical assumptions that came to underpin the results obtained.

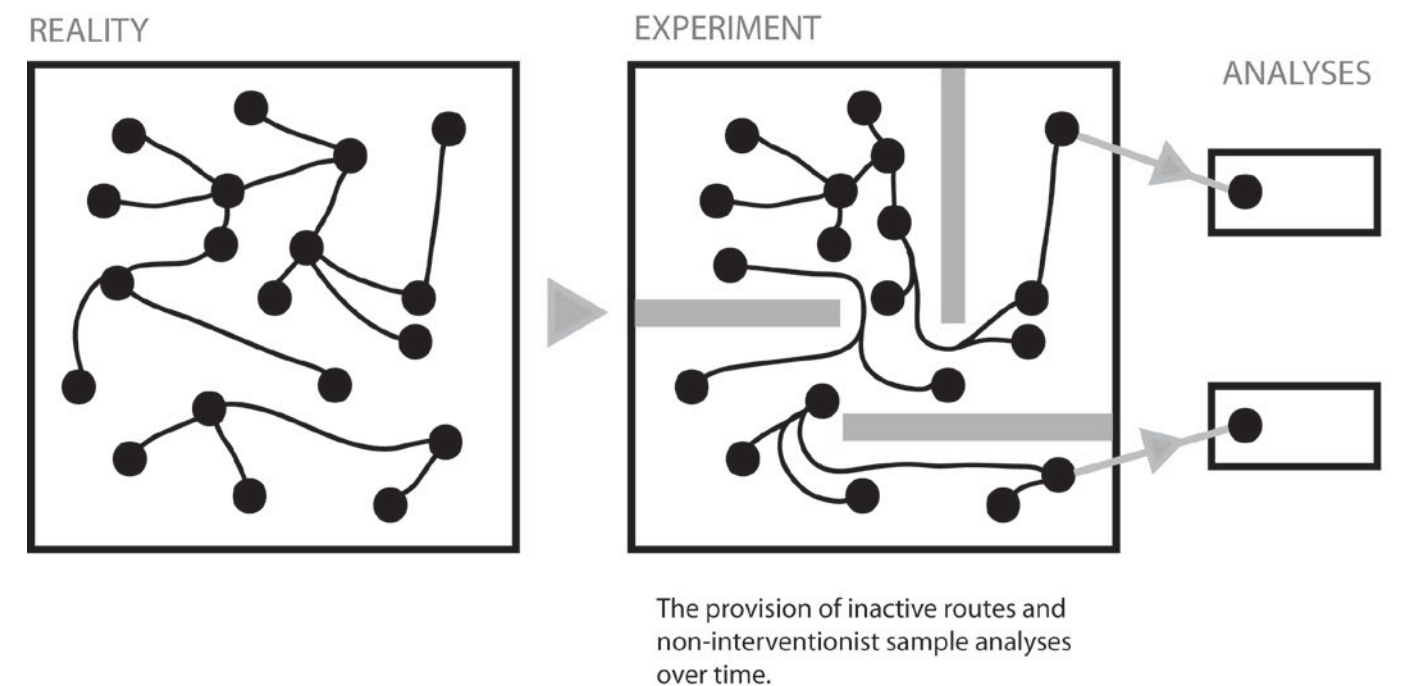
They will, henceforth, be seen as the pragmatic methods that they really are, with real uses in production, but the main achievement of the revolution in the Sciences will definitely be in its new holistic standpoint.

Appendix Pluralist Science / Holist Science

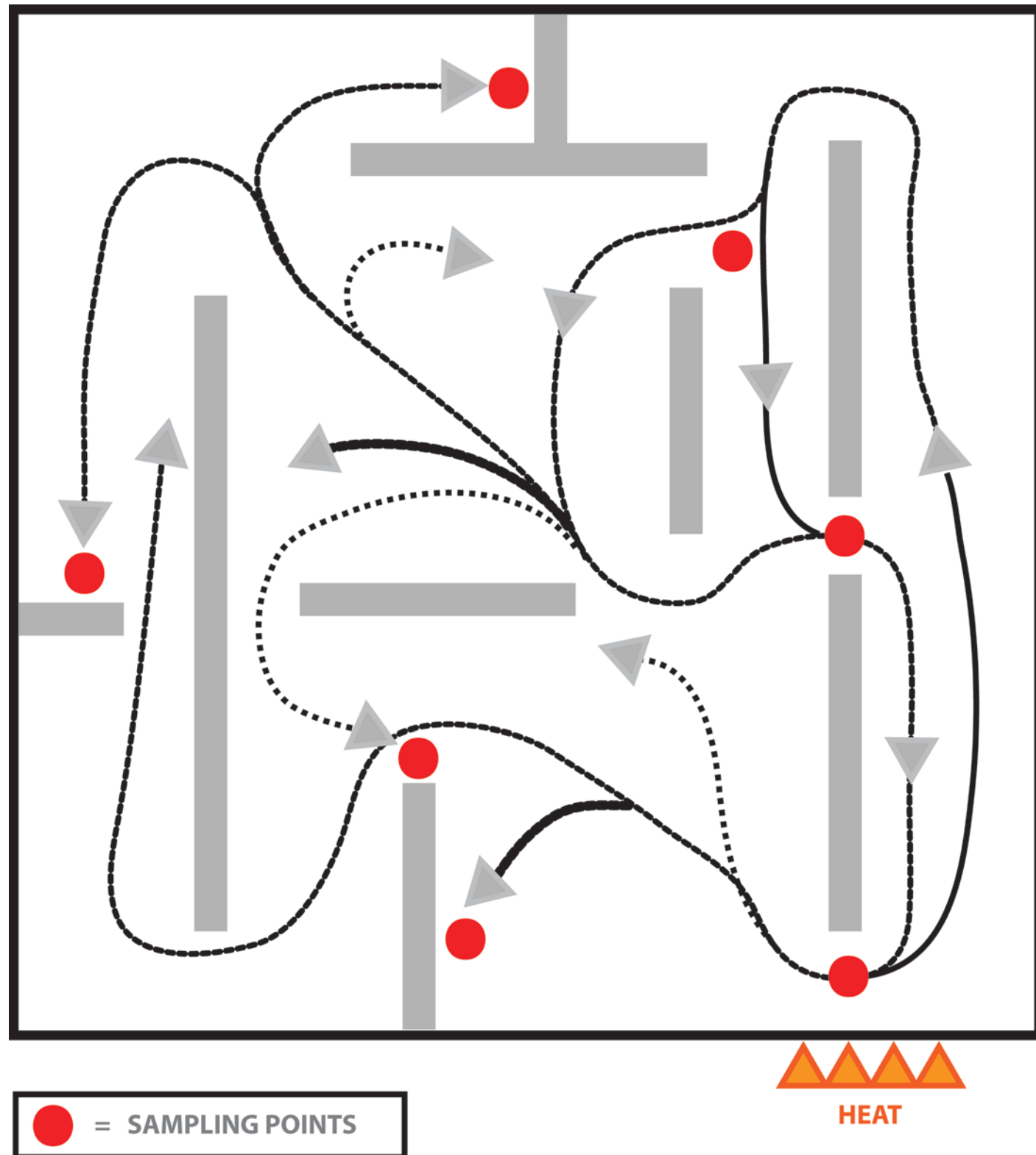
Pluralist Science



Holist Science



The Provision of Routes



SHAPE

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Inert, non-active routes are provided in which certain processes can be assumed to happen because each will require prior processes which have been made parts of the routes-through

Clearly redesigning many times based on the results of each run will be necessary to get the most out of such a system.

This is the methodology required for the new Miller's experiment.