

## Section VI: Introduction to Information

(See also: [Section 3: "Fractals"](#); Section12: "[Man's Role in Nature](#)"; Section 14: "[Causality](#)")

(revised Aug., 2014)

John A. Gowan

[home page](#)

Papers: "[The Information Pathway](#)" with table "[The Information Ladder](#)";  
["Nature's Fractal Pathway"](#);  
[The Origin of Matter and Information](#);  
[The Higgs Boson and the Weak Force IVBs](#);  
[Causality vs Information](#)

[Chardin: Prophet of the Information Age](#)

---

The term "information" as used in physics or communication theory has a very restricted meaning in terms of entropy and "bits" of information, a definition which makes the term amenable to mathematical formulation but which robs it entirely of its usual significance in the human context of knowledge, meaning, complexity, and consequence. This is equivalent to reducing the human body to its chemical elements (for the sake of simplicity) and ignoring its biological unity and function as a specific type of living organism (because it is too complex). In these papers I am only interested in "information" in the latter complex sense. However, because the [hierarchy](#) is arranged by increasing size, its increasing information content is recognized in either case.

---

The "Information Pathway" was presented at "[CPSI](#)" in June 1999. The "Pathway" paper and the table "The Information Ladder" is simply the much older "[Fractal Table](#)" reinterpreted. Each realm of the fractal table can also be considered as a realm of information; it is of considerable interest to note how far up this "ladder" of information human science, art, and philosophy have climbed. Humans have physically explored all 8 of the "Microphysical" and "Biophysical" levels, from particle physics to planet Earth. We are now exploring the first level of the "Astrophysical" realm - with Earth orbiting satellites, Moon landings, and robotic missions to various planets of our Solar System, including the Sun itself (level 9, Stars). Level 10 (Galaxies) remains in the domain of science fiction and art ("Star Trek", "Star Wars"), and of our observational and astrophysical sciences, (via telescopes and theory), as does level 11 ("Universe"). Level 12 ("Multiverse" or "First Cause"), is accessed only through theory: cosmology, religion, philosophy. The Metaphysical realms (human thought: levels 13 -16 and 17-20) are represented by the principles of the Unified Field Theory and/or the conservation laws of the [Tetrahedron Model](#) - in either case, the natural laws which underlie the manifest Universe (rational mode). In the intuitive mode, we find religious/mythological notions of Divine Law, or Plato's philosophic notions of the Eternal Verities and Ideal Forms which lie beyond, but are responsible for, the manifest Universe; we also find occult notions of cosmic order expressed in various "world systems" (the I Ching, Astrology, etc.). Some Eastern religious categories of these higher metaphysical levels are delineated in my late father's books: "[Trance, Art, and Creativity](#)" and "[Operations of Higher Order](#)".

Viewing the "Information Ladder" table as an evolutionary sequence of information states, we see that each higher level necessarily encompasses all the information contained in the levels below. In this

regard it is important to distinguish the planetary level information state of "Gaia" (level 8) from that of a lifeless planet, as the "Gaia" state would apply only to planets which support a biological information realm. Whereas the complex "Gaian" state is the last level of the biotic realm, the simple abiotic or gravitational planetary state is the first cell of level 9 (Stars) in the Astrophysical Realm.

Humans seem to have "a foot on the rung" at every level of the ladder, if only by means of theory or observation. We are at level 7 or 8, considered as separate individuals or as a globally distributed, "terraforming" species, just 2/3 up the 12 rungs of the physical ladder. Yet we have extended our influence, investigations, observations, and theories both upward and downward to the extreme limits of the "Information Ladder". The ladder clearly suggests that we will continue the upward physical climb, probably into level 10 (Galaxy) and possibly on into the Universe of level 11.

The "Information Ladder" reminds me of two things: 1) the Biblical story of "Jacob's ladder", extending from Earth into the Heavenly realms (Genesis 28:12); 2) Chardin's "Omega Point", a universal final state of self-knowledge and unity. In Chardin's view, information, not entropy, is the chief evolutionary vector of the Universe; entropy is just the way the accumulation of information is paid for. (See: "[Chardin: Prophet of the Information Age](#)"). In the "[Tetrahedron Model](#)", information is seen as an intentional, purposeful by-product of symmetry conservation, providing the means whereby the Cosmos achieves self-awareness and further explores and evolves its creative energy and potentiality.

### **Causality and Information**

Causality and Information share the 4th apex (matter, mass, bound energy) in the [Tetrahedron Model](#) of the conservation principles and natural laws underlying the unified field theory. Information is the concept that most comprehensively and succinctly characterizes the significance of matter; without matter, the information content of the Universe is zero. Information requires an asymmetry to exist; perfect symmetries cancel each other and so carry no net information - the prototypical example is the particle-antiparticle pair which self-annihilates (see: "[The Origin of Matter and Information](#)").

Due to genetics, genes, the conservation of heritable units of molecular information (DNA) from one generation to the next, and the neg-entropic mechanism of Natural Selection, biological systems have become a conservation domain of information, a molecular analog of the abiotic conservation domain of information and matter's "causal matrix", historical spacetime. Human abstract information systems simply continue and extend this natural biological accumulation of information - through memory, language, writing, books, libraries, computers, educational institutions, social systems, etc.

Life, humanity, and history are all conservation domains of information. Spacetime itself is the ultimate storehouse and repository of historical information. The ancients referred to this aspect of spacetime as the "Akashic Record", and thought some of the adept had occasional access to it (oracles, seers, soothsayers). Science has likewise taught us that we are looking into history as we look outward into space and backward into time. (See: "[A Spacetime Map of the Universe](#)").

When we stand back a little and look at the reach of humanity into every part, from bottom to top of the "Information ladder", it is difficult to comprehend the view of some scientists that humanity is not a special creature. I subscribe to the view of Teilhard de Chardin that consciousness and intelligence and information are the principle evolutionary axes of the Universe, and that on planet Earth, at least,

humanity is the point of this "evolutionary arrow", the apex or tip of the evolving vector.

A human individual contains an enormous amount of information in the trillions of cells, DNA, biochemical systems, and interconnections of the nervous system. In terms of physical size, we are puny and insignificant; but in terms of information content, we are astronomical in magnitude, both as individuals and as a species. It is on the information scale that the significance of humans must be measured and compared to the other major players of the Cosmos - planets, stars, galaxies, etc.

It seems that abiotic information conservation may be limited to the historical component of spacetime. In terms of "hardware", information begins with charge. Information is most reliably stored as charge at the atomic level, but when charges annihilate, the information they carried is gone, except for the historical component, which is more durable, although evidently subject to the entropy of "dilution" as its effects spread and divaricate, propagating throughout spacetime. At a certain high level of dilution, these effects will become subject to the operation of chaos and quantum uncertainty, further eroding their information content. Hence even though the effects of an action may remain forever in the Cosmos, it may after a time become impossible even in principle to trace an effect back to a single, definite original cause (in the absence of an "artificial" conservation intervention requiring external energy inputs, such as human record-keeping).

There seems to be no limit to the complexity or amount of information systems can attain, if enough energy is available. The primordial function of information (in the form of charge) is to lead matter back to its original symmetric energy state (light), upon a "straight and narrow path" of natural law via charge conservation. Hence we see the natural tendency of all material systems to convert bound energy to free energy, following the information pathway of the charges they contain (stars, supernovas, quasars, the quantum radiance of black holes, proton and particle decay, exothermic chemical reactions, the nucleosynthetic pathway, fission, fusion, matter-antimatter annihilations, etc.). Perhaps this is an explanation, in terms of physics, for the self-destructive behavior of humanity, which seems poised to end its evolutionary history in a flash of nuclear fusion and fission, imitating the stars.

## Gravity

Although gravitation is an abiotic force, it is nevertheless responsible, directly or indirectly, for every level of the fractal hierarchy, including the first: gravity provides negative energy for the "Big Bang", and helps create bound electromagnetic energy from light. Gravity creates the elements in stars, creates planets to support life and the stars which supply life's energy (including radioactive energy), and organizes the various levels of the Astrophysical Realm. Newton's Gravitation stands to the Fractal Hierarchy of Nature as Darwin's Natural Selection stands to the Theory of Evolution - gravity is the neg-entropic engine which produces all the material realms. The fact that both these neg-entropic drives, and the 4x3 fractal algorithm, intersect in the replicating molecule of DNA, has enormous implications for the abundance of life in the Universe, amounting to a theory of, and a prediction for, exobiology. Gravitation, chemistry, and the operation of the 4x3 fractal algorithm are universal abiotic forces which inevitably produce 4x3 molecular structures including DNA whenever environmental conditions allow. *The information system of life is therefore not accidental, but a natural and predictable outcome of the operation of physical law, because of the universal presence and activity of the 4x3 fractal algorithm.* (See: "[Newton, Darwin, and the Origin and Abundance of](#)

## [Life in the Cosmos.](#)")

The tendency of biological and material systems to create large and interconnected information structures (such as the biological web or matrix of Earth, and the dispersal of life into the galaxy) is apparently due to matter's never-ending quest for antimatter, as driven by charge and symmetry conservation, the long-range electromagnetic and gravitational forces, and matter's attempt to recreate in material systems the original connectivity, unity, and symmetry characteristic of light. *The charges of matter are the symmetry debts of light* ("[Noether's Theorem](#)"): *charges are matter's memory it once was light*. The unity and connectivity of light are evidently also ultimately conserved correlates of light's state of perfect symmetry. (See: "[Symmetry Principles of the Unified Field Theory](#)"). The emergence of "beauty" in material and biological systems is an imperfect expression of symmetry conservation manifesting as best it can in an intractable medium.

The problem posed to the Cosmos by the asymmetric creation of matter is this: does asymmetric matter contain enough information, in the absence of antimatter, to return to its symmetric origin as light? Matter is only 1/2 of light's particle form, and so contains only one-half of the original information contained in particle-antiparticle pairs. The answer to this question is a provisional "yes": provided another dimension, time, is added to space to allow the working through of the difficult return path. During this return journey, [the information pathway](#) develops as a consequence of matter's eternal search for antimatter, and appears to be an attempt to recreate in material form the original attributes and potentials of light, including its unity, connectivity, symmetry, and creativity (light creates space and helps create matter). The material realm is a parallel construction, an alternative form, a conserved proxy, an analog in matter composed of charge and information derived from the symmetric energy of the Universe of light: Heaven reproduced on Earth, [Chardin's "Omega Point"](#). The material universe is a laboratory in which the creative potential of symmetric energy (light) is explored and realized. through atomic charge and information, in material and specific form. It is perhaps of special interest to note that it is the symmetry component of the light universe which is conserved as charge and information. (See also: "[Comment on the Metaphysical Realm \(rational mode\)](#)".)

Our species' special position comes about through our discovery of Natural Law and the scientific method. Natural Law is the same everywhere in the Universe; hence a knowledge of the information content of Natural Law is a necessary prerequisite for a universal traveler, a galactic explorer and colonizer, a true Citizen of the Cosmos. The human "niche" has evolved from its beginnings in local Earth biology to a universal expression: the extraction of energy via the social apprehension and application of Natural Law. Our biological role is to be the seed of Gaia, dispersing earth-life into the galaxy via our space program and rocket ships. Nor is it likely that Earth is the only planet in the Milky Way entering its dispersal phase. We need to stop fighting among ourselves, protect our fragile mother-planet, and move on to the new frontier that beckons us from above and is the evolutionary purpose, promise, and destiny of our species.

### **Language and Information**

Terence McKenna (*True Hallucinations* (1993) and *The Archaic Revival* (1991) MJF Books) has said he believes the universe is made from language - which is true enough of the biological realm, since DNA is certainly a form of molecular/chemical language, by any definition. The question remains,

therefore, is the abiotic realm similarly created by language, and if so: 1) is there an analog of DNA for the creation of the abiotic (particle/atomic) realm? 2) Is there a linkage between the language systems of the biotic and abiotic cosmos? I think the answer to both questions is yes: for the first question, the analog of DNA for the particle/atomic realm is the spacetime metric or "vacuum", which serves as a template for the production of elementary particles both during the "Big Bang" and currently (via virtual particle-antiparticle pair creation). (See: ["The Higgs Boson and the Weak Force IVBs"](#).) For the second question, the linkage is obviously through the carbon atom and its five levels of 4x3 fractal resonance, which also has its beginning in the 4-D metric of spacetime. (See: ["The Fractal Organization of Nature"](#).)

Matter is an asymmetric, conserved form of light (one-half of a matter-antimatter particle pair). (See: ["A Short Course in the Unified Field Theory"](#).) The language spoken in the conversion of light into matter is the language of conservation, which has three major modes, spoken simultaneously like the notes of a musical chord. These three conservation modes are 1) raw energy conservation (mass - momentum); 2) symmetry conservation (charge - inertia); 3) entropy conservation (spacetime - gravity). Light's primal form is simply pure energy, symmetry, and entropy - free electromagnetic radiation - manifesting as undifferentiated energetic photons which create a hot, expanding and cooling metric space due to their intrinsic (entropic) motion and symmetric (non-local) energy state. This is not (at first) a language but a primordial roar of raw power. The conversion of this primal thunder into atomic matter (via the symmetric template of spacetime and the asymmetric mediation of the weak force) produces a conserved set of elementary particles (quarks and leptons, identical and invariant within type) which combine with one another to form an alphabet of 92 letters, the natural elements of the periodic table. These letters then combine into the words of molecular chemistry and eventually create the poetic language of life, with carbon and DNA as the connecting linkage between the biotic and abiotic realms. The 4x3 universal fractal algorithm regulates the formation and development of every level of natural organization, from its inception in the spacetime metric and the 4 conservation laws of energy, symmetry, entropy, and causality-information, to the majestic galaxies and the evolution of life. (See: ["The Tetrahedron Model"](#).)

The periodic table is an abstraction, not a physical analog of DNA; so is the nucleosynthetic pathway, which we might also name. The physical object that creates the elements is of course a star, so apparently it is the stars (and the actions of the nuclear strong and weak forces) which are the abiotic physical analogs of biological DNA. In this analogy, galaxies play the role of multicellular organisms. Antecedent to the creation of the elements (and the galaxies/stars) is the "Big Bang" itself, in which elementary particles, including the first baryons (protons and neutrons) are created via the mediation of the weak force and the asymmetric decay of electrically neutral leptoquarks (see: ["The Higgs Boson and the Weak Force IVBs"](#); and: ["The Origin of Matter and Information"](#).) In this abiotic part of the analogy, identical nucleons in different combinations create 92 distinctly different letters (the elements); these letters are then strung together in meaningful molecular words by DNA - "genes" coding for amino acids and proteins.

Hence the conservation "word" which begins as light (pure electromagnetic energy), passes through (at least) three major stages: 1) the "Big Bang", where light is transformed to baryons via the template of spacetime and the asymmetric action of the weak force (see: ["The Higgs Cascade"](#)); 2) stars (in galaxies), where baryons (hydrogen gas) are converted to the 92 natural elements via the actions of all the forces, but especially the strong and weak forces (the nucleosynthetic pathway, including

supernova explosions necessary to create and disperse elements heavier than iron); 3) the creation of DNA (on planets orbiting stars in galaxies) via the organic chemistry of carbon. The 4x3 universal fractal algorithm is active at all levels (see: "[Nature's Fractal Pathway](#)".)

*The charges of matter are the symmetry debts of light* ("Noether's Theorem"), and it is the charges (electric, color, identity, flavor, spin) that give the atomic letters and molecular words their distinctive character and form. "In the beginning was the word", and the word was a conserved form of light - an atomic word which eventually became the flesh of Man, filling his mind with wonder. In this context I also recall the story of Aslan, the magical lion of C. S. Lewis' imagination, singing the world of Narnia into existence. This, I submit, is the physical interpretation of Terence Mckenna's inspired assertion that the Cosmos is constructed of language.

(Added July 2014)

Matter - Energy - Life ([Teilhard de Chardin](#))

Bound electromagnetic energy (atomic matter) - free electromagnetic energy (light) - Information ("[Tetrahedron Model](#)")

---

"Information" is the connecting idea between *life* and *spirit* - between science (biology) and religion (metaphysics). Princeton physicist John Archibald Wheeler famously characterized the ontological role of information: "it from bit".

"Spirit in nature" is the "information" content of nature, as found in the great repository of the 92 elements of the Periodic Table, and elaborated by the living, reproducing molecules of RNA/DNA in biological organisms. While the ultimate source of information is the Multiverse (the scientific stand-in for "God"), in our cosmos information begins with the asymmetric creation of matter via [weak force symmetry-breaking](#) during the "Big Bang". Antimatter is annihilated, while a residue of matter composed mostly of hydrogen and helium atoms is left to form our stars and galaxies. Information creation continues in stars and supernovas through the creation of all 92 natural elements (following a 4x3 fractal pattern - as embodied in the "alpha particle" (helium nucleus), the "brick" or building block of the [nucleosynthetic pathway](#)).

We revere the sun and stars not only for their heat and light, but because they are creators (factories) of information. Information is stored in atoms primarily as charge and spin in two linked systems: 1) as orbital parameters of the electron shells (low energy information useful to life); 2) the configurations of its nuclear constituents (protons and neutrons - high energy information useful to stars). Even the geometry and shape of large molecules may contain biologically significant information (as in the proteins). The concept of "Information" allows us to produce a General Systems bridge between a religious/spiritual vs a scientific/material view of the Cosmos.

[Teilhard de Chardin](#) was the great expositor of this view, although he did not use the concept of "Information" (he used "spirit" instead), as "information" was only just coming into general use as a recognized physical parameter during his lifetime.

What connects life and information? Life begins and evolves from information contained in specific molecular forms (combinations) - RNA/DNA - that "know how" to reproduce and maintain themselves, and successfully compete with other living forms (even those of its own kind), retaining this information for its own use and passing it on to its offspring. While these complex chemical

systems begin as purely "mechanical" forms of information replication, storage, and processing, competition and evolution (even at the molecular level of organized chemical systems) soon favor "individuals" (specific molecular combinations) with an aggressive "personal" agenda for survival and reproduction - resulting in "self-interest", "identity", and "personality" - even in very early living systems. (Later, social organisms will find they must adhere to a more altruistic behavior.) (See: "[The Fractal Organization of Nature](#)".)

A 4x3 fractal algorithm is involved in the evolution of information, from helium to carbon to DNA to the genetic coding for the amino acids of proteins, seamlessly connecting the atomic and biologic realms. Finally, we note that the astonishing Biblical assertion that Man is created "in the image and likeness" of God, is best understood as a statement of the fractal organization of the Cosmos from top to bottom. (See: "[Nature's Fractal Pathway](#)"; See: "[Newton, Darwin, and the Abundance of Life in the Cosmos](#)".)

The universe explores, knows, and enlarges itself through the "[Information Pathway](#)" of life and humanity. Our role is to help the universe understand and appreciate itself, and develop its creative powers, productions, and expressions of beauty.

---

(Added July 2014)

Matter - Energy - Life ([Teilhard de Chardin](#))

Bound electromagnetic energy (atomic matter) - free electromagnetic energy (light) - Information ("[Tetrahedron Model](#)")

"Information" is the connecting idea between *life* and *spirit* - between science (biology) and religion (metaphysics). Princeton physicist John Archibald Wheeler famously characterized the ontological role of information: "it from bit".

"Spirit in nature" is the "information" content of nature, as found in the great repository of the 92 elements of the Periodic Table, and elaborated by the living, reproducing molecules of RNA/DNA in biological organisms. While the ultimate source of information is the Multiverse (the scientific stand-in for "God"), in our cosmos information begins with the asymmetric creation of matter via [weak force symmetry-breaking](#) during the "Big Bang". Antimatter is annihilated, while a residue of matter composed mostly of hydrogen and helium atoms is left to form our stars and galaxies. Information creation continues in stars and supernovas through the creation of all 92 natural elements (following a 4x3 fractal pattern - as embodied in the "alpha particle" (helium nucleus), the "brick" or building block of the [nucleosynthetic pathway](#)).

We revere the sun and stars not only for their heat and light, but because they are creators (factories) of information. Information is stored in atoms primarily as charge and spin in two linked systems: 1) as orbital parameters of the electron shells (low energy information useful to life); 2) the configurations of its nuclear constituents (protons and neutrons - high energy information useful to stars). Even the geometry and shape of large molecules may contain biologically significant information (as in the proteins). The concept of "Information" allows us to produce a General Systems bridge between a religious/spiritual vs a scientific/material view of the Cosmos.

[Teilhard de Chardin](#) was the great expositor of this view, although he did not use the concept of "Information" (he used "spirit" instead), as "information" was only just coming into general use as a

recognized physical parameter during his lifetime.

What connects life and information? Life begins and evolves from information contained in specific molecular forms (combinations) - RNA/DNA - that "know how" to reproduce and maintain themselves, and successfully compete with other living forms (even those of its own kind), retaining this information for its own use and passing it on to its offspring. While these complex chemical systems begin as purely "mechanical" forms of information replication, storage, and processing, competition and evolution (even at the molecular level of organized chemical systems) soon favor "individuals" (specific molecular combinations) with an aggressive "personal" agenda for survival and reproduction - resulting in "self-interest", "identity", and "personality" - even in very early living systems. (Later, social organisms will find they must adhere to a more altruistic behavior.) (See: "[The Fractal Organization of Nature](#)".)

A 4x3 fractal algorithm is involved in the evolution of information, from helium to carbon to DNA to the genetic coding for the amino acids of proteins, seamlessly connecting the atomic and biologic realms. Finally, we note that the astonishing Biblical assertion that Man is created "in the image and likeness" of God, is best understood as a statement of the fractal organization of the Cosmos from top to bottom. (See: "[Nature's Fractal Pathway](#)"; See: "[Newton, Darwin, and the Abundance of Life in the Cosmos](#)".)

The universe explores, knows, and enlarges itself through the "[Information Pathway](#)" of life and humanity. Our role is to help the universe understand and appreciate itself, and develop its creative powers, productions, and expressions of beauty.

Chardin - "Inner" vs "Outer" realm of atoms = information/spirit vs force or energy field. What Chardin referred to as the "inner" essence of the atomic world we would refer to as the "information" content of atoms. It is this information content that eventually produces the emergent property "Life". In religious terms, we might identify information with the "Holy Spirit" and the information content of humanity as the "Divine Essence" of humanity ("God incarnate").

Chardin saw man as the natural culmination of evolution. Man is necessary to understand, explain, and control evolution - as well as to see and review its whole history in the fossil record. Man's control of evolution is the fractal iteration that demonstrates the end of one fractal cycle and the beginning of another in the physical world - natural selection giving way to artificial selection of various sorts - not only plant and animal breeding but genetic manipulation via gene splicing, etc. From physical genetics/genes to the abstract theory of genetics and human control of genetic evolution.

The most amazing emergent phenomenon is human consciousness and creativity. But all life is an emergent phenomenon. What is an emergent phenomenon? Look in the mirror. You are "star stuff", you are composed of trillions of cells, myriad species of bacteria, multiple organ and sensory systems of great sophistication (although you lack one-half of a complete reproductive system), you encompass incredibly complex biochemical pathways and mechanisms, and yet (if you are a normal, healthy individual) you have a single integrated body, identity, personality, agenda, and action.

Emergent phenomenon are exclusively a characteristic of the information domain. Man is successful to the extent that he recognizes and utilizes the information content of Nature ("Science").

Beethoven (and other geniuses) are emergent phenomena of the human species and human social organization (human level of natural organization). Human intellectual abstract mental activity and creativity is an emergent phenomenon of the human brain - language, art, science, religion, etc. Mind is an emergent phenomenon of brain.

The atom, composed of a linked system of electron shells and nuclear particles, presents a most remarkable example of hierarchical information domains, the nucleus containing information useful to stars and the process of element-building, the electron shells containing information useful to biology and the process of species-building. Thus are the planetary and celestial domains united from the beginning by the information architecture of their constituent particles: the Microphysical, Biophysical, and Astrophysical realms of physical reality. Human consciousness adds an emergent 4th: the Metaphysical. (See: "[The Fractal Organization of Nature](#)".)

---

(added Feb., 2015)

The "[Information Pathway](#)" of the Cosmos eventually leads to life, humanity, language, abstract modes of consciousness, communication, and knowledge, imagination, thought, fantasy, mythology, religious ideology, the arts, science, mathematics, and technology. The Information Pathway is the means whereby the Universe knows and experiences itself, enlarges and fulfills itself, evolving a human co-creator who is capable of developing new forms of beauty and exploring new modes and avenues of creativity - even, perhaps, of providing companionship - or at least an interesting evolutionary drama. While biology is firmly embedded within the electromagnetic force, if we were to designate a 5th force of Nature it would have to be the Life Force - born of information and propelled by evolution - the life force is the Universe awakening to itself and exploring a new mode of existence and creative expression.

The [Information Pathway](#) begins with light (electromagnetic radiation) which exists in two forms: a waveform consisting of mutually induced electric and magnetic waves, and a particle form consisting of matter-antimatter pairs of many kinds of elementary particles, such as leptons and quarks, neutrinos and mesons, baryons and hyperons, leptoquarks, and various connecting particles (field vectors) such as gluons, photons, gravitons, and Intermediate Vector Bosons. This "zoo" of elementary particle-antiparticle pairs (which may include the "Higgs boson" and other particles as yet undiscovered), and their associated field vectors and "co-workers", exists in the "void" or "vacuum" of spacetime as an alternative form of light waiting only for enough energy to make itself manifest. Particle-antiparticle pairs continuously form and annihilate each other (alternating between their waveform (light) and "virtual particle" form) within the Heisenberg/Dirac time/energy limit of the "Uncertainty Principle". This is the great primordial, symmetric reservoir of information that exists with light from the beginning of the Cosmos, manifest through the "Big Bang". During the "Big Bang" or "Creation Event" the symmetry of the primordial particle-antiparticle pairs is broken by asymmetric interactions within the weak force - probably via [asymmetric decays of electrically neutral leptoquarks](#). The Universe is not born "stupid", but full of information, waiting for symmetry-breaking by the weak force to set it free on a [cosmological evolutionary pathway](#). The "Big Bang" is an explosion of information as well as of [space, time, matter, and light](#). Our Universe is apparently a life-friendly [electromagnetic subsection of the "Multiverse"](#).

The Information Pathway is seen explicitly in the Periodic Table of the Elements, in the nuclear and electron shells of atoms, the inorganic chemistry of the mineral world, and finally in organic chemistry and the molecular architecture of DNA and the genetic code of biology. It is elaborated through evolutionary time as the plants and animals of living systems on planets such as our own beautiful Earth, and makes a triumphant emergence from matter in abstract form through the symbolism of human language and the mental capacity of the human brain. Its proliferation in abstract form is essentially without limit (human creativity).

The Information Pathway is not a "random walk", but follows a [4x3 \(sometimes 4x4\) General Systems](#) resonance, pattern, or algorithm that begins with the elementary particles of the "vacuum" (three families each of 4 elementary particles), passes through the alpha particle (four nucleons each of three quarks), thence to the carbon nucleus and electron shell (3 alphas each of four nucleons, four valence electrons in the third shell), and ends with DNA and the genetic code of biology (four nucleotides code in triplets, producing amino acids). It can even be seen in the [foundation principles of Natural Law](#). The emergence of life from inanimate matter is therefore programmed into the Universe from the beginning, and we expect to find it abundantly wherever environmental conditions permit. (See: "[The Fractal Organization of Nature](#)"; see also: "[The Information Pathway](#)".)

## References

- Claude E. Shannon and Warren Weaver: *The Mathematical Theory of Communication*. Univ. of Illinois Press, 1949.
- Davies, P. and N. H. Gregersen: *Information and the Nature of Reality*. 2010. Cambridge Univ. Press.
- Terence McKenna (*True Hallucinations* (1993) and *The Archaic Revival* (1991) MJF Books)
- James Gleick *Chaos: Making a New Science*, Viking Penguin Inc., 1987.
- James Gleick *The Information* Pantheon books, 2011.
- Peter Denning and Tim Bell: "The Information Paradox" *American Scientist* Vol. 100 No. 6 Nov.-Dec. 2012 page 470-477.

Books by my late father Prof. John Curtis Gowan

["Trance, Art, Creativity" An Investigation of the Numinous Element and the Metaphysical Realm. A Book by Prof. John C. Gowan, Sr.](#)

["Operations of Increasing Order" Further Investigations of the Numinous Element and the Metaphysical Realm. A Book by Prof. John C. Gowan, Sr.](#)

["Development of the Psychedelic Individual". A Book by Prof. John C. Gowan, Sr.](#)

["Development of the Creative Individual". A Book by Prof. John C. Gowan, Sr.](#)

## Links:

### The Fractal Organization of Nature

[Section III: Introduction to Fractals](#)

[The Fractal Organization of Nature](#) (table)

[Part 1: Microphysical Realm](#)

[Part 2: Biophysical Realm](#)

[Part 3: Astrophysical Realm](#)

[Part 4: Metaphysical Realm - Intuitive Mode](#)

[Part 5: Metaphysical Realm - Rational Mode](#)

[Part6: The Fractal Organization of Nature \(summary\) \(text\)](#)

[Newton and Darwin: The Evolution and Abundance of Life in the Cosmos](#)

[Commentary on the Metaphysical Realm \(rational mode\)](#)

[The Human Connection](#)

[A Short Course in the Unified Field Theory](#)

["The Tetrahedron Model"](#)

["The Higgs Boson and the Weak Force IVBs"](#)

[The Symmetry Groups of Light](#)

### **Information**

[The Information Pathway \(text\)](#)

[Chardin: Prophet of the Information Age](#)

[The Formation of Matter and the Origin of Information](#)

[Causality vs Information](#)

[Nature's Fractal Pathway Spiritual and Scientific Principles of the Tetrahedron Cosmic](#)

[Energy Model](#)

[Postscript: Causality, Information, Karma](#)

[Section XIV: Causality](#)

[home page](#)