Article

Cosmic Order: An Intelligent Face to Evolution

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During Darwin's time the biblical Genesis account was considered by many scholars to be allegorical and various ideas about the transmutation of species were already in circulation. Influenced by findings on the Beagle trip that embarked in 1831 and by communications with others, including A.R. Wallace who had a nearly identical theory, Darwin eventually published his famous book On the Origin of Species. His idea was that small heritable changes over a long period of time can endow a survival advantage in a process of natural selection that can lead to new species. However, the process was regarded as random without plan or purpose. It met with opposition and various amendments until it became generally accepted scientific dogma in the 1930's and 1940's. The views of an ardent proponent of the Darwinian paradigm will be briefly assessed. This will be followed by discussions of some compelling evidence for hierarchical organization as a pervasive feature of the cosmic order, from the physical evolution of the cosmos to biological evolution on the planet Earth.

Key Words: Theory of Evolution, Charles Darwin, Cosmic Order, intellegent direction, spirituality, atheist, Richard Dawkins.

Introduction

When Charles Darwin published his famous book *The Origin of Species* in 1859, he began a debate that has, if anything, gained in intensity over the years. With modern techniques of probing genes the debate has taken on new proportions. A new breed of biologist, armed with a genetic arsenal, is attempting to reduce the whole of life to the mindless perpetuation of DNA sequences. It is intended to be consistent with cosmological implications of the physical sciences. In its passion for unity science reduces life to a meaningless enterprise, an accident without pattern, plan or purpose. This is the grand vision that science offers to lend humanity a sense of cohesion and lead us through the new millennium inspired with hope and direction.

On close examination it becomes apparent that there is no hard evidence to support the exclusive interpretations that many biologists place on their findings and new discoveries are exposing flaws in their logic. The mindless claim for the evolutionary mechanism is itself a blind belief lacking in substance. At the same time many of us sympathize with Darwin's disenchantment with the Biblical interpretation of the creative process. In the context of his time one can understand his need to reinterpret the evidence that he found in a new, more coherent and

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Note: The article is based on my book "Downsizing Darwin: An Intelligent Face for Evolution" self-published in 1996 [1]. More information is available at my website [4].

intelligent way. So he came up with the idea of accidental mutations which may, in some cases, endow a greater survival advantage leading to a natural selection of those mutations, and consequently to the emergence and adaptation of new species according to environmental pressures.

There is abundant evidence to indicate that life has evolved up through the lower species, and adaptation according to natural selection is surely a part of it. But there is also abundant evidence to indicate that there is intelligent direction implicit in the evolutionary process, unfortunately all of it ignored by science. Such questions are forbidden in the halls of science. It seems that mainstream science insists on placing itself in opposition to anything remotely suggesting spiritual overtones. And yet science openly strives to close the book on the whole story of creation, to create a belief system with itself as the only authority, a book it believes must ultimately be accepted by all people for all time. It's a grand dream that many scientists have. One might even call it an open conspiracy. They would deny us all a spiritual reality, deny there is any transcending basis to values, deny there are any moral issues implicit in experience, and consign us all to oblivion. It is a truly strange phenomenon. To any intelligent impartial observer something is off the rails. We are destroying ourselves through dogma, either the dogma of science or that of religion, and there doesn't appear to be any way to turn.

Richard Dawkins [4-7] proudly defends Darwinism in his popular book River Out of Eden. A river of genes springing from the blind fortuitous survival of DNA sequences is the sole determining factor in the evolutionary process. Only DNA sequences he insists. But his supporting arguments are riddled with flaws. How strange that the whole of evolutionary biology should be infected with contradictions. Blind belief without foundation is flaunted as vigorously as any repressive religion. Nor is creationism the only option. The evidence across the broad sweep of time and space confirms that the evolutionary process unfolds in an ordered way that is implicitly intelligent.

Further, intelligence by its nature spans time and space. It integrates history. It is a living process that may learn by trial and error but reinvests that learning up through hierarchical levels in the long climb toward sentient awareness. Left exclusively to genetic linkages, lessons from whole lineages of extinct species spanning eons would be lost forever. Even plants display some sentience, from vascular systems that reach for the sky, to flowers that attract pollinating insects, anticipating processes extended in space and time. The invertebrates from flatworms to flies explore an array of sensory-motor systems spanning space and time at accelerated rates. The vertebrates from crocodiles and cows to chimpanzees add conscious reflection of emotional patterns, providing ever higher discretionary capacities to span space and time.

Lastly, language empowers humans to integrate the whole of space and time through extended ideas. But this left-brain capacity invites a right-brain spiritual sense of propriety. And both brains are fueled by an emotional apparatus harnessed to the ancient brains of the crocodile and horse integrated into our cerebral anatomy. We three-brained creatures are specifically structured to span space and time. With anciently rooted aspirations fueled by our animal brothers we are

obliged to reach for another rung in evolution's ladder and grasp the essence of intelligence implicit in the cosmic order.

Atoms, Stars, Galaxies

It is not enough to harshly criticize the hard line Darwinian view and leave it at that. Anyone can find fault. It is necessary also to suggest a more meaningful alternative that is consistent with the evidence at our disposal. With this objective in mind let us proceed to examine in broad outline an intelligent face that seeks recognition in the evolutionary record. To do this it is also necessary to reach back to our origins in the stars, for that is where our story begins. We are creatures of the cosmos.

Earlier I introduced the idea of historic integration, the integration of space and time as a theme inherent in the evolutionary order. The plants have worked out the spatial integration of the *form* of cells working together, including a large variety of possible sizes and shapes in multi-celled plants. The invertebrates have explored time-like motor-sensory *routines* involved in actively integrating experience. They sense the environment and respond dynamically to it over a huge range of circumstances. Vertebrate evolution has focused on the integration of spatial and temporal organization in a relatively fixed body plan that can progressively modulate behavior at ever more conscious levels of *ideation*. This results in the integration of history according to the hierarchy *idea*, *routine* and *form* which is inherent in the evolutionary process to begin with. Self-similarity pervades the cosmic order.

The integration of history, of space and time, is also the cosmic theme in the universal theater wherein atoms, star systems and galaxies are the players faced with a similar challenge of integrating space and. time. Galaxies possess no independent material form. They are the focus of an integrating *idea* translated through the *routines* of stars to *form* the atomic elements from primary hydrogen.

We may call the universal projection of hydrogen the *primary creative process*. The intimate relationship between the photon, the electron and the proton within each atom is different in kind to the random external relationship between different atoms. The intimate relationship is a more primary characteristic of the physical universe.

It is the level of photonic energy (*idea*), associated with Planck's constant, that directs the electronic *routines* in discrete orbits that determine the atomic *form,* centered in the proton of the hydrogen nucleus. These discontinuous sub-atomic units that act as separate particles have a universal counterpart that tunnels through them, like quarks linking them up from within, sewing them into discrete sets, thus making up the hydrogen atoms of the universe. Hydrogen atoms are separate and distinct, yet all of them are the same. They are one and many, universal and particular.[1] And so it is with all atoms.

[1] Campbell R. Atomic Structure Fundamentals, 1997: http://www.cosmic-mindreach.com/Atomic_structure.html

They also come and go. They are discontinuous not only in space but also in time. Atoms alternately exist as particles then as quantized bits of timeless energy, synchronously oscillating between these two modes. Atoms thus exist as spatially distinct particles with wave characteristics. Their wave character is determined by their oscillation back and forth to a quantum mode that is timeless and spatially indistinct. The very existence of atoms is an extremely rapid series of synchronous pulses, like the successive frames in a movie. Atoms are thus waves and particles at the same time since the quantum frame is timeless.

Max Planck was disturbed by what he had discovered when he came up with the universal quantum of action at the beginning of the twentieth century. No one understood why the electromagnetic spectrum should be quantized. It is a continuous spectrum, and yet the colors of a rainbow come to us as a very rapid series of synchronous pulses.

There can be only one explanation. The physical universe is itself going on and off synchronously, thus packaging the transmission of light into a succession of space frames in a cosmic movie. There is only the action of light and related electromagnetic activity within each space frame of the movie, just as there is only the action of light projecting each still frame onto the screen of an ordinary movie.

Each space frame in the movie is interspersed with a timeless quantum frame in which matter is quantized as spatially indeterminate energy. Each quantum frame is a vast indeterminate Void of balanced energies spanning history, spanning space and time—a master sensorium that integrates quantized elements of experience. All the atoms of the universe become bundles of energy without particulate form. The physical universe thus oscillates between particulate form and indeterminate quantized energy—the Void.[2]

The Void is the Big Screen in the projection of the movie. Relative motions of physical bodies occur through a series of quantum jumps in relative position from space frame to space frame, just as in any movie. The progression of the movie moves from space frame to space frame to provide us with the concept of spatial events changing with increments of linear time.

We measure linear time by repetitive cyclic motions. The Earth revolves once on its axis to make a day. Time, as we measure it is a cyclic recurrent affair that we implicitly span in our mental processes. We are able to do this through our degree of access to elements of experience in memory, in other words through our access to a master sensorium, the Void, that encompasses the universe. Experience becomes quantized in convenient packages that we can recall as past events.

[2] The Void is accessible in human experience. The Void is represented by the blank frame in the Zen Ox-herding picture sequence in D.T. Suzuki's book *Manual of Zen Buddhism*. New York: Grove Press, 1960, and other places. The experience is equated with "enlightenment" because it is timeless, formless and boundless without distinction between subject and object. While it is a life-changing experience there is no loss of identity. The Void is also a common theme in Taoist poetry. See Blofeld J. *Taoism: The Road to Immortality*. Boston: Shambhala, 1978; Also Blakney RB, transl. *The Way of Life (Tao Te Ching).* New York: Mentor Books, 1955.

The past is thus interpreted to anticipate the future in an ongoing synchronous present. The very experience of Being integrates history.

But hydrogen atoms are a very fundamental kind of being. They define the nature of space and time. Space and time are not *a priori* entities in themselves. They derive from the primary projection of physical matter. Each atom is projected independently yet synchronously with all atoms. Light can only travel a certain distance in relation to each independent atom within each space frame so it has a universal velocity. It must also interconnect all atoms within each space frame so that light itself defines the very nature of space. Where there is no light there is no space. There is a black hole. Relative motions between atoms occur as quantum jumps in position between space frames and this introduces synchronous distortions in the primary projection of the movie that account for relativity effects.

Each space frame exists for a discrete length of time as determined by the action of light within each frame. Light thus defines a primary interval of time as well as a primary increment of space. A primary interval of time may be calculated in terms of classical units of time, from quantum considerations in the primary atom of hydrogen. It works out to be 1.519×10^{-16} seconds. That's how long each space frame lasts in the primary projection of the cosmic movie.[3]

But hydrogen atoms weren't created first in a primal birth scenario that brought the universe into existence from nothing in an infinitely small bubble of space and time. Space and time are not things in themselves. There is no evidence that there is such a thing as a space-time continuum. As noted earlier Einstein doubted the continuum basis of General Relativity late and life. He was ready to discard his own theory along with statistical approaches to quantum mechanics that he objected to so strongly. Quantum mechanics has never been reconciled with General Relativity yet both are used in the big bang scenario which Einstein considered bizarre.

Others have questioned continuous concepts. Henri Bergson took issue with Einstein over his concept of time. A quarter of a century earlier, Richard Dedekind pointed out fundamental intractable problems with the very concept of a continuous space.[4] Bishop Berkley objected to Newton's theory of fluxions and infinitely divisible space and time.[5] Zeno's paradoxes exemplified the contradictions implicit in infinitely divisible continuous space and time twenty-five hundred years ago.[6]

In 1851 Jean Foucault suspended a long nearly frictionless pendulum on a wire from the dome of the Pantheon in Paris and set it to swinging. It is another enigma that has never been explained. Why should the arc of its swings be fixed with respect to the fixed stars thousands of light years distant while the Earth rotates under it?[7] Inertial velocity is clearly distinct from gravity. The gravitational mass of the pendulum's heavy bob is synchronous with the projection of the universe

[3] Campbell, R. Atomic Structure Fundamentals, 1997: http://www.cosmic-mindreach.com/Atomic_structure.html
[4] Dedekind R. Essays on the Theory of Numbers [1858]. New York: Dover Publications,1963.
[5] Wisdom JO. Berkeley's criticism of the infinitesimal. Br J Philos Sci 1953; IV, 3:22-25.
[6] Sainsbury, R.M. Paradoxes, 2nd ed. Cambridge University Press, 2003
[7] Baker GP. Seven Tales of the Pendulum. New York: Oxford University Press, 2011:388.

at large despite its proximity to the rotating Earth beneath it. It is further evidence of a discontinuous synchronous universe. The gyro compass works on the same principle.

Space and time are discontinuous and synchronous. They have quantum characteristics that are not infinitely divisible, placing a minimum limit on the differential in the calculus. This draws into question the use of mathematics on a cosmic scale. Planck's quantum of action confirms a discontinuity in space and time that troubled Max Planck for several years.[8] So too does Heisenberg's uncertainty principle, for how can the position and momentum of a moving particle both be known at once, when the exact position depends upon a single space frame, while the momentum depends upon change in position over a series of space frames. There is a clear structural explanation for an otherwise obscure principle.

If there was ever a primal creative event, then we are stuck with the impossible question of how everything came into being from absolutely nothing. The Big Bang refutes the theories on which it is based. The Big Screen does not. The Void is the Big Screen that spans and integrates history.

The creative process is eternal and the cosmic order requires an operating field. The cosmic order had no birth, while galaxies have been giving birth to new stars and recycling old ones forever. There are stars in our galaxy that seem to be older than the allowable maximum age of the Big Bang. And a significant number of galaxies have rates of star formation sufficient to replace their entire stellar populations well within the same time frame. High rates of star birth are very likely a periodic phenomenon in galaxies.

Our own Milky Way apparently has a black hole at its center which appears to have ejected at least four enormous concentric rings of hydrogen, millions of years apart. This suggests that old dense stars are recycled into primary hydrogen. They are timelessly suspended as their quantum energy equivalents beyond the event horizon of the black hole where they accumulate in the timeless Void for periodic ejection as primary hydrogen. The rings of hydrogen are moving outward from the center into the spiral arms breeding star formation. Meanwhile old stars appear to migrate back toward the center. The central bulge contains a high concentration of old stars and star sized masses are observed being torn apart in an accretion disc very near the center according to evidence of X-ray and infrared telescopes.[9]

This suggests that galaxies are in communication with their stellar populations, that they are cells of creative reflux and renewal. Their stellar populations are renewed by regenerating the primary hydrogen feedstock from old dense stars for the recurrent nucleo-synthesis of the heavier elements in the centers of stars. The rate of star formation in some starburst galaxies could regenerate their stellar populations in less than a billion years if sustained, indicating it is a periodic process.

[8] Heilbron JL. The dilemmas of an upright man: Max Planck and the fortunes of German science. Cambridge: Harvard U Press, 2000:8.
[9] Bart Bok gave a summary in The Milky Way Galaxy, Scientific American, March, 1981.

To get a glimpse of how this works together, picture the primary projection of hydrogen as a universally synchronous process. Almost all hydrogen appears in stellar populations together with the giant clouds in galaxies, and it constitutes about three quarters of the mass of the universe. Galaxies like our own are in pinwheel motions about their centers, and yet they must also maintain a degree of synchronicity with other galaxies that likewise entertain various motions about their centers. These cyclic motions introduce a degree of non-synchronicity into the primary projection of space and time associated with hydrogen. The center of each galaxy gets out of synch with respect to its own periphery, because light cannot fully bridge the quantum jumps in position of the stars moving around with considerable speeds.

Perceptual gaps consequently tend to open in the centers of galaxies with respect to their outer reaches, in order to maintain a preponderance of synchronicity with the universe at large. These gaps can be compensated for to some extent if primary atoms of hydrogen condense space by doubling up. That way two atoms can occupy less than the space of one by becoming heavier atoms. This complex nucleosynthesis of the higher elements from hydrogen to helium to carbon and so on is what takes place in the centers of stars. It is driven predominantly by the angular momentum of galaxies.

But the nucleosynthesis of the higher elements is not enough to absorb all of the perceptual gaps in the projection of the cosmic movie. A black hole is left as a common feature in the centers of galaxies. The space frames at the center vanish into the peripheral gaps opened by circular peripheral motions. This mends together the spatial closure of the galaxy as an integral whole that is predominantly synchronous with the universe at large. It results in an integrated space-time fabric.

It is true that this tends to lend local curvatures to space and time at concentrations of mass if we consider the integrated fabric of space and time. The integrated fabric has characteristics of a continuum, just as any movie appears continuous. But on a cosmic scale the continuum assumption on which General Relativity is based is invalid. It cannot be extended to the universe at large. The singularity at the center of a galaxy is shared alike with all galaxies in the universe as a single synchronous event. A very different cosmology necessarily results.

Solar systems themselves are also in rotation about a center, and we know in our own solar system that the sun constitutes about 99 percent of the mass of the solar system, while about 98 percent of the angular momentum resides in the planets. Why is most of the momentum in the peripheral planets and not in the much more massive sun? This strange phenomenon is manifest within the sun itself, since its poles rotate in thirty three days while its equator takes only twenty five. Why is the center rotating slower than the periphery?

This is the opposite of what one might expect from classical dynamics. For example when a skater goes into a spin with arms extended, their rate of spin increases as the arms are pulled into the body. In a similar manner, when the solar system condensed from a cloud of gas and dust it should be spinning faster at its center where the bulk of the mass has become concentrated. There must be

a process which retards rotations at the center of the sun with respect to its own periphery and the peripheral planets.

Part of this effect is due to the nucleosynthesis of hydrogen into helium and heavier elements, which effectively concentrates space at the center of the sun with respect to its periphery. The other part may be due to a force of retardation at the center of the sun to compensate for and reduce the skipping of space frames at the center and thus preserve synchronicity with the universe at large. In both cases it can be seen that events within stars are linked via events in the centers of galaxies to the universe at large. Galaxies are in communication with their stellar populations through their need to be synchronous with the primary universal projection of matter.

This approach to physics has been much more fully developed in *Science and Cosmic Order: A New Prospectus.*[10] The ideas are briefly reviewed here to show their general relevance to biological evolution on the planet.

We may now return to the universal hierarchy that pervades the cosmic integration of experience. Galaxies themselves are integrating their history, encompassing the whole of space and time. The creative *idea* of oneness is what lends integrity to the wholeness of anything. Their unifying *idea* is translated into their various *forms* through their angular motions linked to the *routines* within stars, and to stellar cycles of birth and death. Galaxies are like communities that see successive generations of people and buildings come and go, while they themselves are the elusive communications network that makes it all work together without benefit of independent physical substance. Galaxies can go on forever, but not the stars that constitute them. While the bulk of stars may be beckoned into being by the cohesive power of gravity, they are ignited by the need for the synchronous being of matter.

The System elaborates within itself. The unifying power of gravity and angular momentum initiates the integrating *idea* of a solar system. The nucleosynthesis of the elements physically knits together space and time through fusion *routines* that create new *forms* of atoms with concentrated gravitational mass. The integrating *idea* holds the planets in their orbital *routines* and energizes their physical *forms* with rhythmic tidal forces and a flood of electromagnetic radiation. The planets themselves are formulated from heavier elements synthesized through the integrating power of previous generations of giant stars that expend their energies faster, ending in a supernova that enriches the clouds from which succeeding generations of star systems condense.

Subsumed within this context planets have an independent yet related integrating *idea* realized in their gravitational *form* through dynamic *routines* generating magnetic fields, regulating plate tectonics and atmospheric patterns. Planets are thus constituted as complex chemical laboratories, furthering the *idea* of integrating space and time by linking up atoms through their electronic *routines* into an unlimited variety of molecular *forms*. This chemistry is greatly elaborated in its variety by the complex mechanisms of life, when a biosphere is born enshrouding a planet. The biosphere must be seeded by the integrating *idea* of the universe at large, for that is what it's all

[10] Campbell R. Science & Cosmic Order, 1997. http://www.cosmic-mindreach.com/Science_Cosmic.html . See also Campbell R. Cosmology & System 3, 2008. http://www.cosmic-mindreach.com/Cosmology.html .

about—the integration of space and time—the integration of history. The germination of life is a cosmic affair. Life integrates the potential of the universe to know itself through the self-similarity that pervades the cosmic order.

All of this happens according to the universal hierarchy *Idea→Routine→Form*, wherein each member of the hierarchy displays properties of self-similarity to the whole hierarchy, providing intelligent links. For example we find that stellar *routines* in galaxies are linked to planetary *routines* in solar systems that are linked to biospheric *routines* in planets. The same pattern keeps emerging again and again.

The Mandelbrot Set in Chaos Theory is a man made expression of the universal hierarchy. Its distinctive *form* is generated via the *idea* of successively integrating an invariant *routine*. This generates a geometrically patterned boundary between the inside and outside of the whole set that regresses infinitely within itself, with the same pattern recurring again and again at different levels of magnification.

The Cosmic Order and the System

The cosmic order is not the simple affair that the Mandelbrot set is. There is much more involved than repeating an invariant routine. The cosmic order elaborates on itself in discrete stages associated with reconciling multiplicity to unity. Unity requires that there is such a thing as Universal Wholeness but it cannot be monolithic oneness if there are to be separate phenomena observable in experience. There is a Rift in Universal Wholeness such that it subsumes discrete levels of multiplicity. This implicitly requires that there are both universal and particular aspects involved in an open ended hierarchy of discrete Systems such that the lower Systems transcend and subsume the higher Systems, such that it remains One System subsumed by System 1.

System 1 requires that all phenomena share a universal inside and a universal outside, neither of which can be known to the exclusion of the other. All we can every know in phenomenal experience of any kind is active interface processes between the universal inside and outside. The subsumed hierarchy of higher Systems is each generated by the ascending number of active interfaces such that we can speak of System 2, System 3, System 4, System 5, etc.

Systems 1 and 2 transcend and subsume the physical creation that is generated by System 3. For example energy released from within atomic processes, whether in suns or light bulbs lights up the physical world of atoms around us by interacting with atomic interface processes. These consist of a closed Photon energy shell that determines the ***Idea*** and spatial extent of a neutral atom, a closed Electron particle that enacts orbital ***Routines*** consistent with the photon energy level, and a closed Proton particle that concentrates the mass of the atom in the ***Form*** of the nucleus. The same universal pattern of *Idea -> Routine -> Form* prevails. It elaborates with the nucleo-synthesis of the heavier elements in which the neutron is a regenerative mode that complements the expressive

mode by further concentrating physical Form by contracting space many orders of magnitude in the nucleus. This is developed in Science & Cosmic Order as well as in a website article.[11]

Numbers are a man-made contrivance that allows us to count things and thus abstract experience and span space and time. The cosmic order itself may not be reduced to numbers or mathematics however, although we can refer to the number of active interfaces in each higher System.

The cosmic order is something else altogether. We have seen how it is expressed by the three step hierarchy *idea*, *routine*, and *form* in the primary projection of the universe, and we may call this System 3, because there are three steps in the hierarchy. System 4 is an elaboration of System 3. It has four steps in the hierarchy because a *knowledge* level becomes distinct from the *idea* level. System 4 is associated with biological process that are subsumed within the primary projection of the physical universe. The hierarchy of System 4 can be written as follows:

Idea-> Knowledge-> Routine-> Form.

There are only nine possible ways that four active interfaces can mutually relate to one another with respect to a universal inside and outside. Each way is called a Term such that there are nine Terms transforming through three interdependent sequences of transformation from Term to Term. Three Particular Sets of active interfaces, called Centers, transform through a repeating six Term sequence one synchronous Step apart, each Set having both expressive and regenerative modes, making 12 Transform Steps in all. The sequence is prescribed by Term 7 which is a memory Term since the inverse of 7 is the repeating sequence of Terms 1, 4, 2, 8, 5, 7 repeating to infinity.

There are also a Primary and a Secondary Universal Sets that work together in a four Step repeating sequence such that the three 12 Step Particular Transform Sequences are divided into three repeating Cycles.

It is curious that each centriole in each centriole pair common to animal cells is arranged as three interlinked circles of nine microtubules that form cylindrical structures at right angles to one another as illustrated in Figure 1. The mother Centriole forms the basal body of the Primary Cilium common to each cell. The primary cilium grows on the end of the basal body during inter-phase of the cell cycle and plays a central role in Cell communication with Organs and Host. The cylindrical Primary Cilium that protrudes from the cell membrane has nine doublet microtubules and lacks the two central microtubules common to motile cilia that beat synchronously together. There are 20 Terms in System 5 consistent with this structure that is subsumed by System 4. It reciprocates like two System 4's one directed outside the cell and one directed inside, thus reconciling internal and external events. The static primary cilium lacks the two central microtubules because the universal integration of internal and external events of all Cells relates to all Organs of the Host's body and cannot be delegated at the level of the Cell.

[11] Campbell R. Atomic Structure Fundamentals, 1997: http://www.cosmic-mindreach.com/Atomic_structure.html

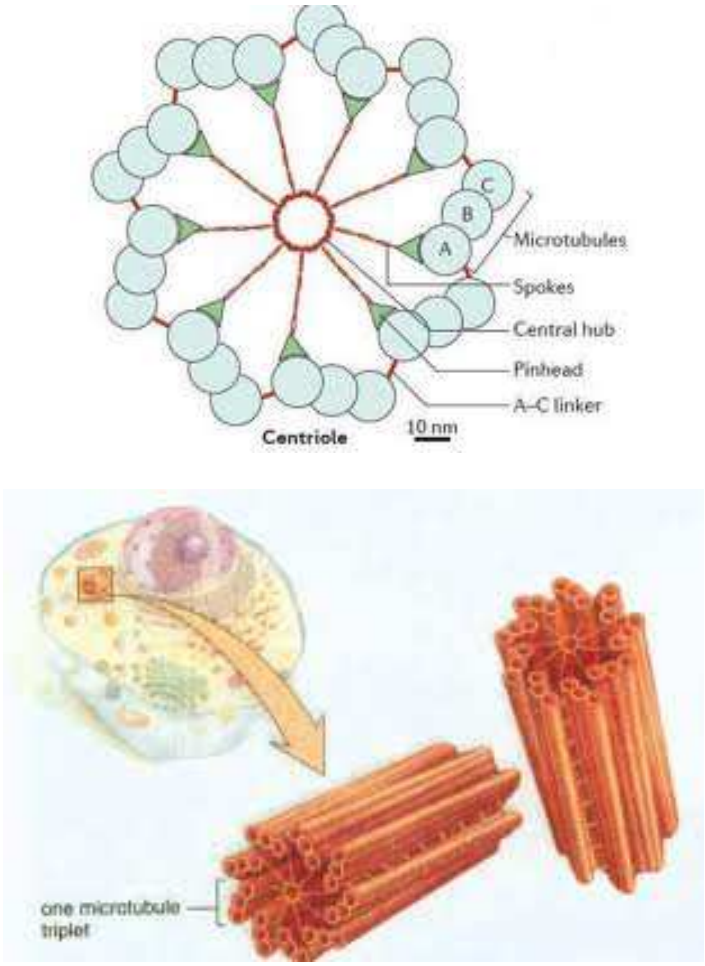
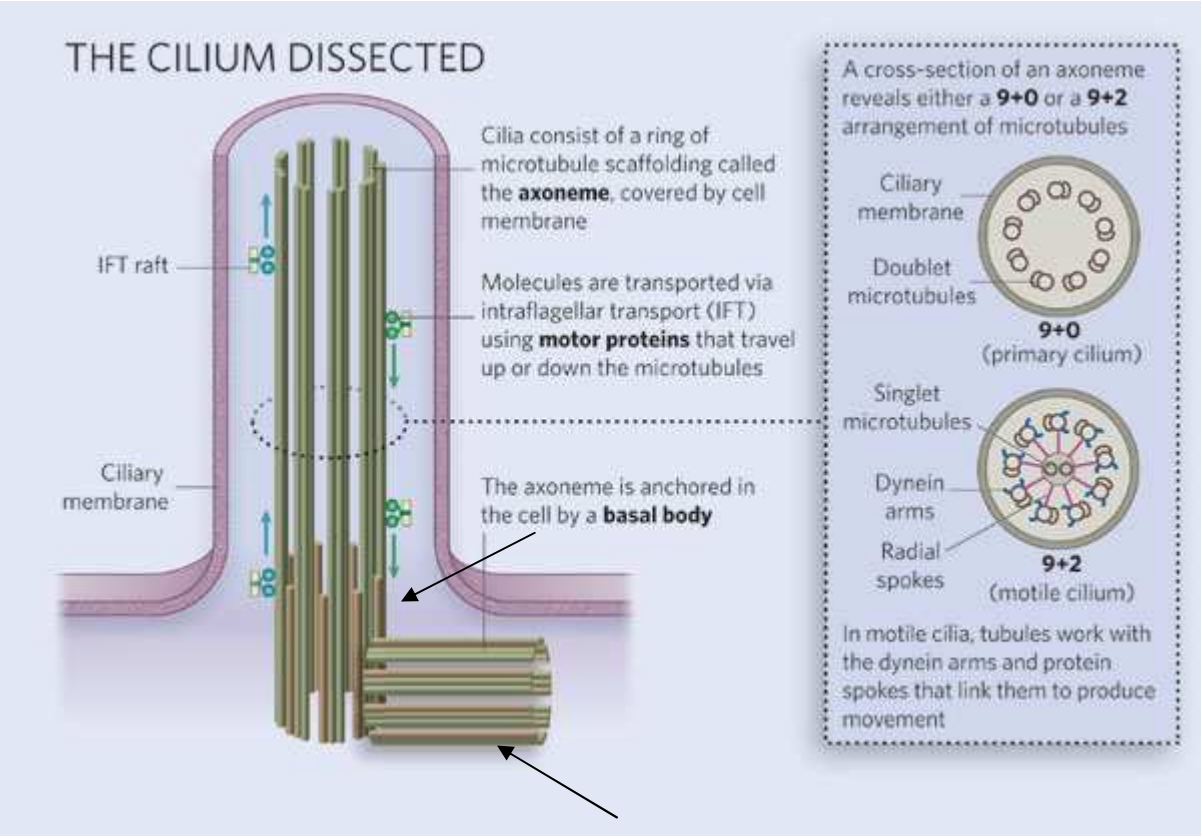


Figure 1

The mother Centriole forms the basal body of the Primary Cilium with the daughter Centriole orthogonal to it. During cell division the Primary Cilium is disassembled and both the mother and daughter centrioles duplicate themselves at right angles with one pair migrating to the opposite pole of the Cell where they are instrumental in constructing the spindle fibers that separate the chromosomes. The Primary Cilium is illustrated in Figure 2.[12]

This correspondence to Systems 4 and 5 can hardly be coincidence. The microtubules structures channel the energies of the System Term transformations. These dynamics of the creative process at the level of System 3 and System 4 were introduced in Fisherman's Guide in 1985 and have been more fully developed in *Science and Cosmic Order: A New Prospectus.* They are summarized in website articles.[13, 14]

[12] Campbell R. Primary Cilia, the System & Mind: http://www.cosmic-mindreach.com/Cell_Primary_Cilia.html, 2011.
[13] Campbell R. System 3: http://www.cosmic-mindreach.com/System3.html , 2005
[14] Campbell R. System 4 Terms: http://www.cosmic-mindreach.com/System4Terms.html , 2005



Daughter Centriole

Figure 2.

If we think of System 3 as specifying the primary projection of star systems in the heavenly theater, System 4 elaborates more specifically on the evolution of the players of biological life on the planetary stage. It is a cosmic movie with players that have very specific roles to play, as they probe and explore every secret niche of the biosphere. It is a drama of intelligently discovering the great mysteries of life through the integration of history.

It is beyond the scope of this article to explore the dynamic matrix of all nine terms as they are involved in evolutionary biology. It will suffice for our present purposes to show that the universal hierarchy of System 4 is abundantly evident both in the fossil and in the living records. It will also become clearly evident that self-similarity of the hierarchy is manifest within each level of the hierarchy. In other words there are four levels within each level that display the same pattern within each level.

Biospheric Evolution

Let's look more closely at the biosphere and the evolutionary process from plants to invertebrates to vertebrates to humans. We have previously seen that this represents the progressive delegation in steps back up the hierarchy *idea→knowledge→routine→form*, similar to the way it worked in Hank's company.

For our present purposes we may relegate the prokaryotic bacteria to a fifth level at the bottom of the hierarchy and ignore it for now. Prokaryotic cells are much simpler in structure and smaller than the eukaryotic cells employed by all plants and animals. We may designate them as part of System 5. System 5 is considerably more complex than System 4. It works like two reciprocating System 4's, one open to broader perceptual vistas, and the other one closed to a more confined format that works behind the scenes. Although there may be more species of bacteria than all species of eukaryotic life combined, the eukaryotes are open to broader horizons while the prokaryotes are forever confined to the microscopic realm. Even bacteria that appear microscopically similar in a pinch of soil from America and Australia can be as different genetically as a mouse and an elephant. They generally focus on exploring immensely diverse forms of chemical synthesis within a comparatively limited range of microscopic physical forms, everywhere on the planet. So we will only look at the System 4 that we are most familiar with, the one we can normally see in the natural world from the plants to humans.

The self-similarity of the System has been pointed out. In System 4 it means that we should be able to identify four levels within each level in the hierarchy. Let's begin with a brief introduction to the plants, and then we will explore them more thoroughly in the next chapter.

Plant cells, like bacteria and unlike animal cells, have a cell wall protecting their membrane, but plant cells, unlike bacteria and like animal cells, have their genetic material contained within a nuclear envelope and they are very complex in their internal design. All plants and animals consist of eukaryotic cells. Plants evolve by exploring the usually static spatial forms of the eukaryotic cell, although a few rare species of higher plants have adapted simple motor-sensory mechanisms in branches and flowers. The Venus Flytrap is a well known example.

Each of the levels in the natural order continues to evolve and change in interaction with higher and lower levels of sentient evolution. This functions like an energy refinery, similar in a way to a fractionating column in an oil refinery, with the efflux and reflux of patterned energies moving respectively up and down the hierarchy. These energy flows that percolate up and down the levels continually strive for equilibrium, as new factors keep coming into play. Energy disseminates and returns from level to level of the hierarchy in the process of coming to harmonic balance in the biosphere.

What follows is not intended as a new system of taxonomy, although it may lend meaning and guidance to existing systems. Because of difficulties in clearly categorizing plants and animals at the most primary levels, biologists frequently group them separately as protists or protozoa. For our purposes here we will distinguish them as either plants or animals according to criteria to be

described in the next chapter. Typical to the way the System works single celled animals diverged in early stages of plant evolution.

The first ventures in the evolution of plants explored unicellular forms that employed chlorophyll to capture the energy they needed from the sun by storing it in the chemical bonds of sugars and starches. This process of photosynthesis is common to the evolutionary variant of plants. Unicellular forms began cooperating in loosely knit communities then multi-celled organisms emerged. Individual cells became dedicated to specific roles in the plant's overall structure, as they evolved more highly developed organs, such as roots, stems and leaves.

Let's keep in mind that we have generally identified the role of plants as exploring the primary molecular *forms* that eukaryotic cells may take, individually and collectively in the task of storing the sun's energy. Even though we will move up a hierarchy in plant evolution from *form* through *routine*, and *knowledge* to *idea*, this hierarchy exists within the context of the organized forms that plant cells can take. Accordingly we may speak of a *form-form* level, a *form-routine* level, a *form-knowledge* level, and a *form-idea* level. Although these levels may not always be consistent with classifications established by systems of taxonomy, this is not important here. It will simply be shown that four levels within each of the four major levels can be clearly distinguished and identified, in accordance with the organizing principle of self-similarity. This much alone is powerful evidence of an intelligent universal order at work in the evolutionary process.

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