Essay

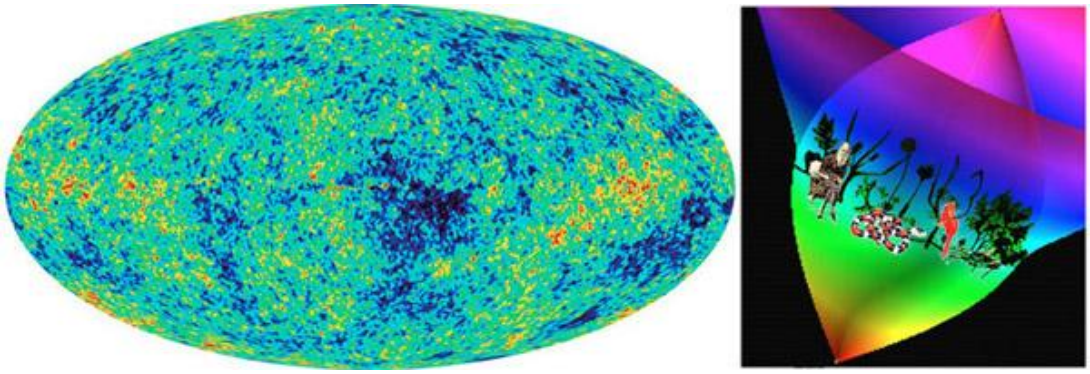
Holy War against Science: Natural Evolution versus Intelligent Design

Chris King*

ABSTRACT

Far from being random mutation, evolution, is the most rapid generator of complex form in the universe because it is a massively parallel quantum molecular computer based on parallel nucleic acid replication. It can't be reasonably compared to any naive probability process based on random processes, because the extreme degree of parallel exploration of the space of possibilities makes genetic algorithms the most efficient computational process in the universe. For all its elegant structure, and even consciousness, even super-intelligent design is cumbersome, clunky and completely unsuited to generate new life forms.

Key Words: natural evolution, intelligent design, random mutation, paralell quantum computer, genetic algorithm.



Left: WMAP image of the cosmic background radiation, gives the echo of the cosmic fireball at the point light separated from matter when the plasma of charged particles first coalesced into atoms. It provides evidence that our universe had an explosive beginning, but it doesn't suggest the God created it, nor that this is evidence for 'let there be light'. Right: The biota occupy the cosmic equator through a major central epoch of the universe's evolution and thus form a cosmological manifestation of the interactive culmination of the four forces of nature.

Our idea of the universe and our own relationship with it as biological organisms has been profoundly transformed by the scientific revolution. We now know that the universe has an explosive beginning some 12 billion years ago in which the cosmological processes of the universe at large are complemented by differentiation of the four fundamental wave-particle forces of nature. At the same time we know, despite its relatively fragile nature on the cosmic scale that life is the supreme manifestation of interactive complexity of the four forces of nature on a cosmic footing. Life thus has a unique status in cosmic terms and occurs over an epoch of 3.5 billion years, spanning nearly a third of cosmic history.

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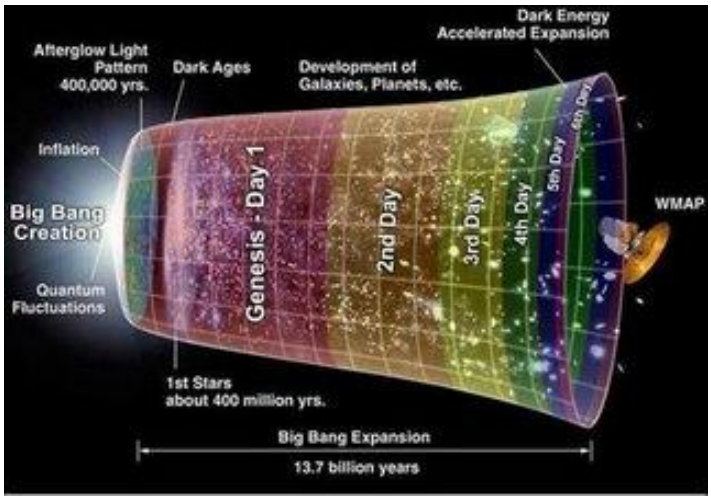
The investigative process of science and its basis in the skeptical principle: in which a theory becomes accepted only if it withstands disproof through validation in every natural situation which might refute it, rather than the untested assumptions of spiritual faith, which asserts that belief in God is essential, and lack of faith is betrayal. Affirmative belief has meant that the cherished and often simplified assumptions of religious cosmologies have gone unquestioned for fear of retaliation if not for the simple lack of critical scrutiny.

Sabbatical creation defies the natural order. Although light is created before the stars, consistent with the cosmic background, the plants are impossibly created before the Sun, moon and stars. The firmament of the heavens is "raqiya`" a beaten hemispherical bowl, dividing waters above and below, in which the stars are fixed. Earth is a flat domain created by bunching the waters under heaven to one place. Night and day happen before the sun is placed in the heavens. The fishes and whales and the birds are created a day before the land animals and long after the plants.

The idea that the earth is flat, overlaid by heavens in which the astronomical bodies are set, as if on some gigantic hemispherical ceiling by God have proved to be simply folk myths, fantastic tales having no credibility in the harsh light of careful experiment. Vested religious interests have tried to silence this discovery process, endeavoring to excommunicate Galileo for correctly discovering that the Earth orbits around the Sun, rather than being fixed in the centre of the universe, around which all other objects revolve. However these efforts have over time eventually proved in vain because the natural evidence is there for all to see, once we discover how to ask the right question.

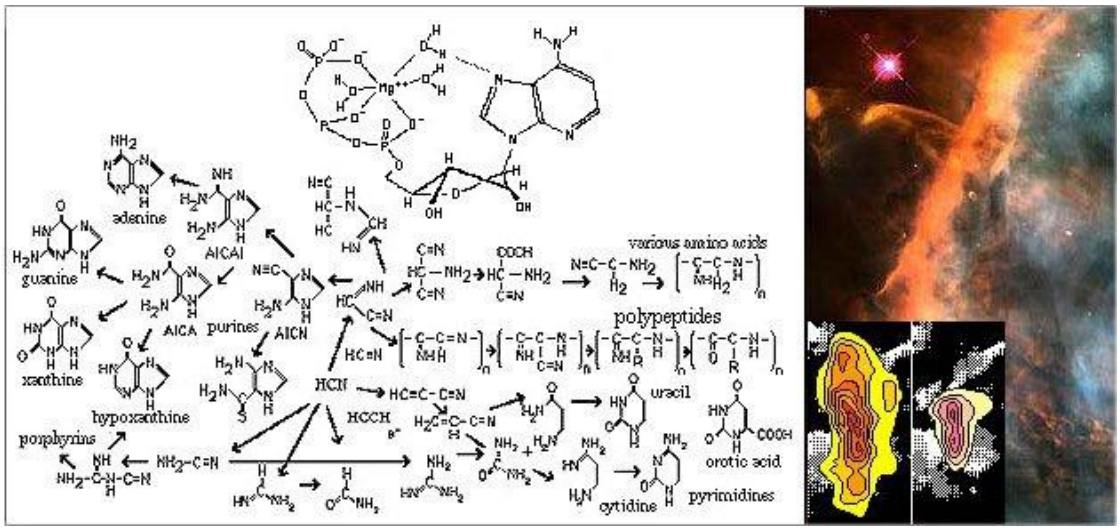
Despite the overwhelming detail and consistency of the scientific revolution, which has by the turn of the third millennium unveiled the dynamics of the universe at large, reached the doors of the theory of everything unifying the cosmological forces of nature, unleashed nuclear holocaust, and not only laid bare the genetic code, but decoded the human genome as well, the fact that religion is based on affirmative belief rather than skeptical inquiry has led to a situation of stand-off, where key aspects of the scientific description, such as the genetic evolution of life, continue to be rejected by religious fundamentalists, who frequently interpose over the scientific description the same simplistic scriptural accounts.

An attempt to overlay the Sabbatical creation on the inflationary cosmology, based on the WMAP observations being 'let there be light" followed by a dark era before the galaxies formed ignores the manifest inconsistencies and uses the scientific discoveries to retro-fit the six-day creation to observed events - faith interposed over fact. The idea that the sabbatical account is an inspired reflection of a divine intervention seen through a glass darkly millennia before these discoveries raises more questions than it solves.



A key area still to be finally resolved in the lab is the exact path by which life began on Earth. However, far from indicating God

made RNA and then DNA to support his life plan, the accumulating evidence indicates that planets are commonplace features of stellar systems and that those in the 'goldilocks zone' where liquid water exists are by no means uncommon. Rather than being an impossible contrivance of vanishing probabilities requiring God to intervene, the molecular precursors of life and of nucleic acids themselves may have an origin in the first gas clouds forming solar systems, and have showered on the early Earth in abundant proportions.



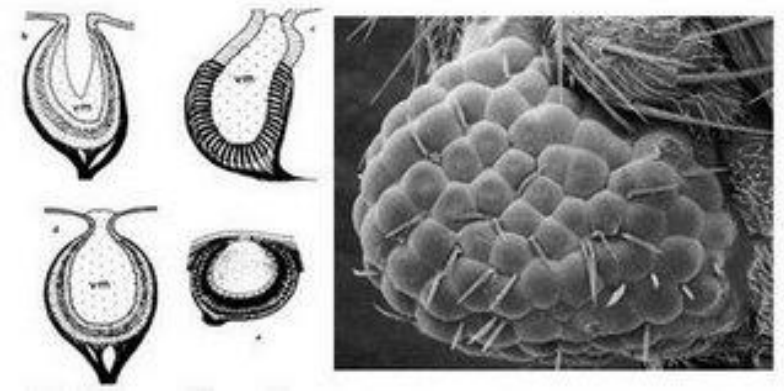
Right: HCN and HCHO form major constituents of gas clouds in star-forming regions of the Orion nebula. Left: HCN is capable of polymerizing in association with other molecules to form both the pyrimidine (U, C) and purine (A, G) bases of nucleic acids. HCHO is likewise capable of generating a variety of sugars including ribose. Above: ATP the monomeric ribonucleotide unit, which forms the archetype of both energy source and structural unit of RNA, along with the other bases G,C and U enabling complementary replication, is a co-pentamer of HCN and HCHO. Both purines and pyrimidines have also been discovered in the Murchison meteorite.

Central to the debate between religion and science is the issue of evolution and whether life is too complex and wonderful to have been crafted by the blind groping of evolution, rather than divine creation, or its new guise, 'intelligent design'. Because evolution is a process which happens over relatively long time-scales, Christian fundamentalists have attempted to portray it as merely a conjecture, despite the fact that some evolutionary process are very rapid, and genetic sequencing, has laid bare the historical record of untold evolutionary transformations and relationships, which provide evidence so detailed, that the denial of it forms the dark side of affirmative belief - a holy war against the manifest truth.

By claiming that evolution is simply a theory which has arguments for it and arguments against it creationists falsely imply there is no real experimental confirmation of any of the evolutionary links between species which make the diversity of life a sensible and meaningful system. If the biota were designed by God, why are there parasites and diseases, some of which have altogether diabolical manifestations? It is these diseases, from influenza, through HIV to tuberculosis, which show the most obvious signs of rapid evolutionary adaption. Why are there carnivorous predators if killing is deemed a sin?

Two arguments typical of the intelligent design advocates are irreducible complexity and specified complexity, both of which manifestly fail the scientific test of skeptical inquiry. Irreducible complexity claims that complex biological systems possess irreducible complexity and could not have evolved because removing any one component makes the whole system fail. This is a fallacy

because it is only intelligently designed systems which suffer from this flaw. A living system can arrive at a situation of irreducible complexity by evolution from systems, which are not irreducible, either because they have redundancies which are later pruned out by natural selection, or through natural stability structures evolving to become genetically coded irreducible systems. For example key metabolic pathways such as the citric acid cycle are likely to have evolved from natural polycarboxylic acid pools by genetic takeover, resulting in an efficient cycle which later looks irreducible. Other systems touted as evidence for irreducible intelligent design such as the camera eye are clearly not irreducible at all and have obvious evolutionary intermediates.



Left: Naturally occurring eyes show all forms of intermediate in the formation of the camera eye. Right: A compound eye on an insect leg elicited by a mouse gene involved in vertebrate eye development.

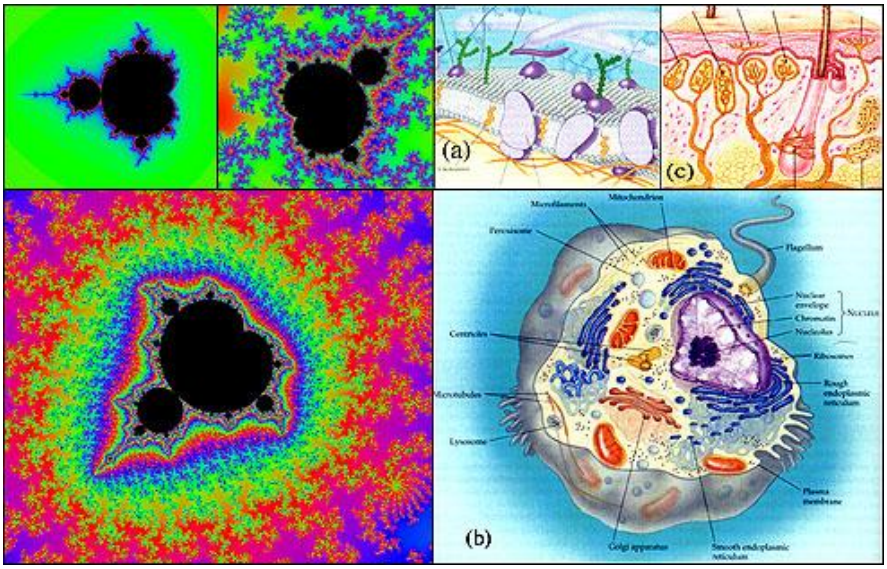
The camera eye has often been cited as something that could not have evolved by stages, because its functionality only exists in its completeness of design. However there are diverse examples of pinhole camera pit eyes forming all the intermediate stages of formation of a camera eye. Moreover eyes diverse as the insect compound eye and the vertebrate camera eye use homologous genes to trigger their development, showing that eyes, which appear to be founded on radically different principles have a common genetic origin.

Other examples, such as the rotary bacterial flagellum, which might seem to have to be designed in one step entirety can also be easily explained through transfer of functionality from genes which first evolved to fill other roles, as genes making up the rotary assembly have been shown to have sequence homology with related genes having other functions. Thus one of the creative aspects of evolution is its capacity to bring together adventitious combinations of existing or modified genes or gene modules in new integrated functionalities.

Specified complexity is another scientifically false notion that complex structures, which are not simply random have to be instructed by a design specification to exist. This is manifestly false and fails to understand critical properties of dynamical chaos and the fractal complexity of structures, which emerge from edge of chaos dynamics. Molecular matter is complex largely because of the unique complexity of the way the four forces of nature broke symmetry in the big bang at the origin of the universe. As a result of this symmetry-breaking quarks bind together in threes to form neutrons and protons which in turn bind tightly together to form atomic nuclei with neutral and positive charges, resulting in a complex semi-periodic series of some 100 electrically polarized atoms with orbital electrons capable of forming molecular orbitals and hence chemical bonds.

The capacity for chemical bonding does not stop with the ionic and covalent bonds of ball and stick mechanical molecules, but continues unresolved in a string of weaker cooperative H-bonds, hydrophobic, polar and van der Waal interactions resulting in the complex folding and global cooperativity of large protein and RNA molecules. This process is a quantum fractal and continues in upward scales from molecular complexes, through organelles to cells and finally tissues, organs such

as the brain and whole organisms. If the complexity comes from design, it is the design of the forces of nature we need to look at, to understand why tissues are capable of becoming complex when encoded by the genetic information in living evolving organisms.



Living organisms exist as complex structures only because the universe is based on non-linear interaction of the forces of nature. Tissues are fractal molecular structures in a manner similar to the way the non linear dynamics makes the Mandelbrot set arguably the most complex known object in mathematics.

It also needs to be understood that intelligence itself - something possessed by whole brains of intact organisms to aid their survival is not necessarily the best or most fertile basis to generate new viable forms. The entire landscape of life, both in terms of genetic sequences and the folded domains of proteins, consists of modular structures. Higher organism genes are divided into functional subunit exons separated by non-coding introns. This provides not just for random mutations of the code but for functional shuffling of active subdomians to form new combinations. The introns likewise allow for complex RNA-based dynamic modular regulation of whole batteries of genes in ways, which can result in new phenotypic and regulatory pathways. Furthermore our genomes are littered with the remains of transposable elements and viruses, which in addition to causing deleterious events can facilitate new forms of regulation and horizontally transfer whole genes between species in a way which enables useful genes to find themselves in completely new places where their effects can combine in new ways. Indeed the evidence is now becoming clearer that the tree of life of higher organism evolution emerged from a tangled web in which genes are freely passed between species enabling life to exist in almost any extreme environment. There is also manifest evidence that the genomes of higher organisms have arisen from multiple symbiotic events bringing together diverse metabolic systems.

What is almost entirely misunderstood by the intelligent design movement is that far from being random mutation, evolution, is the most rapid generator of complex form in the universe because it is a massively parallel quantum molecular computer based on parallel nucleic acid replication. It can't be reasonably compared to any naive probability process based on random processes, because the extreme degree of parallel exploration of the space of possibilities makes genetic algorithms the most efficient computational process in the universe. For all its elegant structure, and even consciousness, even super-intelligent design is cumbersome, clunky and completely unsuited to generate new life forms.

Supporters of intelligent design suffer from a delusion that emergence and evolution of life are somehow beyond the scope of natural explanation, but they fail to properly apply their theories to rigorous test. The central arena for the viability of such a 'design' hypothesis is development of the

organism, not evolution, or the origin of life, for it is in development that we can see biological design in action and arriving at a precise result over time scales we can readily observe, both in the lab, and out in the millpond.

The evolution of intelligent design illustrated in the Buick emblem: The intelligent designer creates each individual de-novo, having only the same general concept. Because there is an external designer following his own predilection, there is no absolute requirement for a new design to depend in any significant way on the form of the predecessor. Both development and evolution are fundamentally a product of the designer only and not the design itself. In successive generations, one Buick shield can become three and then an Eagle. By contrast natural evolutionary change leaves the fingerprint of its variation in the genomes of the ancestors and their descendants. Corporations, operating systems, and technological innovation all follow the 'evolutionary' protocols of intelligent design.

The central model for intelligent design is the watchmaker - that is human craftsmanship of an elegant precision applied on small scales to produce a complex yet stable mechanism. By extrapolation, we are then expected to believe that God, given his much more awesome mysterious powers, could by the same process of design, external to the blind groping of nature, produce something so elegant and complex as a living organism.

The trouble with this idea is that external design works from the top down and the only really complex machines humanity has been able to construct are digital computers, which, while they are capable of delivering a lot of challenge and entertainment, are founded on one very basic notion, that of a Von Neumann architectured Turing machine. There is no mystery of life or consciousness here. All the responses available are fully described by the simple instruction set.

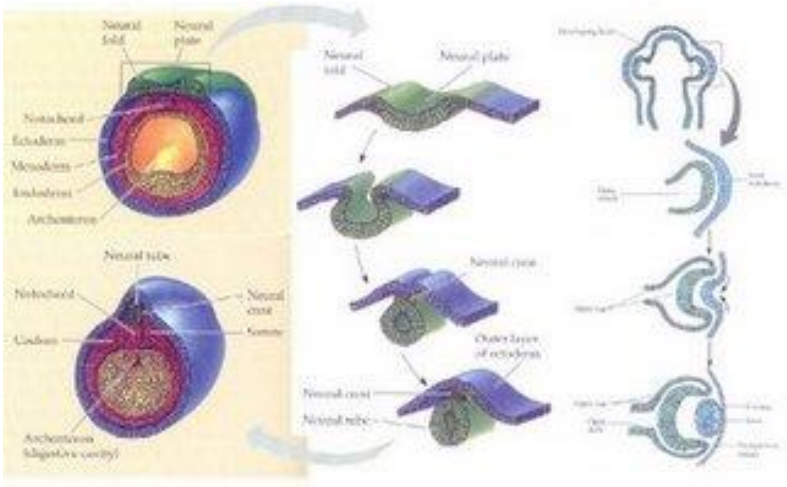
Robotic car assembly illustrates development by intelligent design. The parts above have no capacity for interactive self-assembly, because the process has to be entirely guided by the external intelligent design process. The process of development is instead driven externally on a global basis by robotic machines executing the intelligent design algorithm, or by God as the case may be!

Embryonic development, while ultimately determined at the molecular level by the DNA code, is an emergent interactive process, both resulting in changes at the intracellular level, as cell types specialize, and inter-cellular transformation, in the sequence of interactions between individual cells, and cell layers.

Moreover, development reflects the underlying evolutionary process, which made it possible, as

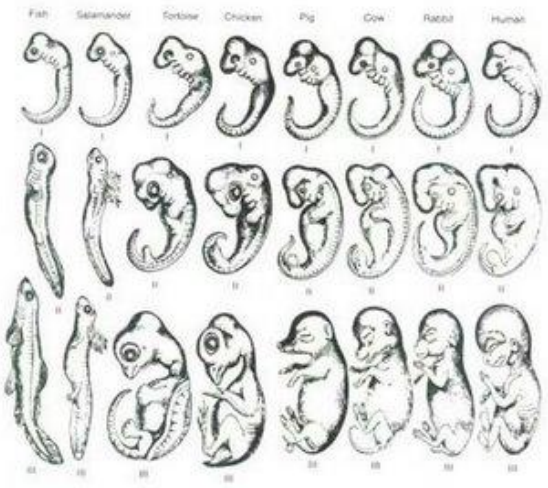
shown below. Furthermore evolutionary changes are sequentially dependent in the information possessed by the organism, rather than an external intelligent designer. They are clearly dependent on small transformations of an existing genomic instruction set, so the genetic information of the organism is the key instructor of the process under small discrete changes caused by mutation and rearrangement. By contrast intelligent design is liable to abrupt change, as illustrated in the Buick example, and even when there is a degree of homology, is merely a conceptual reworking rather than a topological bifurcation.

By contrast with machine assembly, embryonic development, from the ovum to the organism, is based on mutual interaction resulting in sequential differentiation and depends on quantum processes such as protein folding which are intractable as classical computational processes. There is absolutely nothing about this process which suggests an external intelligent designer, but rather an internal self-interactive process. This goes all the way to the central nervous system, where there are massive migrations of cells on pre-developed scaffolds in response to growth factor signals expressed by other specific target cell types, as well as massive cell and synapse death to prune the connections to those which are required for effective sentient function.



Left-center: Formation of the neural tube, after gastrulation has already invaginated ectoderm and endoderm, is a self-interactive topological bifurcation. Right: Development of the eye recapitulates the essential bifurcations of the evolutionary process that generated it.

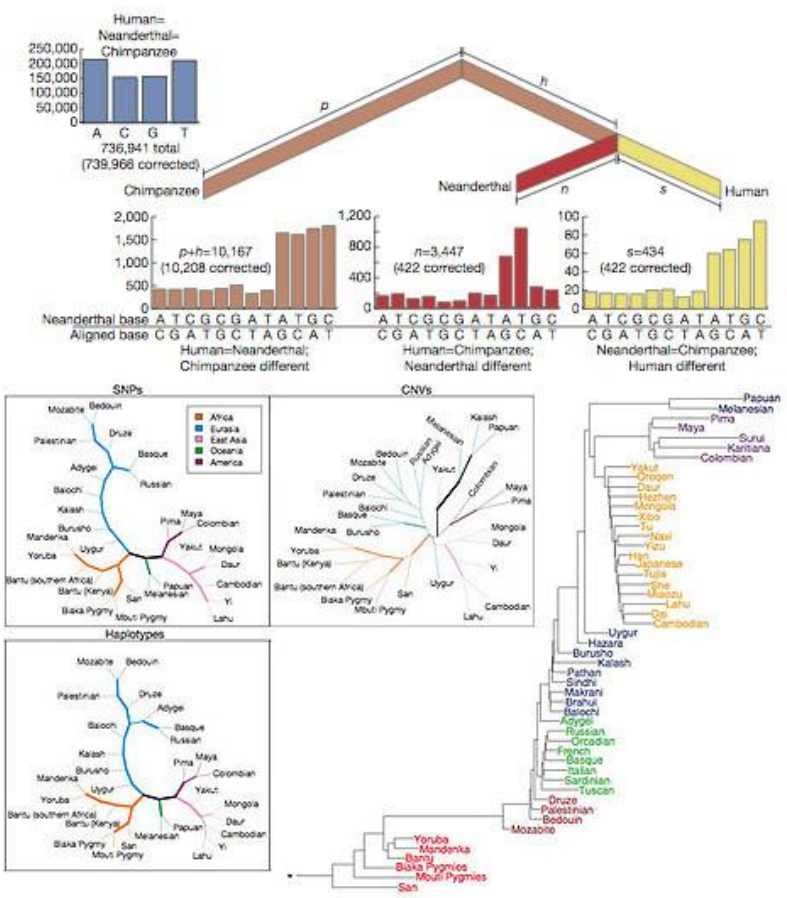
We thus see that even in the developmental context, where we clearly have an encoded biological design and a process, which is elegantly targeted to a specific outcome, there is no hint of a designer except the interaction between the DNA sequence and maternal cytoplasmic inheritance. To suggest that the DNA sequence is God given, rather than a result of mutability of the process due to the occasional errors of replication resulting from the impossibility of absolute perfection, the interaction of transposable genetic elements and the modular nature of genes and their intervening non-coding sequences now known to have a major role in gene regulation is frankly pissing in the wind.



Relationships between evolution and development: Early embryonic forms of vertebrates all have the long tails and many segments of fishes because they have a deep underlying evolutionary relationship, in which fishes became land animals. The program of development is encoded in our DNA and the evolutionary process reflects the long-term transformations of his program's form and function. Neither development, nor evolution show any of the traits of intelligent design. Both do show the traits

of autonomous variation.

The final knell for the intelligent design hypothesis is the human genome project, and with it the genome projects of related and other species, which lay bare the encoding of the tree of life of the evolutionary process and bring it right up to date in real time during the cultural divergence of human groups in the cultural epoch. See: **Tree of Life Tangled Roots and Sexy Shoots** http://www.dhushara.com/book/unraveltree/unravel.htm for the evolutionary trace from the first cells to humanity. The key refutation of the impossibility of generating life from primordial molecules is the discovery of a spontaneous route to generate RNA .



Above: Genetic tree of evolutionary divergence between chimps Neanderthals and humans confirms each evolved from a common ancestor - the bane of creationists and 'intelligent designers'. Below: Evolutionary tree of Human ethnic groups using a variety of different analyses of genetic sequences gives a consistent overall evolutionary tree for human societies with minor variations due to the differing effects of sexual recombination and other process on the types of DNA change analyzed. The inevitable conclusion is that humanity is evolving in real time as we speak.

But the central critical fallacy of intelligent design lies deep in the 'heart' of its own rationale. If we propose an intelligent designer, we have reduced the explanation of the evolution of natural complexity to the ordered constraints imposed by the 'designer'. This is a fallacy because it offers no answer at all as to the creative evolution of the designer's own 'design'. Fair discussion on this issue depends on a complete model of cosmology, so we HAVE to address the evolution of the designer.

But we have no evidence of the nature of the 'designer' to build a cosmology upon. There is no real evidence for God at all in nature. Indeed, Buddhism itself is a clear reaction against the deity-infested tradition of Hinduism, essentially removing all deism while retaining the other aspects of the cosmic mind cosmology. The fact that God and gods vary so much between cultures means they are human inventions. In all other situations where there is a natural basis for something, like the evidence of a 'design', you can actually find it in the geological record.

There is NO evidence whatever for a designer in nature. What intelligent design proponents try to assert is that 'blind', 'random' processes couldn't have done it, so the designer (who conveniently coincides with the monotheistic hypothesis) must have done it by default. This is a double negative finesse which fails because of the complete failure to describe the design of the designer.

By implication the pejoratives 'blind' and 'random' are based on a false mechanical engineering model of cosmology and are suggesting two things:

> That optical vision and possibly prescient vision is required for the complexification of nature to proceed over time immediately implying the designer.

That 'blind' 'random' processes of evolution don't give an adequate explanation, again implying the 'designer'.

This ignores several important aspects of how the universe works, including chaotic sensitivity, self-organized criticality, fractal emergent structures, quantum superposition, tunneling and entanglement and the other side of evolution which is anything but blind and random - selective advantage. It also ignores the modular fractal structure of the genome as an informational oracle.

The real problem is more immediately to do with the failure of the concept of design than the designer Himself. Design is an ordered constraint on boundary conditions, which is sufficient to determine the subsequent form of the dynamic.

The concept of intelligent design comes from six root mistakes:

- An incorrectly based belief in the rule of order, rather than new order coming out of the edge of chaos, or bifurcations out of chaos which introduce new fractal attractors.
- An incapacity to understand that the dynamical evolution of complex systems is generally NOT fully defined by their initial conditions.
- A belief in God, which then by faith, imposes a necessity for ultimate order - God's divine plan - His cosmos versus primal chaos.
- An engineering fallacy, in the Newtonian mold, of making a false analogy between the craft of industrial technology and nature, while the physical universe and the biological world is based on more subtle principles of wave-particle complementarity, fractal interactive divergence of the fundamental forces of nature, quantum entanglement, tunneling, uncertainty and superposition of states.
- A failure to understand that constructive or deductive intelligence is not the root basis of complexity, and in fact is a product, rather than a cause of natural complexity.
- A failure to realize intelligent design is not a cosmological explanation of any sort, because it is posing a regress into the unknown and unknowable, i.e. the designer and design of the intelligent designer.

In the real world this idea is drawn from, technology is designed by humans, so there is no automatic regress into the unknowable, but rather an investigation into our own intelligent sentience.

It is possible to try to achieve a 'best of all possible worlds mysticism' still cryptically conceding a 'creator' by proposing that: "The creator isn't the creator by creating all that is, the creator is more the creator by being all that is".

The physical universe has two complementary perspectives:

- In the space-time manifold the universe is eternal and IS all that there is, possibly sentient of itself, through the very process of consciousness we experience.
- In the time-evolving perspective, the states of the universe evolve dynamically, according to

Laplacian dynamics, and could also include anticipatory future-past cryptic quantum time-symmetric interactions as well.

However if we propose an eternal omniscient creator, beyond temporal change, we inherit an onus to demonstrate how this looks in the dynamical perspective - that is, how the complexity and sentience of life actually comes about. Does it self-generate naturally as science would attest, or is there someone out there, with the abstract attributes of intelligence and even mammalian emotional love and jealousy, tinkering with the blind groping of nature over evolutionary time, even if not making the whole shebang as a calculatingly flawed cosmic toy factory in the Genesis?

And what about the contradictory issues of free-will and the capacity to sin so elegantly embroidered into the whole moral guilt cosmology to give humans the capacity to err from God and thus have to succumb to His divine rewards and punishments later? Given Augustine's notion of original sin, how can we be blamed for our sexual concupiscence, any more than the Lion, whose flawed carnivorous destiny is to helplessly consume the lamb?

You can't have it both ways with a term like 'Creator'. The term doesn't just apply to 'all that there is', which is at once the Tao, the Tantra, Brahman, Buddha nature, the Elysian fields, and this life and the after life as well as the beneficent transcendental Deity rolled into one great reverberating resonance. The term 'creator' and with it 'intelligent designer' is used to describe an external agent transcendent over the laws of nature and the physical universe who creates life (in Eden) and lets it go, only to run down, like a faulty clockwork toy, which doesn't contain the creative principles that brought it into existence in the first place.

Despite the fact that his conflicts entirely with the fossil evidence that living systems have become ever more complex over time, and the meticulous detailed DNA evidence of evolution happening right in front of our eyes, people with a vested psychological interest in God seem to have an obsession with trying to convince themselves that this cosmic emergence process is just blind groping that couldn't possibly have pulled itself up by its own cosmic boot straps.

But Jesus cautioned us: "Don't look at the speck in the others eyes but the plank in ones own". Having to deny the creative potential of nature is not just a plank - it is a fundamental part of the scorched-Earth philosophy of theism that leads to the rape of the planet.

What is needed if one is going to espouse this kind of mystical omniscient theology is to say what it means in terms of active human participation for caring for the living diversity of the planet and restoring the Garden of Eden to its paradisiacal form, otherwise one is simply playing with smoke and mirrors. The acid test is the all too evident capacity of the religiously zealous people of Earth to use themes like the 'Creator' to destroy the Garden of Eden before it has even had a chance to serve its time for the very reason that it is just a flawed creation of a transcendent God.

On the other hand there are seven features of the evolutionary paradigm, which give it its richness and creative capacity and the onus is on intelligent designers to invalidate all of these if they are going to be able to claim "life couldn't have done it".

Sabbatical Evolution

Genetic evolution is surely the most sophisticated super-computational system in the universe and is

easily capable of all the creative manifestations to which intelligent design proponents refer.

Massively parallel genetic algorithms: Genetic algorithms have huge creative efficiencies resulting from massive parallel computational aspects of the disseminated genomes across vast ecosystems, particularly including those of bacteria and single-celled organisms which have been responsible for evolution of most of the metabolic pathways. Although the genetic evolutionary process looks superficially like blind mutational groping disseminated genetic algorithms are known to be able to solve serious computational problems in short shrift through parallel mutational adaption. In a fundamental sense the genomes of the world ecology constitute a type of disseminated 'brain' responding to selective pressures through innovative transformations. It is this 'evolutionary brain', which can over time generate the active central nervous systems we associate with higher animals and humanity itself.

Quantum processing and superposition: Genetic evolution including point and modular mutations combined with DNA repair mechanisms are quantum mechanical processes involving molecule-molecule interactions, so take advantage of aspects of superposition of states available only to quantum computing. The influence of the quantum realm is evidenced in enzyme reactions, where quantum tunneling is essential to traversing the activation energy of many reactions.

Translation and Protein folding: The entire genetic process is mediated through translation from 4x3 nucleotide sequences to 20x1 amino-acid sequences so that genetic information becomes transduced into the 3D structures of protein catalysts. The protein folding problem - how the primary sequence of amino acids turns into the 3D structure of an active enzyme is a computationally intractable problem in classical terms solved by dynamic quantum molecular rearrangement, probably involving quantum superposition. The RNA era preceding DNA-protein translation has a single molecule encrypted form of this folding problem in the one RNA molecule which can both replicate and adopt catalytically active 3D conformations. It has recently been demonstrated to have primitive synthesis routes for its harder to synthesize pyrimidine nucleotides, so the whole of life and the replicative process can rise from the quantum milieu spontaneously as an interactive cosmological manifestation.

Genetic symbiosis: The symbiotic interaction of mobile genetic elements with cellular genomes, in addition to the cellular symbioses resulting in mitochondria and chloroplasts, results in a fractal architecture in which modular transformations which are far more likely to have a functional advantage come into play. Genetic symbiosis is key to higher organism evolution, which has also involved major gateways, such as the development of homeotic gene expression, providing coordinated expression of organismic segmentation and tissue specialization.

Promiscuous and Recombinant Sexuality: Sexual recombination has made possible endless rearrangement mutations without deleterious effects, launching higher organism evolution to new heights of complexity, without which multi-celled organisms could not have evolved. Bacteria also have promiscuous virus-mediated sexuality which traverses species boundaries. Sexuality also enables selective sweeps, in which an advantageous gene can infiltrate an entire gene pool in a small number of generations through sexual recombination.

Natural and Sexual Selection: Natural selection, which is anything but random, and acts like a slowly opening causal doorway to advantageous mutation, is complemented by strong sexual selection particularly of males by choosy females and a degree of social selection. Given the avenues of transformation open to genetic symbiosis, the line between Darwinian processes and acquired characteristics has become a little more subtle, because stress responses can elicit coordinated genome transformations, as well as epigenetic effects of altered DNA

methylation, which can carry down several generations.

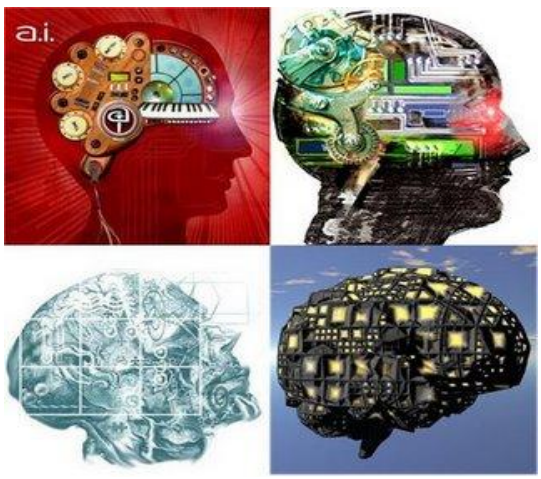
Consciousness: Just to let the sabbatical creation come to its final resting place on the day of peace, consciousness is changing the face of evolution, both by the critical incentives it gives to the reproductive process (women who aren't dominated by male pressures and delinquent fantasies like smart guys who can play a mean song crack good jokes and tell a spell-binding tale as well as being good fathers by far the best), by the devastating effect it is having on world ecosystems, AND not least by the paradoxical effects of consciousness itself as a space-time anticipation, on the genetic process.

The critical gap still existing in the scientific description of reality is the central question of how the brain evokes subjective consciousness. Since religious descriptions, in dealing with a God outside and/or above the mortal coil of the physical universe involve themselves in questions of the afterlife beyond physical death, religions are predominantly descriptions from a conscious sentient perspective, in which the biological and physical aspects of reality are frequently shunned, as part of an inferior, bestial, or degraded condition, at best a mere stepping stone to the heavenly paradise of God.

Recent studies have even shown that a tendency towards intelligent design may be embedded in the way we think. Deborah Kelemen has found that the tendency to favour explanations invoking purpose-seeking yet false explanations of natural phenomena - promiscuous teleology - is shared by both religious and non-religious adults, suggesting that humans are neurobiologically predisposed to be susceptible to 'intelligent design' and creationist explanations (Cognition (DOI: 10.1016/j.cognition.2009.01.001, Callaway, Ewen "Humans may be primed to believe in creation" New Scientist 2 Mar 2009).

Science thus badly needs to make some progress into the depths of how the brain generates subjective consciousness to avoid being accused of being a purely materialistic description of no real weight in deciding the lofty questions of the fate of sentient existence.

Coming from the diametrically opposite pole to affirmative belief, there is a purely materialistic claim of intelligent design, applied, not by the religious, but by those who follow a purely mechanistic, cyborg line, in which the human brain is pictured as just another form of computer. In an act of reverse faith, this belief is that artificial intelligence will provide the complete solution to how the brain makes sense of the world. In this description, the notion of subjective consciousness is discarded as a superfluous, non-objective, non-scientific idea, having no replicable correlates on which we can base real experimental evidence, because subjective experience is not an objective verifiable phenomenon at all. The artificial intelligence approach presents another form of intelligent design, for it claims that the only defining characteristics of the brain are its computational structure and function and that, once this is elucidated, there is nothing more to discover.

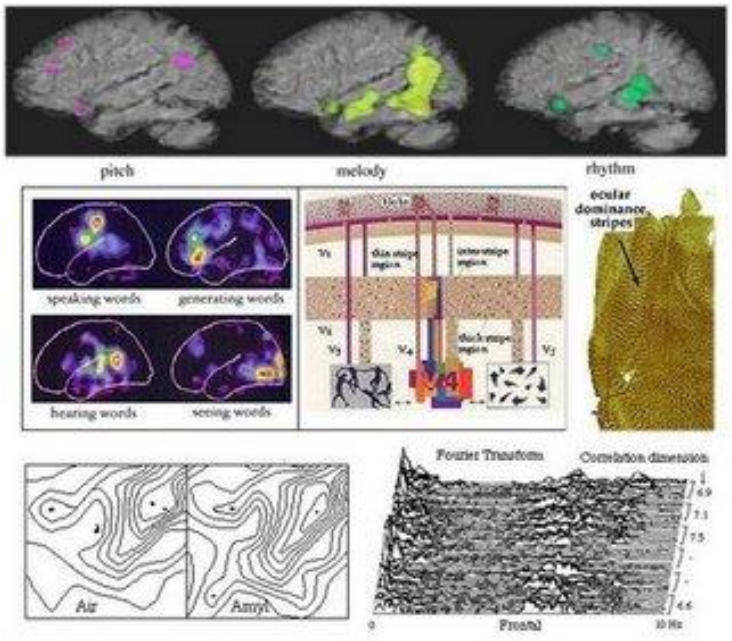


Intelligent design closes in on the designer: Four views of artificial intelligence (internet)

However, artificial intelligence has proved incapable of making the huge strides it promised. An interesting

example is optical character recognition, one which computers should really be able to handle, where scanned snippets of old texts called Captchas (Completely Automated Public Turing test to tell Computers and Humans Apart) are used to make sure real humans log onto web sites, eliminating phishing and spamming computers, which are still unable to perform unambiguous character recognition, despite decades of AI research into such areas.

The brain is in no way like a digital computer and uses completely different principles, involving waves of excitation, chaotic dynamics, continuous, rather than entirely discrete digital communication, and probably, into the bargain, exotic quantum phenomena. Despite having 10^{11} neurons and 10^{15} synapses, the brain is an extraordinarily bad numerical calculator, having a digit span of only about 7. Cultures exist with no linguistic terms for number and there is debate whether there are any hard-wired skills for numeracy in the human brain. Moreover the sorts of problems the conscious brain is best able to solve - anticipating immediate and serious threats to survival in the open environment - are notoriously intractable computational problems which would leave a digital computer being eaten by its tyrannosaurus equivalent because it became catatonic at the crossroads and took too long to compute whether to jump out of the way of the predator.



Top row: Localization of pitch, melody and rhythm perception in music. Left: Different aspects of language function result in activity in varying regions of the cerebral cortex. Center: Visual processing for color and motion is done separately in parallel. Right: Ocular dominance of one or other eye is distributed dynamically across the visual cortex and varies as a result of cortical plasticity. In blind people these regions may be used for spatial representation using auditory sensation rather than vision. Lower left: Processing in the olfactory cortex distinguishes two odors through global 'holographic' differences in the wave form of the excitation. Lower right: Brain excitations are broad frequency chaotic excitations. Rather than discrete processing, the brain appears to use phase coherence as in a hologram to distinguish the relevant stimuli from the random groundswell of noise.

Neuroscience is beginning to uncover intriguing relationships between how different areas of the cerebral cortex handle sensory and cognitive processes and the subjective consciousness with which they are associated. For example different regions process colour and motion, resulting in pathologies, in which people who have had injuries in particular regions, cannot experience either colour or motion, instead witnessing a grey landscape or a confusing sequence of frozen stills when the coffee is poured. Likewise rhythm, melody and pitch in music, and semantic meaning and articulate expression in language, are processed in distinct regions. Moreover, the allocation of such functionality is capable of plasticity, so that in blind people, visual regions may be involved in auditory spatial processing.

Furthermore, the brain does not depend on digital processing. Although long axons are pulse-coded, sending a spike train at a rate corresponding to the intensity of the stimulus, other neurons have continuous potential changes. Neuron-neuron connections are not entirely electrical, with many

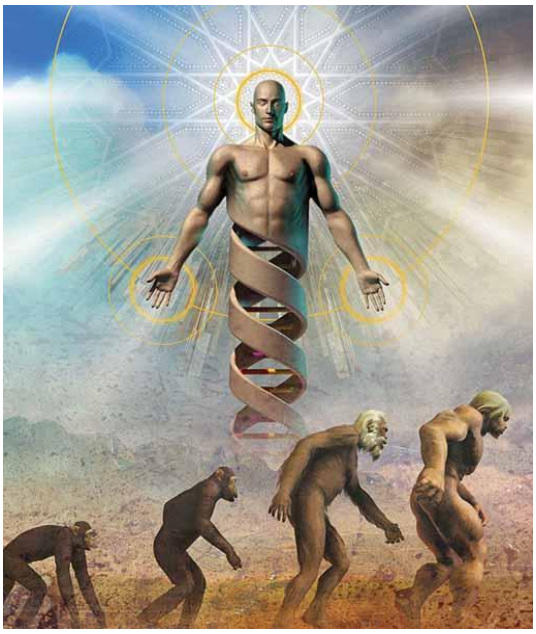
different types of chemical neurotransmitters involved, some of which can have profound effects on consciousness. Memory likewise has a major biochemical component involved in delayed recall. The neuron as a cell is far from a trivial discrete component like a transistor or a simple additive unit, with large pyramidal cells having many different types of excitatory and inhibitory synapses and up to 10,000 synaptic connections, many of which are capable of non-linear interactions, resulting in complex dynamics between neurons.

The global nature of brain waves is broad-spectrum, rather than simple resonances, allowing for transitions in and out of chaos, and using holographic type principles of wave phase correlation, to distinguish the critical information being paid attention to from the groundswell of noise. Some researchers also suggest that quantum phenomena may play a role in brain function and that there may be a relationship between quantum uncertainty and quantum entanglement, and the capacity of the conscious brain to anticipate circumstances and possess the attribute of free-will.

Conscious states of the brain do not appear to be associated with any specific brain centre, but rather a function of the higher levels processes distributed over the entire cerebral cortex. Although the conscious brain remains the abyss in the scientific description, brain science is bringing us ever-closer to an understanding and challenging our assumptions, both religious and mechanistic.

Evolution IS Intelligent Design

In returning to this topic two years later, I came to a renewed synthesis of the dilemma of our perceptions of reality that the intelligent design saga demonstrates.



Evolution IS the Intelligent Designer. The DNA code is the physical manifestation of open-ended evolutionary design as a heuristic genetic computational algorithm.

The tragedy of intelligent design is that it robs us of understanding the most important, complex, creative and exciting processes in the universe - life, consciousness and intelligence. All of these processes owe their complexity to their self-generating adaptive anticipation. They are not fixed by their design, they do not run down but upward into more complexity and consciousness. Were they designed they couldn't have become what they are and they would have no open-ended future either.

However there is one respect in which evolution is clearly and unambiguously its own intelligent designer. Anyone who looks anywhere in the universe to try to find out the designer of complex life has to come to the realization that the most complex and efficient computer known in the universe is the collective genomes of the biota on Earth.

This computer is functionally in the process of weaving evolutionary adaption through the modular architecture of genes, sexual recombination, mobile genetic elements in our genomes, horizontal

transfer of genetic information between organisms and species, through the immense parallel computing capacity of its genetic algorithms and the fact that it is a parallel computer on a truly molecular level, which is open to heuristic adaption through occasional mutational change, the collective genome is precisely adapted to be the intelligent designer of evolution.

The fact that it doesn't have a central computational system like the brain in no way means it lacks the functional capacity to generate new and more complex forms of adaption. In fact a brain-like form of centrally organized designer is nowhere nearly as suited at solving the dispersed adaption problem of discovering new 'degrees of freedom' in ecological and environmental niches as the massively parallel distributed genome is.

To give a very rough idea of the computing power of the combined bacterial genome alone, taking into account bacterial soil densities ($\sim 10^9$/g), effective surface area ($\sim 10^{18}$ cm^2), genome sizes ($\sim 10^6$), combined reproduction and mutation rates ($\sim 10^{-3}$/s) gives a combined presentation rate of new combinations of up to 10^{30} bits per second, roughly 10^{13} times greater than the current fastest computer at 2 petaflops or about 10^{17} bit ops per second. Corresponding rates for complex life forms would be much lower, at around 10^{17} per second because they are fewer in total number and have lower reproduction rates, but they are still vying with the computation rates of the fastest supercomputer on earth.

Moreover they are physically manifest in the right place at the right time, unlike the hypothetical ephemeral external 'intelligent designer', which is nowhere in sight anywhere in the physical universe. Moreover, as several examples of where evolution has resulted in simpler degenerate organisms, such as the sea-squirt which as a vertebrate, has a fish-like larva but settles down to adult life a rather brainless jelly-fish-like adult, a single centralized intelligence like a brain is less suited to solving evolutionary computation questions than the highly distributed decentralized computer our genetic algorithms provide which allow different forms of opportunistic adaption depending on the ecological and environmental circumstances.

The modular architecture of the genome combined with all its symbiotic mobile repetitive elements provides exactly the substrate to enable this open-ended process to generate life's complexity and we can see this in action in any of a host of studies of **genetic sequence relationships in evolutionary trees**, running from the dawn of life to the relationships between chimps, Neanderthals and humans - the transition most abhorred by the religious.

See: Tree of Life Tangled Roots and Sexy Shoots for the evolutionary trace from the first cells to humanity: http://www.dhushara.com/book/unraveltree/unravel.htm

We understand our brains are encoded by our DNA. We can't put a designer into the argument because it is not evolution taking place, but the genetic program of embryogenesis which, despite its complexity, is structurally stable, so that the vast majority of the time we develop into humans, rather than still-borns or mutant monsters. Nevertheless the brain is far from a fixed program. It develops dynamically during the growth of the fetus, through chaotic excitations of its neurosystems, starting from the retina and ending with the cortex, and the brain retains neural plasticity into adulthood, so that brain regions for seeing can become adapted for spatial hearing in blind people. It is clear the same genetic algorithms that can generate the brain of our offspring in nine months based on our own genetic codes, are also a mutable and adaptive process, fully capable of presenting new genetic combinations, which can adapt to and take advantage of emerging niches.

When coming to how replicative life emerged and the evolution of complex life, we are dealing with the most complex generative process in the universe. The emergence of life from the chemical soup is slowly becoming understood and is the final interactive result of cosmic symmetry-breaking in molecular complexity. It is thus as complex as the cosmological TOE, or physical theory of everything, to unravel.

Evolution looks simpler to understand (and criticize) being based on replication, mutation and selective advantage, and occurs over long time scales, but this doesn't mean it is just a theory, or an alternative to a religiously inspired shadow of an archaic God, in the form on an 'intelligent' designer making dead end products like we make machines.

It is the tragic fallacy of Christianity that it keeps trying to demolish the wonder and generative power of life's future by subjugating it to the feudal, jealous totalitarian designs of a Hebrew watchmaker coming from a time when only sundials existed.

I would take a position about intelligent design that it is like incest - fundamental anti-life perversion of sexuality in the name of an Oedipus complex with a fantasized creator who we love because of our fear.