The Trajectory of Science

I have always loved math and physics. Raised an atheist squarely in the rational scientific tradition of the west, I for a time narrowed my sights to the visible and calculable aspects of the universe. But it was never fully satisfying. There was a nagging sense that a lot was missing. On my college entrance exams I got the highest score possible for math, but that achievement didn't reflect a growing discomfort I was feeling about the limitations of academic reasoning.

Ultimately, calculus did me in. It's based on a core assumption that a near approach to a thing tangentially is as good as being right on the mark. I couldn't accept it in my gut even though it "worked" in practice, because I knew perfectly well there was an infinite range within any distinction, near or not. An analogy can never be the thing itself. Life can be viewed as an extended series of analogies, a struggle through a wide range of disciplines to approximate the absolute essence of what is. I was unwilling to make the leap of faith that modern math requires, to presume that it accomplishes what other systems aim for and fail, when it so plainly didn't. After a second try, at university, I abandoned mathematics and went looking for another way to enter into life exactly rather than approximately. But I never gave up the enjoyable mental exercises of playing around with numbers and rational concepts.

For several centuries Western science prided itself on its ability to limit its purview to observed objects. It studied existence in isolation, *sat* if you will. Only at the beginning of the twentieth century did the observer, *chit,* become recognized as an inescapable factor in the scientific outlook. Grudgingly, the witnessing mind has been incorporated into the picture. But thus far is far enough! Unwilling to fully embrace sat-chit-ananda, the whole enchilada, science has been grimly determined to not admit the value factor, *ananda,* into the equation. The insistence that there is no meaning to the universe is one of the key a priori

assumptions of the scientific faithful. Now, at the beginning of the twenty-first century, the foundation of that assumption too is beginning to crumble to nothing.

Several recent books have addressed the new directions of scientific thought, none as exciting or coherent in my estimation than *Science and the Akashic Field,* by Ervin Laszlo (Inner Traditions, 2004), luminously edited by Nancy Yeilding. Laszlo has spent nearly half a century pursuing a Theory of Everything as a philosopher and scientist, teaching at Yale for many years and lecturing widely around the globe. While motivated by the classic questions of philosophy, Who am I? and Whence this world? Laszlo chose science as his route, "because empirical science is the human endeavor that is the most rigorously and systematically oriented toward finding the truth about the world, and testing its findings against observation and experience." In other words, he felt science was the most reliable approach to valid knowledge.

Laszlo eloquently addresses the impending transition to a new outlook early in the book:

> The depressive futility inherent in the negative face of Western civilization has been spelled out by the renowned philosopher Bertrand Russell: "That man is the product of causes which had no provision of the end they were achieving," he wrote, "his hopes and fears, his loves and beliefs, are but the outcome of accidental collocations of atoms; that no fire, no heroism, no intensity of thought and feeling, can preserve an individual life beyond the grave; that all the labors of the ages, all the devotion, all the inspiration, all the noonday brightness of human genius, are destined to extinction in the vast death of the solar system, and the whole temple of man's achievement must inevitably be buried beneath the debris of a universe in ruins—all these things, if not quite beyond dispute, are yet so nearly certain, that no philosophy which rejects them can hope to stand."

> But the face of progress need not be so cold, nor the face of fall so tragic. All the things that Russell mentions are not only not "beyond dispute," and not only are they not "nearly certain"; they may be the chimeras of an obsolete view of the world. At its cutting edge, the new cosmology discovers a world where the universe does not end in ruin, and the new physics, the new biology, and the new consciousness research recognize that in this world life and mind are integral elements and not accidental by-products. All these elements come together in the informed universe—a comprehensive and intensely meaningful universe, cornerstone of the unified conceptual scheme that can tie together all the diverse phenomena of the world: the integral theory of everything. (pp. 14-15)

Of course, Russell also pointed out "The fact that an opinion has been widely held is no evidence that it is not utterly absurd; indeed, in view of the silliness of the majority of mankind, a widespread belief is more often likely to be foolish than sensible." At the time he said this he was bucking some pretty absurd popular notions, but later in the century scientific materialism enjoyed a few decades of widespread popularity and is now showing signs of foolishness too.

Meaning has come to be associated with religion—a subset of philosophy—so science has made an a priori assumption that it must avoid it to remain scientific. Ancient notions of God in their simplistic modern guises certainly appear unreasonable, and their presentation as being on a par with science is laughable if not scary. And by presuming an all-controlling God, science can be seen as completely beside the point and unnecessary. However, information is flooding in that in some mysterious way the unfoldment of life is far from a blind process.

Unfortunately, power mad religious bigots are, as always, muddying the waters. The current gambit is called "intelligent design," an innocuous sounding name for a vengeful God bent on

empowering his followers to eradicate all nonbelievers. Scientists are well advised to be skeptical, since religion has proved so often to be a perfect vehicle for the human race to bathe in blood. While scientists can be plenty arrogant, they generally stop short of insisting on the eradication of nonaligned parties.

An article challenging "intelligent design," by Daniel C. Dennett, an apostle of traditional Darwinism, appeared recently in the New York Times. While exposing the ulterior motives of intelligent design's proponents, it was rife with categorical and unproven statements like "The designs found in nature are nothing short of brilliant, but the process of design that generates them is utterly lacking in intelligence of its own." That's an a priori assumption on a par with belief in God. I'd love to know how to correctly distinguish brilliant from intelligent, myself. Dennett also says, "[Let's] look at what contemporary biology has demonstrated beyond all reasonable doubt: that natural selection - the process in which reproducing entities must compete for finite resources and thereby engage in a tournament of blind trial and error from which improvements automatically emerge - has the power to generate breathtakingly ingenious designs." Ingenious—how does that differ from intelligent? Essentially, all that's asserted is that a theory, natural selection, has the ability to generate incredible designs. True or not, that doesn't prove it's how the universe works. The blindness of nature is an assumption, nothing more. Furthermore, if the theory is beyond all reasonable doubt, all doubt is by definition unreasonable, so you must either believe it or go to hell. Sound familiar?

Entrenched beliefs in purely blind randomness stem from the admirable methodology required of scientists to strive to not make assumptions. But simply because blindness is assumed doesn't mean blindness is thereby proven. Science is now coming to the realization that some form of intelligent patterning is accelerating creation and evolution to a tremendous degree.

Laszlo's book on the quantum akashic field points out that since up until recently intelligence was automatically subtracted

from the modeling equations in physics, many presumptions but also lots of evidence of how such an unlikely "accident" as our universe could come about were scrupulously eliminated. New mathematical models for calculating true randomness in evolution indicate an order of quadrillions of years of blindly mucking about to produce a simple mammal-like creature, roughly a million times longer than the calculated age of our universe. And that's after starting with a viable universe at the outset. The highly respected mathematician Roger Penrose has calculated the probability of hitting on a universe as perfect as ours via a truly random process from among all possibilities as one in 10 to the 10 to the 123rd power, which is by far the largest number I've ever heard of, even larger than a googolplex.

The key idea in the new physics to make all this rapid evolution possible is that the quantum vacuum, nicknamed the ZPF or zero point field, isn't empty as it appears, it's packed with an unbelievable amount of energy. Would you believe one hundred orders of magnitude greater than the energy at the center of the sun in each cubic centimeter? That's one estimate. And the energy is holographic, meaning each part replicates the whole and is able to store vast amounts of information. The kind of information that could even contain the results of previous random universes, forming patterns in the ZPF that could assist the current universe avoid unsuccessful strategies and home in on the tried and true.

The equations keep insisting the energy's there, but for a long time mathematicians conveniently deleted it, as it's not perceptible. Now some of them are wondering if they were deleting God, in a manner of speaking. The ZPF is very nearly omniscient, certainly omnipresent, and approaching infinitely omnipotent. If it only had a mean streak….

Nitya Chaitanya Yati, in his *Psychology of Darsanamala,* points out why resolving this paradox is so important:

> As a result of the conditioning of the faithful by the established religions, and of the skeptics by the categoric

> statements of science, man has become bifurcated in his sense of his true beingness. Having thus separated him from his true ground—that substratum that gives rise to all beings—those responsible for this have largely repressed in him the sense of wonder and delight in which one who knows his true being lives all the time. Looking in vain for some religious statement or scientific formula which will neatly encompass the whole mystery of being, so that we can file it away in our box of consumer goods and calendar maxims, we have forgotten that the mystery we seek to penetrate is our own mystery. (p. 56)

Science and religion are equally guilty of suppressing humanity's natural ebullience. A meaningless universe is little better than one run as a dictatorship by a heartless Overlord. Neither encourages us to become more than worms, victims of circumstances beyond our control. Happily, there is a strong movement nowadays toward a much more optimistic view of our place in space.

In Laszlo's book, the limitations of Darwinism and other branches of science are thoroughly explored. It appears that science is on the verge of another major era. Many of the old hypotheses are breaking down in the way Newton's mechanical universe broke down with the advances of relativity. It may be that science is at last discovering the importance of meaning, which will validate the ancient seers' integration of *sat, chit* and *ananda* as a complete unit of experience.

Basically, and in a non-fundamentalist sense, intelligence—or as it's put with due caution, patterning or in-formation—is being revealed more and more in scientific experiments. (Such patterning that guides and infuses the course of manifestation is what Indian psychologists call vasana or incipient memories, by the way.) Laszlo includes reports of several fascinating experiments demonstrating that evolution takes place rapidly and far from randomly. They show very clearly that entities respond to environmental stresses by instantly mutating and quite frequently

passing the mutations on to their progeny. It is incredibly exciting that experimental science is finding ways to go beyond Darwin and Newton, beyond blindness, into an intelligent universe brimming with consciousness. Once you grasp the absurdity of true randomness, the new directions make perfect sense. Sure, we should always guard against a provincial God creeping in to "skew the pitch" away from absolute neutrality, but having done that we can admit that there are still far more things in heaven and earth than are dreamt of in our philosophy. Conscious, meaningful intelligence may well be the very ground and purpose of existence, and it may reside everywhere, not just in some far off, imaginary deity. Laszlo gets to the nub of the argument in a section worth quoting at length:

> The "synthetic theory," the modern version of Darwinism, still insists that randomly produced genetic mutations and the chance fit of the mutants to the milieu evolve one species into another by producing new genes and new developmental genetic pathways, coding new and viable organic structures, body parts, and organs.
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> Yet random rearrangements within the genome are entirely unlikely to produce viable species. The "search space" of possible genetic rearrangements within the genome is so enormous that random processes are likely to take incomparably longer to produce new species than the time that was available for evolution on this planet. The probabilities are made a great deal worse by the consideration that many organisms, and many organs within organisms, are "irreducibly complex." A system is irreducibly complex, said the biologist Michael Behe, if its parts are interrelated in such a way that removing even one part destroys the function of the whole system. To mutate an irreducibly complex system into another viable system, every part has to be kept in a functional relationship with every other part throughout the entire transformation. Missing but a single part at a single

step leads to a dead end. How could this level of constant precision be achieved by random piecemeal modifications of the genetic pool?

An isolated genome working through randomly generated mutations is not likely to produce a new and functional mutant. If such a mutant is in fact produced—and produced time and time again in the course of evolution—the mutation of the genome must be precisely correlated with conditions in the organism's environment. This correlation was often suspected, but in the twentieth century it was dismissed as a mysterious form of "pre-adaptation"—the idea that mutants are somehow spontaneously tuned to the conditions a given species finds in its milieu. Yet unless mutations in the genome are in fact precisely tuned to conditions in their milieu, the resulting mutants will not survive: they will be eliminated by natural selection.

How is it, then, that complex mutants have *not* been eliminated—how could the biosphere be populated by millions of species more complex than algae and bacteria? This could only be if mutations in the genome are highly and quasi-instantly responsive to the environing conditions that affect the organism—if genes and environments form an interconnected system. Evidence is now available that this is indeed the case.

The evidence is statistical, and it goes back to the beginning of life on this planet. The oldest rocks date from about four billion years, while the earliest and already highly complex forms of life (blue-green algae and bacteria) are over three and a half billion years old. Because even the simplest forms of life manifest a staggering complexity, if the existing species had relied on chance mutations alone, this level of complexity is not likely to have emerged within the relatively short period of about 500 million years. After all, the assembly of a primitive self-replicating prokaryote (primitive nonnucleated cell) is already a complex undertaking. It

involves building a double helix of DNA consisting of some 100,000 nucleotides, with each nucleotide containing an exact arrangement of thirty to fifty atoms, together with a bilayered skin and the proteins that enable the cell to take in food. This construction requires an entire series of reactions, finely coordinated with each other.

It is not enough for genetic mutations to produce one or a few positive changes in a species; they must produce the full set. The evolution of feathers, for example, does not produce a reptile that can fly: radical changes in musculature and bone structure are also required, along with a faster metabolism to power sustained flight. Each innovation by itself is not likely to offer evolutionary advantage; on the contrary, it is likely to make an organism less fit than the standard form from which it departed. And if so, it would soon be eliminated by the pitiless mechanisms of natural selection. The cosmologist and mathematical physicist Fred Hoyle has pointed out that life evolving purely by chance is about as likely as a hurricane blowing through a scrap yard assembling a working airplane. (pp. 86-88)

Another biological anomaly indicating the fundamental impact of consciousness is the way many diverse entities function together in a virtuoso display of life expression. Laszlo includes a fascinating section on what's called whole-system coherence:

No matter how diverse the cells, organs, and organ systems of the organism, in essential respects they act as one. According to Mae-Wan Ho they behave like a good jazz band, where every player responds immediately and spontaneously to however the others are improvising. The super jazz band of an organism never ceases to play in a lifetime, expressing the harmonies and melodies of the individual organism with a recurring rhythm and beat but with endless variations. Always there is something new,

> something made up, as it goes along. It can change key, change tempo, or change tune, as the situation demands, spontaneously and without hesitation. There is structure, but the real art is in the endless improvisations, where each and every player, however small, enjoys maximum freedom of expression, while remaining perfectly in step with the whole. (pp. 83-84)

Biologist Teilhard de Chardin studied cells as autonomous units that function together to make individual beings while seeming to have no awareness of the whole of which they are a part, and then wondered in turn if there was a greater organism in which each of us is like a cell. How would we know? How could we find out?

Scientists are, predictably, not flocking to embrace these cutting edge ideas in anything close to a stampede. It's good to keep one foot firmly planted on known ground when taking a step forward. The old paradigm is staunchly maintained in a highly readable book, *Parallel Worlds,* by Michio Kaku. Still, the "old" ways are far from conservative, they're pretty new themselves. It's amazing how far out even mainstream physics has gotten these days, while upholding a veneer of humdrum respectability. Infinite universes, multiple dimensions, wormholes through time, neutron stars rotating more than a thousand times a second, you name it. Or how about this: due to the counterbalancing of positive and negative forces in the quantum flux, Kaku claims a universe like ours could be created from "a ridiculously small net amount of matter, perhaps as little as an ounce." The old guard reminds me of how back in the 1960s we would be tripping out of our minds on LSD through dimension after dimension without any solid grip at all, but knew how to pretend that we were "normal"—at least enough to fool the police.

Fascinating as it is, the book abounds with examples of breathtaking assumptions cloaked in colossal arrogance. Truly, scientists and fundamentalist religious types have much in common. Gurus have taught by example that if you're in contact

with truth there is no need to swagger, but these guys clearly aren't listening. On page 297, Kaku quotes astronomer Donald Brownlee: "Mother Nature wasn't designed to make us happy." How's that for a priori! Why would there be any *other* reason to bother creating a universe? Here's my favorite of many outlandish claims:

> Whether we like it or not, if we are to pursue a career in science, eventually we have to learn the "language of nature": mathematics. Without mathematics, we can only be passive observers to the dance of nature rather than active participants…. Galileo once wrote, "[The universe] cannot be read until we have learnt the language and become familiar with the characters in which it is written. It is written in mathematical language, and the letters are triangles, circles, and other geometrical figures, without which means it is humanly impossible to understand a single word." (pp. 217-218)

As a matter of fact, academic disciplines like math turn you into a passive observer and away from active participation in life, if anything does. Kaku goes on to point out how mathematics and physics are so great because they can create "models" of the universe. There isn't even a claim of true unitive understanding, only of accurate models, analogies, which anyone who examines the history of science can see are constantly being modified and amended, and occasionally thrown out completely. For instance, Benoit Mandelbrot has demonstrated, within the last forty years, that in fact triangles and circles are *not* the geometry of nature, and has introduced a new mathematical model that is a much better replica of the world we see. Luckily for us, the history of the universe is not merely the history of humans making increasingly accurate models of reality, or we would never have developed beyond the plankton stage. You can't eat analogies. All that aside, by citing a single statement from a scientist terrorized by the Inquisition as "proof," Kaku claims religious, poetic, artistic,

literary, mystical, and all other nonmathematical forms of understanding the universe are a priori invalidated. That's politely called hubris.

Still, the fantasies of scientists are incredibly fascinating, the religious myths of our day, brimming with imagination and subtlety. If you can get past the hubris, there are some great stories being cooked up. For instance, there is a lot of excitement nowadays about string theory. The gist is that the universe is not made up of tiny point-like particles, but of even tinier little violin strings. Once particles are modeled as strings, the mathematics comes into resonance, but only if you assume 11 or 26 dimensions. This is a very poetic model, with infinite universes vibrating to the music of the spheres, and all the known particles representing harmonics of the strings. Sadly, the strings are too small to regut your guitar with: a billion billion times smaller than your everyday proton. Moreover, you have to add in a bunch of imaginary particles to even things out, but it's possible they'll turn up some day, since they're mathematically logical. I don't know about you, but I LOVE this stuff!

Too bad the wisdom of the ages gets short shrift from most scientists, while imaginary particles are insisted to be real. If anyone wonders why we keep destroying intricate civilizations and ecosystems with our "progress," maybe this is the place to take a good hard look. We can only hope that the far more humane and meaningful models of scientists like Laszlo will turn the tide before we reduce our wonder-filled and harmoniously intelligent planet to a desert of unconscious particles, thereby fulfilling our own bitter prophesy of long ago.

Scott Teitsworth, 2005