EVOLUTION—FORM AND CONSCIOUSNESS[1]

An Exploration of the Jewish and Scientific Perspectives on Creation

BY SARAH YEHUDIT (SUSAN) SCHNEIDER

[1] Published by: B'or Hatorah: Science, the Arts, and Problems of Modern Life in the Light of the Torah. #4, Summer 1984 (Shamir: Jerusalem, Israel). p. 15-38.

It is a popular misconception that Torah and science present two competing and mutually exclusive accounts of the Creation story. However, if Jews of opposite outlooks would overcome their prejudices against such terms as G-d and natural selection and would carefully delineate the content and context of each scenario, they would see that the two sources provide compatible—even complementary—descriptions of the origin and unfolding of life.

PARAMETERS

The first step in resolving this dispute is to diagnose the points of conflict and to clarify the limits of each account. From a Torah perspective, using the language of classical metaphysics two macrocosmic tendencies appear to be operating in the universe.

CONTENT:

Torah is primarily concerned with consciousness, soul, mortality. (While the history it contains is accurate, this is not its central purpose.)

Scientific theories of the origin of the species are solely concerned with the historical development of form on this planet.

CONTEXT:

Torah begins with the absolute unity of the infinite *Ain Sof* and describes the subsequent process of Creation and the unfolding of the diversity. It goes forward in time, from "above" to "below".

Scientific theory on the origin and propagation of life takes our present experience of diversity and extrapolates a hypothetical origin and process. It goes backward in time, from "below" to "above".

FIRST CAUSE:

Torah is premised entirely on the assumption of One G-d as Architect and Creator of the universe.

Science is a-religious. Proposing no theory of first cause, it neither affirms nor refutes the concept of Deity.

AUTHOR:

The Torah Creation narrative begins in the super-conscious, supra-rational omniscience of G-d (called HaShem in Hebrew).

Evolutionary theory originates in the experience and rational mind of man.[2]

2

TERMINOLOGY

There is contention as well regarding the definition of "evolution" itself and the particular range of phenomena described by that term. From a Torah perspective, using the language of classical metaphysics this paper sees two macrocosmic tendencies operating in the universe.[3]

INVOLUTION:

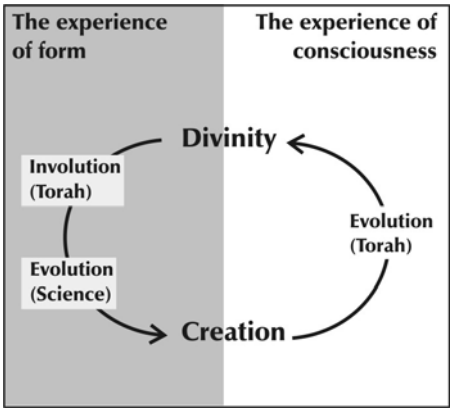
The Creation process whereby multiplicity emerges from the essential and indivisible unity of G-d, called *yesh m'ayin* (meaning literally "something from nothing" or *Creatio ex nihilo*).[4] It is the means by which the apparent substance of the universe arises from the primeval incorporeality of G-d.

EVOLUTION:

The process of returning to the Source, called *t'shuva* (meaning "return"). This is the effort whereby man—and through man, all creatures— are reunified with *HaShem*. *T'shuva* is accomplished by cleaving to G-d, fixing one's thoughts firmly in His unity and performing the 613 *mitzvot*—the Commandments, laws and statutes outlined in the Torah.

Thus, according to the definitions used here, G-d initiates involution; man initiates evolution. "For creation, heaven was prior, for perfecting earth was prior."[5]

FORM AND CONSCOUSNESS



The above outline uncovers a hidden problem: "Evolution" in a scientific framework is called "involution" from the Torah perspective. The development of greater complexity on the physical plane (biological *e*volution) represents at the same time, increasing multiplicity (or metaphysical *in*volution). Conversely, the process which this paper calls evolution has no counterpart in scientific theory, which limits itself to a narrow range of physically detectable phenomena.

This discrepancy in definition is resolved by postulating that two "points of view" are represented here: the perspective of *form* and the perspective of *consciousness*. (Form here means substance and the arrangement of substance. Consciousness here means simply the

---

[3] Isaac Luria, *Talmud Esser Sfirot*, trans. Levi Krakovsky with commentary by Yehuda Ashlag (Jerusalem: Yeshivat Koll Yehuda, n.d.).

[4] It is actually more acurate to say *ayin m'yesh*, nothing from something. For if the only True Reality is the Divine Essence, the undifferentiated, infinite life of *Ain Sof*, then this must also be the only True "Something", for it alone is infinite and eternal. Man's relative "reality" is but an ephemeral, finite image of that which is Absolute. It, then, is "nothing." Thus G-d actually created the nothing (*ayin*) of relative reality from the *yesh*, Something, of His infinite Self. (From a lecture by Rabbi Lopez Cardozo, Jerusalem).

[5] Meir Leibush Malbim, *Beginning and Upheaval,* trans. Zvi Faier (Jerusalem: Hillel Press, 1978), Genesis 2:4.

way an organism relates and interacts with its environment.) According to this premise, the following relationships emerge: form *in*volves; consciousness *e*volves. The "objective" sequence of events constituting the Creation of the universe (both initially and continually) is expressed through the medium of *form* as increasing diversity and apparent separation from G-d. The same sequence of events is simultaneously expressed through the medium of *consciousness*, as movement toward G-d, toward a perfect and complete imitation of Him. Each increasing level in the hierarchy of Creation, "by incorporating in a more perfected form those things that had appeared earlier",[6] encompasses in breadth and depth an ever widening range of the possibilities that exist in G-d's absolute consciousness. It is similar to what happens when you change the lens of a camera from 16 mm to a wide angle. A larger area of the scene thereby comes into focus. Thus each ascending level of life brings a wider range of the infinite Consciousness into focus and perspective through the "lens" of its particular form.

Thus *biological* evolution is the evolution of *form. Metaphysical* evolution is the evolution of *consciousness*. These two processes are interpenetrating and interdependent. Just as an elastic when stretched grows *both* longer *and* thinner, so does the created universe always manifest a corresponding change in form for any change in consciousness and, conversely, a corresponding change in consciousness for any change in form. There is a direct and inevitable correspondence between the two; each necessitates and induces the other.

BEFORE THE BEGINNING—TORAH AND SCIENTIFIC CONCEPTS OF TIME AND SPACE

The Torah begins with *bet* (the second letter of the Hebrew alphabet) while the Ten Commandments begin with *aleph* (the first letter). "We learn from this that prior to the initial *act* of Creation, *bereishith*, there was *anochi*, the 1 AM aspect of G-d: the singular, indivisible and transcendent SELF "negating entirely the possibility of any derivative form of existence."[7] At this level, which is called *Yachid* (singularity), there is only the unitary and eternally present vision of the end purpose of Creation. This is the original, quintessential "thought" which inspired and induced the first creative act. Jews affirm this Creation paradigm each week when they sing "*L'cha Dodi*," the traditional song for welcoming the Sabbath "Queen"; this song contains a verse that says how "The final act arose in thought primordially."[8]

Yachid, translated literally means "single" or "singular." This is precisely the word chosen by most modern physicists to describe, at an infinitely lower physical level, the "point" of origin of the universe.

> By extrapolating backward from the present day expanding universe to the time before galaxies formed, cosmologists have traced the origin of the universe to a *singularity*, a state

[6] Malbim, *Genesis* 1:25.
[7] Rabbi Yitzchak Ginsburgh, unpublished lectures on the "Fifty Gates of Understanding."
[8] Ginsburgh's trabslation of the song composed by Rabbi Solomon Halevi Alkabetz in 16th century Safed.

of apparently infinite density. The singularity represents the origin of space and time... Before that time the laws of physics known today do not apply.[9]

This both confirms the Torah paradigm and explicitly acknowledges the current limitations of theoretical physics. Science hypothesizes the existence of a singularity but cannot describe its internal character. Torah also teaches the inscrutability of *this* level of G-d and insists on describing it through statements of what it is not.[10] Were we to ascribe any positive attributes to this aspect of *HaShem*, we would be limiting that which is essentially and necessarily without definition.

IN THE BEGINNING

"In the beginning G-d created the heavens and the earth." [11]This first act of Creation evoked the process of "bringing into reality that which had existed "only" as a thought in the mind of G-d. Creation is nothing but a materialization of this primordial thought and the means by which He imparts to His thought an external, concrete existence.[12] There is general agreement among Torah commentators that, in this first instant, "G-d created the entire universe from absolute nothing, simultaneously."[13] This includes time and space as well as the "seeds" of potential for all subsequent existence.

We experience time as a linear sequence of events flowing perpetually from an indeterminate future, through an ever vanishing present, into a history that is past, but this is only a relative reality—a view from "below".

The Judaic conception of time and space is of "an all-embracing field of existence that constitutes the definitive framework wherein life evolves."[14] Time is stationary, absolute, cyclical—having been created *yesh m'ayin (Creatio ex nihilo)* at the very onset of Creation.[15] The Jew travels a spiral path through the weekly, monthly and yearly cycles of Shabbat and festivals. This is Absolute Reality, the perspective of the omniscient consciousness of G-d. From this viewpoint, there is only an Eternal Present—that which was, is and will always be." Creation is simply the illumination of that which already exists primordially in the Divine Unconscious. The entire

---

[9] John Barrow and Joseph Silk, "The Structure of the Early Universe", SCIENTIFIC AMERICAN, Apr.1980,p.98.

[10] The principle that it is impossible to ascribe positive attributes to this ineffable dimension of G-d is presented by the Rambam. However, Chassidut hold a somewhat different position, declaring that the sole of man can have a positive experience of even the most transcendent levels of *HaShem*. This apparent disagreement can be resolved by validating the exalted experience of the soul, but recognizing the impossibility of expressing that experience verbally without limiting that which is, by definition, without limit (*Ain Sof*).

[11] *Genesis 1:1*.

[12] Samson Raphael Hirsch,on commentary *Genesis* 1:1.

[13]Book of the *Zohar* on *Exodus*, 20 A.

[14]Ginsburgh.

[15]Malbim propounds the idea that anything created *yesh m'ayin* in its completeness and actuality is immortal and unchanging; whereas that which was created in potential, *yesh m'ayin*, but appears in actuality *yesh m'yesh* exhibits growth, development, evolution, etc.

unfolding of Creation is nothing more than the progressive illumination of a singular and perfect Divine Image."[16]

This matrix of space and time— the Eternal Present— is not a vague, amorphic, infinitely malleable ether; rather it has a definite configuration that is rigorously determined by law (Torah). As *Chazal (the Talmud Sages) say: "HaShem looked into the Torah and created the world."*[17]

Physicists cannot really speculate about "what happened at the precise moment of Creation because unfamiliar physical principles unique to the immense densities and temperatures of that moment mask the initial structure of the universe."[18]

There is, however, general agreement about the subsequent formulation of the cosmos and the original and fundamental qualities introduced in those earliest moments after Creation. In the language of geometrodynamics (a theoretical explication of Einsteinian Relativity): the space-time manifold is the single, irreducible substance/principle from which all matter, all forces, all characteristics and components of the universe derive.[19] "It includes the entire history as well as spatial extent of the universe."[20]

> The Newtonian view of space and time is a *dynamic* picture where events *develop* with the passage of time. Time is one dimensional and *moves* (forward). The past, present and future happen in that order. The special theory of relativity, however, says that it is preferable, and more useful to think in terms of a static, non-moving picture of space and time. This is the space-time continuum. In this static picture... events do not develop, they just are. If we could view reality in a four-dimensional way, we could see that everything that now seems to unfold before us with the passing of time already exists *in toto*, painted, as it were, on the fabric of space-time. We could see all the past, the present and the future with one glance.[21]

Thus, mainstream theoretical physics paints a picture of the early universe and a conception of space and time that is essentially identical to the model of Divine Reality in the Torah.

COSMIC BLUEPRINT

This Eternal Vision, the Torah, the essential geometry of the space-time continuum, introduces the axiomatic and *a priori* relationships that become engraved upon space-time substrate. This is the Divine Will— or the unified irreducible "field" of geometrodynamics— which defines and

---

[16] Ginsburgh.
[17] *Bereishith Raba 1:1.*
[18] Barrow and Silk.
[19] John Graves, *The Conceptual Foundations of Contemporary Relativity Theory* (Cambridge: MIT Press, 1971), pp. 312-313. "Geometrodynamics is a wholly new kind of physical theory based on what might be called `physical monism'. As opposed to dualism it asserts that there is only one kind of substance in the world, rather than two (or more) with radically different kinds of essences, like mind and matter or atoms and kind of force, action or influence, rather than a multitude competing with each other in some uneasy balance. And as opposed to atomism, it asserts that there is only one individual substance with absolute or intrinsic characteristics of its own".
[20] Graves, p.314.
[21] Gary Zukav, *The Dancing Wu Li Masters: An Overview of the New Physics* (Fontana Collins, 1982), p.171-172.

directs, mold and sculpts the subsequent unfolding of Creation. It is primordial in both the religious and scientific paradigms. As such, it exerts an irrevocable and definitive influence on the configurational and existential possibilities of the universe. It is the limiting factor for any thing or any state (emotional, intellectual, spiritual) that will ever appear.

Thus, the general scheme of Creation—the possibility/probability patterns of both cosmological and ontological evolution—is built into the structure of the universe itself. This is similar to the way the architectural blueprints determine the final form of a house well before the first brick is laid. Although the final product is specified in the overall possibilities for integrating each type of building material into the structure or it is predetermined (*i.e.* the oak boards will either become part of the dining room floor or the kitchen cabinets, while the pine will be used for the bedroom closets), there is still an element of change (or randomness) regarding the particular "fate" of each brick—how it, specifically will fit into the final structure—on what row of masonry, in which wall, by which worker, on what day...[22]

Considering this description of the cosmological drama, it is possible to identify another correspondence between science and Torah.[23] Free will in Judaism parallels what Quantum Mechanics calls the inherent randomness of individual subatomic events, while determinism within a Torah framework is analogous to the overall probability patterns that can be predicted with 100% accuracy, though the outcome of individual events remains necessarily inscrutable.[24]

---

[22] [22]Rav Eliayhu Dessler discusses this idea in the fourth volume of *Michtav M'Eliyau*, where he presents a theory of *hashgacha pratit* (Divine Providence). In this model, the final outcome of a verdict from Heaven might hinge upon the unstipulated result of an individual's free will. This would seem to contradict the position of the Ba'al Shem Tov, who holds that nothing happens outside that which is explicitly determined by *hashgacha pratit*.

[23] This is not to say that Torah must look to Theoretical Physics for a validation of its understanding of free will and determinism, nor is it to reduce the idea of free will to the level of mechanical, physical principle. Rather it is to aknowledge a very elegant metaphor that exists between the world of atoms and the world of man. (From Cardozo).

[24] This is a complicated and exciting topic that would require a paper in itself to discuss. But in brief, the notion that the unpredictibility of individual subatomic events is simply a function of our limited ability to perceive or identify the underlying determinant is called the principle of local causes or Einstein-Podolsky-Rosen determinism. Implicit in this theory are certain assumptions which are distinctly incompatible with the Quantum Theory of Uncertainty. An ingenious mathematical proof called the Bell Theorem proposed a way of experimentally testing and discriminating between the two theories based on their mutually exclusive predictions of certain probability patterns. This experiment was performed, and the results confirmed Quantum Mechanics and refuted determinism. The implication is that probability and unpredictibility are built into matter and into the universe. For further reading, see:

Albert Einstein, Boris Podolsky and Nathan Rosen, "Can Quantum Mechanical Description of Physical Reality be Considered Complete?"
PHYSICAL REVIEW vol.47, 1935,p.777 ff.

Erwin Schrodinger, "Discussions of Probability Relations Between Separated Systems", PROCEEDINGS OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY,vol. 35, 1935, pp. 555-562.

Stuart Freedman and John Clausner, "Experimental Test of Local Hidden Variable Theories", PHYSICAL REVIEW LETTERS, vol. 28, 1972,p.938 ff.

Henry Stapp, "The Copenhagen Interpretation and the Nature of Space-Time", AMERICAN JOURNAL OF PHYSICS, vol. 40, 1972,p. 1098.

Bernard d'Espagnat, "The Quantum Theory and Relativity", SCIENTIFIC AMERICAN, Nov. 1979,p.128.

ADAPTATION...BUT TO WHAT?

From a Torah perspective, this unfolding of physical and spiritual reality is not arbitrary or haphazard. It is seen instead as a divinely choreographed process whereby Creation comes into greater conformity with, and more perfect expression of the underlying pattern of Divine Will.

From a scientific point of view, the phenomenon of cosmological and planetary evolution could be described as an unwinding of a thermodynamic[25] torsion that was built into the primordial universe. (Exactly how and why this particular pattern of geometry arose is beyond the scope of contemporary science.)

The Darwinian Theory of Evolution presents an explanation of the process whereby organisms change through time, so that descendants become progressively more suited to their environment or learn to adapt to a changing environment. The mechanisms of change postulated in this theory are a combination of mutation, natural selection and the survival of the fittest.

One reason the religious community objects to this theory is that it seems to deny any possibility of Divine contribution by reducing the entire odyssey of Creation to a blind, mechanical process. Many Darwinian theorists even make the brazenly materialistic claim that life forms change solely in response to desultory physical pressures and random environmental influences.

ENVIRONMENT = DIVINE WILL

After carefully examining this controversy, a rhetorical question remains:

What is this "environment" is not the original Will/Pattern/Geometry as it is projected into the relative realms of name and form, time and space? It is a living symbol, expressing in minute and perfect detail the vision that underlies and directs Creation.

So, when a species adapts to its environment, it is actually adapting to the Divine Will/Primordial Geometry that is manifest as that environment.

At this point, the mathematical arguments against Darwinian theory (based on the unwieldy time factor necessary for a purely random process of genetic mutation and recombination to yield the existing variety of life forms) can be eliminated. We are no longer working with a "random system," but rather with one profoundly constrained by the underlying patterns of the universe.

> A purely mathematical treatment of patterns of gene expression demonstrated the capacity of a large system to settle into distinct patterns. A gene system with 10,000 genes has 10 to the 30th possible combinations. Given certain simple assumptions about rules of regulatory interactions, the system spontaneously confines itself to 100 different patterns of activity. These represent the approximately 100 cell types in a complex organism. These are powerful, deep, underlying constraints that do not need natural selection... [Yet] Scientists were frustrated by their limited understanding of how an organism develops. *Something* determines symmetry in development, instructs cells where to move, how often to divide,

[25] For a definition and explanation of thermodynamics (sufficient for the needs of this paper) see section below, "Thermodynamics."

what characteristics to express and when to die, but the details have not yet been spelled out...[26]

Thus, the empirical evidence of mainstream science contradicts any theory of evolution based entirely on *random* mutation. Rather, an "unidentified factor" seems to determine the "rules of regulatory interactions" that confine an evolutionary system to a relatively limited number of developmental options. Torah would describe this "unidentified factor" as Divine Will, while physics could explain it as the space-time matrix.

POWER SOURCE

Any comprehensive theory of evolution and creation must address the question of power source: *What "foots the bill" in the energy-demanding process whereby Creation evolves from the simple to the complex?* From a Torah perspective, the answer is elementary: It is the Life Force, *Chaya*, the Primal Will-to-Good of the Divine Mind that eternally creates and sustains the universe. This is the immanent, providential aspect of G-d (as distinct from His transcendent, encompassing, super-rational Self). It is "the creative power in action through which *HaShem* becomes manifested in the world embodied as the Life force within Creation."[27]

THERMODYNAMICS

Within the framework of science, this question becomes more complicated. A thorough response requires the following (albeit lengthy) explanation of the thermodynamics.

Thermodynamics is the science of the activity and the interrelationships of energy and matter. It attributes the role of "driving force" to energy disparities within the universe and the "compulsion" of nature to eliminate them.

The character and direction of change in any physical system can be predicted from two fundamental laws:

1) *The Law of the Conservation of Energy and Matter* which states that although energy and matter are interchangeable, their sum total remains constant. In other words, they can neither be created nor destroyed.

2) *Entropy (the Second Law)* which states that all systems tend invariably toward increasing randomness, chaos and equilibrium. Water flows down hill, ice melts, gasses disperse, things decay, dishes pile up, mountains erode. Entropy is the unit which scientists use to describe and measure the degree of randomness in a system.

---

[26] Julie Miller, "Evolution: Return of the Embryo", SCIENCE NEWS, vol. 120, July 4, 1981,pp.12-14.
[27] R. Yosef Schneerson, *On the Teaching of Chassidus,* trans. Zalman Posner (New York:Kehot Publication Society),p. 12.

There are no exceptions to these laws. They are axiomatic, inviolate principles. The distinguished physicist and astronomer Arthur Eddington ascribes to thermodynamics the "supreme position among the laws of nature".[28] Thus, the universe is relentlessly and perpetually driven toward increasing equilibrium. *All activity in the cosmos - from the movement of electrons around a nucleus to the orbit of planets around a sun, from the complex metabolism of a human being to the locomotion of a paramecium - expresses this same thermodynamic force. It is physical correlate of the metaphysical notion of Life Force.*

The question arises: Isn't there a contradiction between evolution and thermodynamics? The former describes a process of increasing complexity and differentiation, while the latter predicts increasing chaos and homogeneity. It seems like thermodynamics would be working against evolution. Yet, this paper contends that the thermodynamic imperative is in fact the power source behind evolutionary development.

In actual fact, there is no conflict. The two theories are reconciled in the following way: The sun is the primary supplier of physical energy to the earth. Through the medium of photosynthesis and the food chain it provides the energy currency necessary for the continuation of life on all levels. The residual energy stored in the chemical bonds of living systems after death becomes the fossil fuels which power our modern industrialized world. It drives the hydrologic cycle of precipitation and of evaporation which is the indirect source of hydroelectric power. In fact, except *perhaps* for earthquakes and tidal activity, all energy-related processes on earth rely directly or indirectly on the sun.

Two characteristics of solar energy endow it with a high degree of negative entropy,[29] a thermodynamically unfavored state of affairs. First is the highly concentrated form in which the sun's energy arrives on earth. At the time that it enters our atmosphere, solar energy is confined to a relatively narrow range of possible wavelengths in the middle region of the electromagnetic spectrum, while entropy and the Second Law of Thermodynamics favor undifferentiated light at lower energy levels. The second source of negative entropy is the huge discrepancy between the energy level of sunlight and the energy level of the earth. Entropy favors an equilibration of this disparity which is accomplished through an erosion of the highly ordered energy configuration characterizing sunlight and/or a corresponding elevation of the vibratory level and organizational complexity of the biosphere (the earth and its life forms).

Living systems function as "catalytic agents" bringing about this balance in two ways:

1) Through photosynthesis, a by-product of which is the transformation of light into heat.

2) Through *the biological cycles of life and death*, whereby otherwise inaccessible and seemingly stable configurations of matter are made subject to this thermodynamic imperative.

---

[28] *The Feynman Lectures on Physics*, vol. 1 (California Institute of Technology: Addison Wesley Publishing Co., 1963).
[29] [29]Negative entropy measures the degree off orderliness, inequality and non-random arrangement within a thermodynamic system. It is greated the farther a system is from absolute homogeneity and equilibrium. Entropy and negative entrop[y are inversely proportional.

1) The *photosynthetic* process transforms light energy into the bonding energy required for manufacturing organic molecules, *i.e.* carbohydrates ($C_6H_{12}O_6$). We describe this chemical reaction as:

$$6CO_2 + 6CH_2O + \text{light} \longrightarrow C_6H_{12}O_6 + 6O_2 \qquad 1)$$

Animals consume carbohydrates either directly (as in the case of herbivores) or indirectly (as in the case of carnivores). They metabolize these molecules either completely (in which case all available energy is extracted) or incompletely (whereby only a partial extraction of energy occurs) and the remainder of the molecule is converted into a structural or enzymatically useful form. The reaction that occurs upon complete metabolism of plant derived food is:

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{energy (90\% heat)} \quad 2)$$

Equations (1) and (2) would simply cancel each other out (nothing lost, nothing gained) were it not for the discrepancy in energy units. Sunlight goes in; heat comes out.

This, then, is the answer to our question above: Because of the fact that sunlight is in a state of negative entropy, while heat is the energy configuration expressing the greatest degree of entropy, the food chain actually facilitates the thermodynamic flow of the planet.

2) The more sophisticated an organism is, the greater is the rate and magnitude of the thermodynamic transformation catalyzed both by its life and by its death.

> Each localized reduction in entropy (*i.e.* the evolution of complexity in the hierarchy of living beings is accompanied by an even greater increase in *total* entropy. Man represents the culmination of this relationship, for society itself creates order out of disorder, thus producing large scale but local entropy reductions. The ceaseless urge of man to bring order out of his experiences so he may understand them gives rise to science, which is another example of entropy reduction (*i.e.* negative entropy). Even though society can effect local reductions in entropy, the general and universal trend of entropy increase easily swamps these anomalous but important efforts of civilized man.[30]

This is because the human equation must include the food, wood, fossil fuels, atomic vision, and other energy-demanding/entropy-increasing process that underwrite and overrule the localized increases in order and systematization. Baking a cake provides a helpful analogy. A recipe describing specific ingredients in measured proportions is the blueprint for bringing a highly

[30] Stanley W. Angrist and Loren G. Hepler, *Order and Chaos: Laws of Energy and Entropy* (New York: Basic Books,1967).

ordered product into the world. The end result is a nicely shaped, neatly iced, hopefully tasty creation. And yet, if we step back and look at the larger scene, we see dirty dishes, flour all over the counter, containers pulled from their ordered places on the shelves, chocolate covering children's faces and clothing, not to mention all the fuel consumed by the baking process. It becomes obvious that the "orderliness" of the cake is accomplished at the expanse of a much greater increase in the *total disorder* of the household - not that it wasn't worth the pleasure that it brought.

The outcome of this cascade of thermodynamic transformations has far-reaching metaphysical implications. According to theoretical physics, the entropy level of the macrocosm can be calculated as the ratio of photons (the massless particles of electromagnetic radiation) to nucleons (the heavy protons and neutrons comprising the nucleus of atoms). Entropy measures randomness and this is equivalent to evaluating all the possible configurations of a system. Entropy is highest where there is minimal constraint or definition. For example, a liquid shows high entropy because its atoms can arrange themselves in a great variety of ways, while a crystal shows lower entropy because its structure is rigidly and inflexibly defined. "The ratio of the density of photons [light] to the density of nucleons [matter] is a measure of entropy because photons constitute the most disordered states of thermal energy and nucleons constitute the most ordered state. Hence the relative abundance of these two extremes is a measure of the average entropy."[31]

Since, "according to the Second Law of Thermodynamics, the total entropy of the universe increases continuously as time goes on,"[32] it follows, logically and inevitably, that there is a slow and continuous transformation of matter (nucleons) into light (photons). Thus, the undeniable "fate" of the universe is to become light-like. While this is a fanciful and somewhat unorthodox interpretation of physical facts, it is nonetheless entirely and rigorously consistent with the current assumptions of theoretical and experimental physics and cosmology.[33]

A functional equivalency is hereby established between the Judaic notion of Life Force and the scientific concept of thermodynamics. Both demonstrate a singular, omnipresent, intrinsic, unidirectional force that drives Creation forward, through time, to G-d, or into light.

There is no separate vital energy peculiar to animate matter and thereby lacking in the mineral kingdom. Nor does a separate force specifically vitalize plants while another vivifies animals. Rather, the one Life Force, manifest a stone through the molecular organization of the mineral kingdom, expresses another dimension of itself through the "form" or molecular organization of plants and so forth. Although life *forms* exhibit diversity, the Life *Force* is singular and simple.

---

[31] Barrow and Silk, p. 100.

[32] Barrow and Silk, p. 101.

[33] This scenario describing a gradual transformation of matter into light anticipates the refutation of the Theory of the Conservation of Baryons, a fact that is similarly predicted by most contemporary cosmologies. There are several currently running experiments attempting to isolate and document an incident of proton decay. Two difficulties with these projects are th disagreements among scientists as to th predicted half-life of these nuclear particles a well as the hypothetical decay products of sue an event. See: Rick Gore. The Once and Future Universe' NATIONAL GEOGRAPHIC vol. 163, no. 6, Jun 1983, pp. 704-749. Dietrict Thompson. "The New Inflationar Universe'. SCIENCE NEWS, vol. 123, Feb. 1J 1983, pp. 108-109.

> G-d is one, and Divine Wisdom is that emanating aspect of G-d which penetrates into and unifies all phenomena and realms... G-d's influence is manifest in every realm in a form that accords with a particular structure of the realm.[34]

Electricity provides a helpful analogy of a single type of energy with a manifold expression. The same electricity manifests light through a light bulb, music through a radio, heat through a stove and "intelligence" through a computer. As above, so below. Form is diverse, force is singular.

When the Life Force dwells within a particular creature or thing, it is called a soul: just as water confined to an indentation in the earth is called a lake or political power delegated to an administrative system is called a government.[35]

An essential duality exists in all creations: the dimension of substance/form and the dimension of soul.

> Even in completely inanimate matter such as stones or earth or water, there is a soul and a spiritual life - that is the enclothing of the "letters of speech" of the Ten Utterances which give life and existence to inanimate matter that it might arise out of the naught and nothingness which preceded the six days of creation.[36]

The degree and depth to which a creation expresses this Life Force varies from realm to realm, from kingdom to kingdom, from individual to individual giving rise to different existential levels of "soul".

THE PARADOX OF MAN

The *Genesis* chapter of Torah presents an evolutionary-like sequence of Creation whereby “each day introduces a qualitatively higher level of life form.”[37]

“The only thing that Torah discloses about the mechanism [of this progressive development] is that it involved a partnership between G-d and the earth (*i.e.* nature).”[38]

“Both earth and the Creator collaborated to produce man. The earth brought his body, just as it did the bodies of all other creatures, and G-d infused him with the intellectual soul.”[39]

---

[34] Malbim, *Genesis* 1:26.
[35] The Divine Soul of man, the *Shoresh Elokit,* is a actual portion of G-d and not an emanation (Him (as with other levels of soul). In this regard, is not altogether accurate to equate Life Force with Soul Force, for the highest level of Divine Soul exists "before" the bifurcation of immanence and transcendence. (From R. Yitzchak Ginsburgh).
[36] *Shaar Hayichud,* chap. 1 "quotes Rabbi Isaac Luria in *EtzChaim, Shaar Man U'Mad,* sec. 3.
[37] Malbim, *Genesis* 1:25 B.
[38] Malbim, trans. Zvi Faier, p. 125, footnote 252.
[39] Malbim, Genesis 1:26.

The implication is that whatever the "earth" did to formulate the bodies of other creatures, so it did in the formation of man. Yet we must not forget that "the earth's capacity is restricted to yielding the anatomical structures... while it is within His [*HaShem*'s] power alone to imbue creatures with the breath of life."[40]

BACK TO THE PARAMETERS

We return to an initial premise of this paper where we differentiated between the "content" of Torah and that of scientific evolutionary theory. The latter is confined to an explanation of the physical aspects of man and Creation. It claims only to be a history of the progressive development of substance and form. It makes no speculation about soul or spirit, for such things are outside its range of applicability.

Torah, on the other hand, is concerned primarily with the highest soul level of man, the *neshama*. It addresses the implications of introducing that dimension of reality into Creation—morality, free choice, aspiration, intellect, love and fear of G-d, knowledge of G-d's Will, *mitzvot*—all that is specifically relevant to human beings because of their exclusive possession of a Divine level of soul.

Thus, the evolution of form addresses the "earth" side of "partnership" (the aspect of ourselves that represents the sum total of all physical creations preceding us), while the evolution of consciousness expresses *HaShem*'s side of the "bargain" (the part of ourselves that is "in the image of G-d.") Again, it must be emphasized that the earth, too, is a creation of *HaShem*. Its "side of the bargain" is simply an *indirect* expression of G-d through the medium of nature and natural law. On the other side, when we discuss soul and spirit, we refer to the *direct* relationship of G-d with man. These two viewpoints are intimately related, "for all those souls are pure emanations from on high, how they become revealed in this world depends upon the kinds of vessels within which they are compelled to act."[41] Thus the earth was charged with evolving a form of vessel of a sufficiently sensitive, complex an refined nature as to be capable of holding and expressing the highest and most profound level of the human soul, the *neshama* or the intellectual dimension of man.

BACK TO THE MONKEY?

Biologists have woven a theory presenting a probable/possible means by which the evolution of physical form was accomplished on this planet. It synthesizes evidence from a variety of scientific disciplines and presents a convincing explanation based on observable facts:

1) The genetic and molecular similarity of various species of one to another;

2) The possibility of ranking all the species on a ladder ascending from simple and primitive to complex and developed;

---

[40] Malbim, Genesis 1:25.
[41] Malbim, Genesis 2:7 ("And man became a living Being").

3) The developmental states representing lower organisms through which the human embryo passes;

4) Fossil records.[42]

Neo-Darwinian Evolution outlines a logically and experimentally consistent (if incomplete) theory of the development of life on this planet through a mutation and natural selection. In this paradigm form assumes greater complexity and sophistication with time, and each new creature emerges from a lower and more primitive species.[43] Thus, evolutionists conclude that there is compelling physical evidence that Homo sapiens evolved from the gene pool including monkeys and apes.

Although it has become a "reflex" for the traditional Torah community to label such a statement *treif* (not kosher), there is nothing in the Torah that necessarily contradicts it. In fact there is even a branch of commentary that could be invoked to support such a theory.

Malbim claims, "Most sages agree that when G-d said, `Let's make man in our image,' He was addressing the works of Creation which had already been established."[44] He further stipulates that in the progression of Creation "the more advanced creatures incorporated in a perfect form all things that had appeared earlier."[45] Following his line of thought, we can conclude that the highest and most sophisticated life form, *i.e.* primates, was a kind of microcosm and therefore the logical template from which the human *guf* (body) could arise and manifest, in totality nature's part of the *tzelem* (image).

But Torah doesn't say "your" image. It says "our" image. Man is not just the apex of a physical process of evolution, possessing a body of greater sophistication and refinement than any of his primate ancestors. Of infinitely greater significance than the physical dimension of his being, man is blessed with a *neshama*, a unique level of soul that partakes of the very essence of HaShem. Earlier creatures could neither contain nor express this level of Life Force. "Each succeeding level [of creation] had to become increasingly more refined and more complex in order to be receptive to ever higher levels of the soul."[46]

The real question is not "whether man's anatomy did or did not develop from simpler anatomies, but to what extent is man primarily defined by his anatomy."[47]

> The true definition of man is not, as the philosophers have defined him, namely *chai medaber*, an animal possessing the power of speech - but *medaber chai*, the primary essence and true nature of man is his intellectual soul. Hence judged in accordance with man's

---

[42] Herman Branover, "Evolution and the Specious", JERUSALEM POST MAGAZINE, May 20, 1983.
[43] The Maharal (16th century) proposed a nearly identical description of evolutionary unfoldment: "...the earth has within it a force of creation whereby each level of life comes froth from that which preceded it."
[44] Malbim, *Genesis* 1:26.
[45] Malbim, *Genesis* 1:25 E.
[46] Malbim, *Genesis* 1:25 F.
[47] Malbim, trans. Faier, p. 125.

> essence, he is not to be classed together with the lower creatures, but with the higher beings... since the physical body is only an incidental aspect of man.[48]

The scientific theory of evolution does not and can not address these issues. A person holding a materialist weltanschauung will force science into that framework while a person holding a spiritual world view cannot help but see the hand of G-d behind the miracle of physical form, whether it arose from an evolutionary process or not.

> The naturalist who denies G-d discloses a trace of the very G-d he denies with every law, with every force, with every purpose he works out of any form or shape he investigates. Yea he denies his denial with the very step which he takes in his searching in the realm of nature. The end he seeks presupposes the thinking G-d whom he denies, Who must have established the Laws, the very discovery of which fills him with such supreme joy.[49]

THE RECONCILIATION

Even if neo-Darwinian evolution is not incompatible with Torah, the question still remains: Why do we as religious Jews need it? Even if it's not *treif*, what can it contribute to our body of religious understanding?

Evolutionary theory provides a macrocosmic parable of the human creative process. A scientist's loyalty to neo-Darwinian evolution is not an attachment to a set of empirical facts or biological evidence, but a deep identification with the creative paradigm outlined in that theory. In the human experience, change and evolution are nearly synonymous. In every realm—cultural, ontological, technological, physiological, psychological—growth imitates the evolutionary model. Growth is sometimes graduated and sometimes punctuated, but it moves persistently and progressively—stage by stage, with each stage emerging out of the last—toward increasing sophistication and perfection.

Thus, evolutionary theory actually integrates and verifies two important "axioms" of Torah:

1) The "Law of Correspondence."[50]

2) The Creation of man in the image of G-d.

1) The first law postulates that anything true on one level of reality has a correspondence on every other level. If on a global level growth and development consistently occur in the natural world as a process of maturation and transformation, then it follows from the "Law of Correspondence" that this is a likely model for describing on a cosmological level the hierarchical development of life forms on this planet.

---

[48] Malbim. *Psalms* 8:6.
[49] Hirsch. *Genesis 1:1*.
[50] *Zohar*, *Exodus* 20a.

2) The second "axiom" explains that man is created in the image of G-d (*b'tzelen Elokim*). The human being is a microcosm mirroring Divine reality in one-to-one correspondence, albeit on an infinitely smaller scale. The attribute articulated in Torah as the feature distinguishing man from other forms of life and according him the status of b'tzelem Elokim, is his creativity—his ability to refashion the raw materials of his environment into new and original forms. "Let us make man in our image, after our likeness and he shall have dominion over (the entire earth)."[51] The laws of observing Shabbat are based on this principle.

Since man creates in an evolutionary-like manner (wherein the products of his creative expression are continually refined and elevated from the primitive to the sophisticated), and since his attribute of creativity is expressly identified by Torah as a point of overlap with *HaShem*, it becomes possible to assume that when G-d chose to fashion the universe by projecting Himself into the relative realms of name and form, time and space, He did so through a process similar outlined by the scientific theory of evolution. Even if we knew nothing of Darwin, we could derive his theory from *Genesis* and these two laws (as did the Maharal, see footnote 42). Rather than calling for a surrender of Torah principles, Neo-Darwinian evolution affirms and extends the Torah weltanschauung.

Torah, in turn, can explain two of the discomforting loose ends that plague neo-Darwinian theory, notably:

1) The statistical impossibility of "random" mutation yielding the current variety of life forms in such a short period of time. (Time here is that specified by geologists and cosmologists.)[52]

2) The fact that science has not documented even one instance of any new species actually evolving into existence.

The first problem (as discussed in detail in an earlier section of this paper) was eliminated by the idea of a "blueprint" that defined all the probabilities and limitations of the as-yet-uncreated universe. The second problem concerning the lack of speciation is more serious, for science has yet to explain why "There has never been actual observation of one species descending from another (despite numerous experiments on various types of bacteria, Drosophilia and other rapidly reproducing organisms)."[53]

Torah commentators explain this second problem by introducing a very sophisticated and profound idea based on *Genesis* 2:1, "Thus the heaven and the earth and the whole host *were brought* to their desired *completion*."[54]

Samson Raphael Hirsch elaborates:

---

[51] Genesis 1:26.

[52] This paper has not addressed the question of time — whether a day in the Genesis narrative is necessarily identical to a 24-hour day as we know it. The reader is referred to *Challenge: Torah Views on Science and its Problems,* eds. Aryeh Carmell and Cyril Domb (Jerusalem-New York: Feldheim Publishers, 1976), where this issue is discussed from every conceivable angle and resolved many times over.

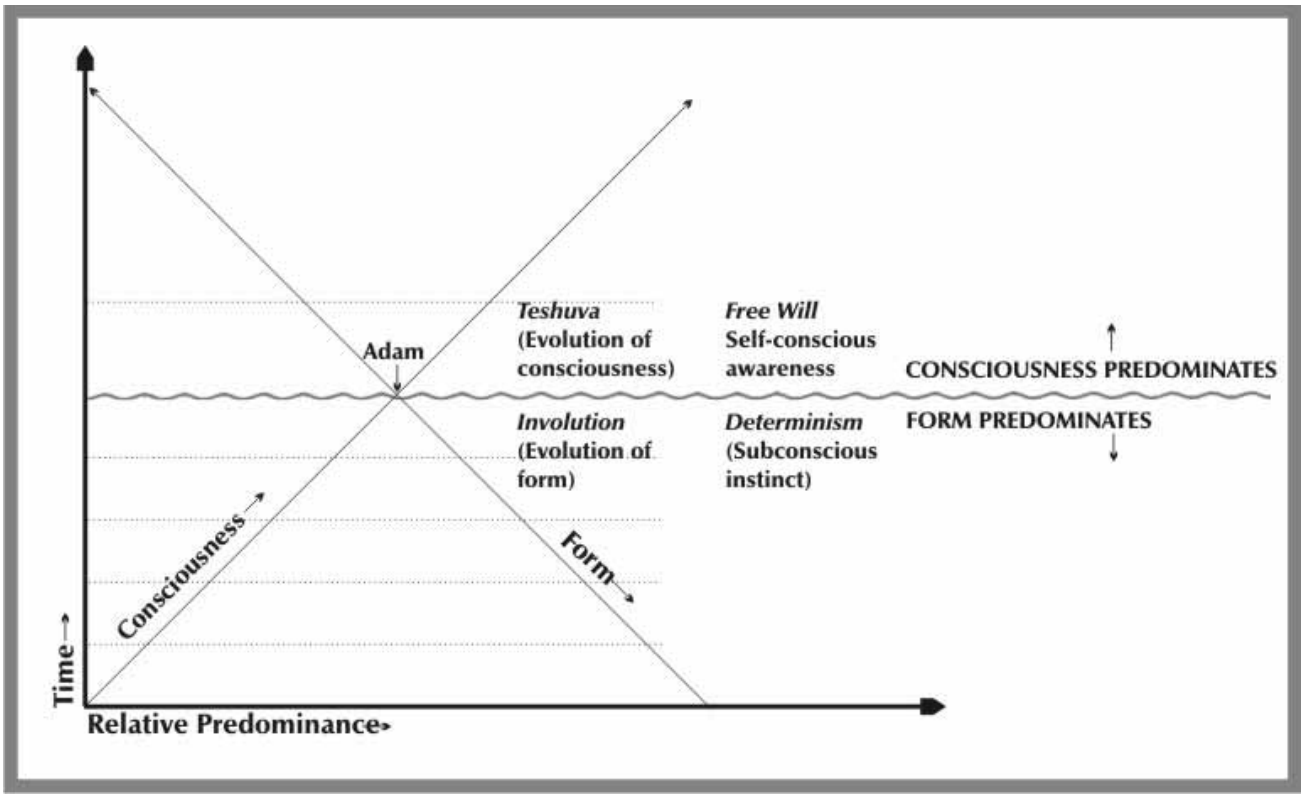
[53] Branover.

[54] ויכולו השמים והארץ וכל צבאם. The key word her is ויכולו (*vay'chulu*) meaning, "they were brought to completion."

> Our sages teach us... that matter and energy, once called into existence, were in a state of continuously progressive evolution until (*vay'chulu*) G-d set a goal and a limit to their development. Had He not called 'enough' to heaven and earth, they would still be today in a state of continuous development. This ending of creation that no new formations emerge established the Sabbath of creation.[55]

Just as the weekly Shabbat is a time for turning attention from acts of creative expression and mastery over the physical plane, so the Sabbath of Creation marks the transition, in the macrocosm, from physical enumeration, to an entirely new and non-physical phase of evolution—the evolution of consciousness.

The process of writing this paper provides a useful metaphor. The first phase involved much physical activity and outward-directed energy—collecting information from science libraries and *yeshivot*, consulting resource people, copying articles, tracking down suggested reading material, following up on bibliographies, cross-referencing Torah commentators. I could have continued indefinitely collecting all the information having some direct or indirect bearing on the topic. Only by saying "enough! ", by determining that I had gathered sufficient material (even though I had not covered every conceivable angle) was it then possible to proceed into the second phase of developing the ideas and the structure of the paper. This part of the project engaged a higher and qualitatively unique level of conscious activity, that of creative and abstract thought. It involved



[55] Hirsh, Genesis 21:1.

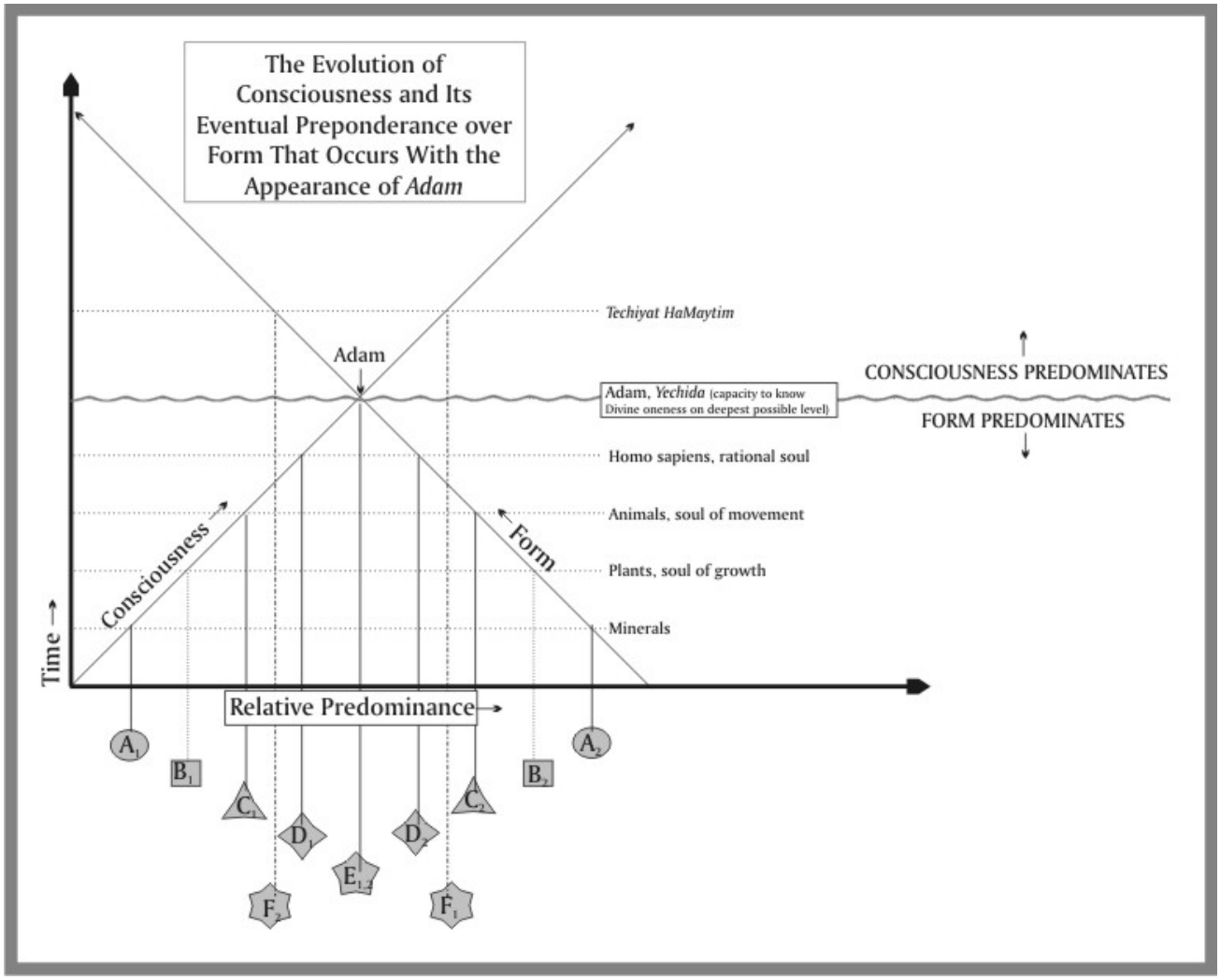
minimal physical effort and, therefore, activity was not manifest on a physical plane. Rather it entailed an intense degree of mental exertion. The project continued toward its original goal, but the progress was now apparent only in the mode of consciousness.

Only after the creation of “man” was such a “phase change” possible in the macrocosmic world. Human beings represent the outer limits of physical diversity (and apparent separation from G-d) as well as the first possibility of re-identifying with the center and unitary source of Creation. Variation in man goes far beyond the physiological variety characteristic of other species. Human individuality expresses itself in clothing, shelter, occupation, personality, and the like. Yet the intellect and conscious awareness of man introduce the possibility of self transcendence as well. This is accomplished by turning away from the seductive “glitter” of external activities and directing one’s intention inward, toward the knowledge and service of G-d, the Supreme Unity.

Thus, evolution continues towards its predetermined end. However, as shown by Figure B., at the pivot point representing the creation of man, it shifts tracks from the physical to the spiritual,[56] from involution to evolution. Here we see graphically the correspondence of form and consciousness discussed earlier in this paper. We see that they are two interpenetrating and interdependent sides of the same reality.[57]

[56] This is a currently respected and accepted theory among cultural evolutionists and biologists such as Stephen Gould of Harvard University and Allen Wilson of the University of California in Berkeley. Says Wilson, "The brain drives evolution... In human evolution, behavior may underlie 99% of the anatomical change... The crucial difference between rapidly evolving mammals and birds and the more conservative reptiles and amphibians is the power of their brains... Nongenetic propagation of new skills in large populations will significantly accelerate anatomical evolution in all vertebrates, even non-humans". From SCIENCE NEWS, vol. 124, no. 7, Aug. 13, 1983, p. 101.

[57] This diagram (Figure C) shows the relative predominance of form and consciousness at key stages in the evolution of life on this planet, starting with the mineral kingdom which appeared earliest on the evolutionary scene and so is lowest



on the time scale. Its horizontal time line intersects the consciousness and form axes at points A1 and A2 respectively. The great distance between these two points, and the position of A1 at the extreme left of the graph, shows that in the mineral kingdom, form prevails over consciousness to a very great degree.

The plant line intersects the consciousness and form axes at points B1and B2 respectively. Since the consciousness of plants is more developed than minerals, the predominance of form over consciousness has decreased somewhat, as indicated by the shortened distance between its two intersecting points.

The animal kingdom's timeline continues this pattern. Its intersecting points, C1 and C2, are closer to each other still, which shows that the predominance of form over consciousness has decreased even more.

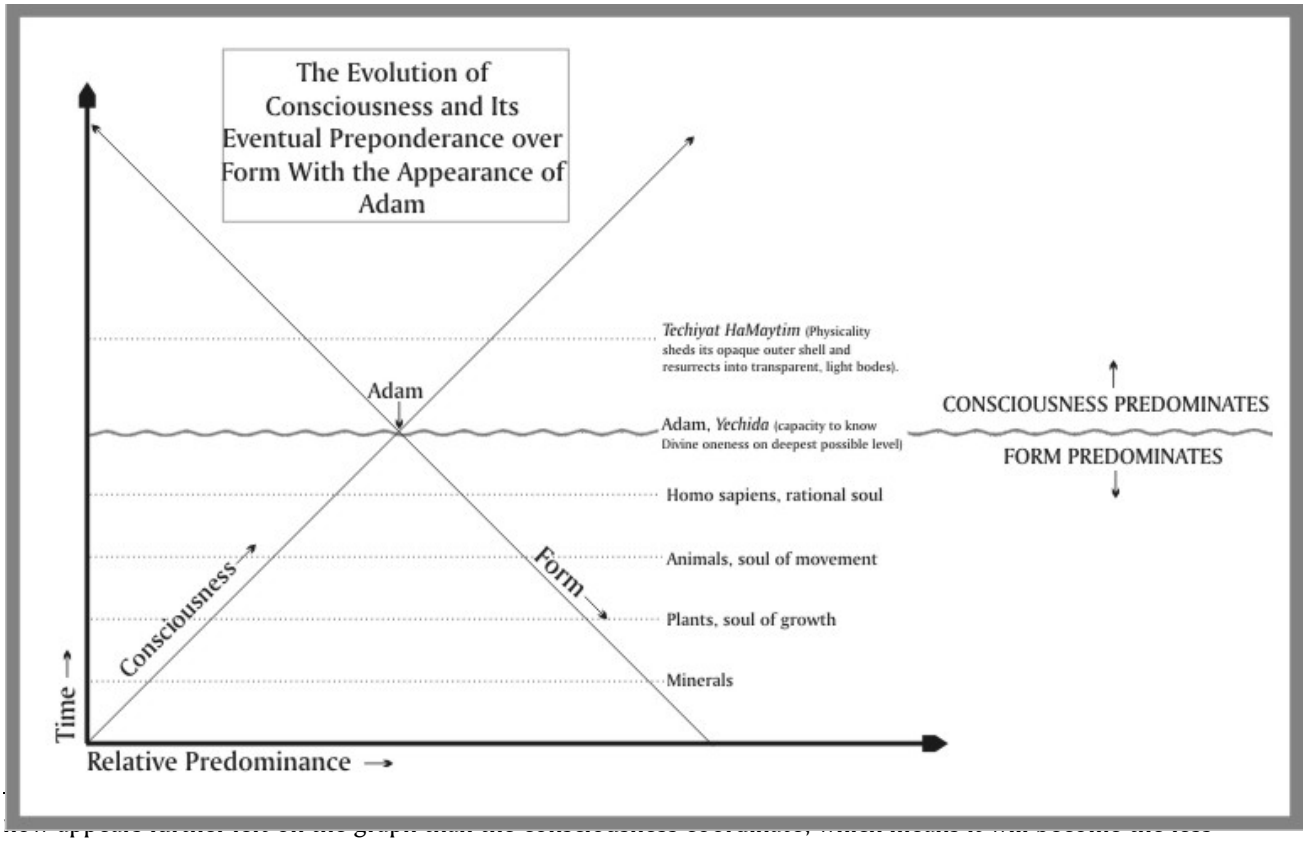
And for homo sapiens (A1 and A2), consciousness has developed to a point where form now only predominates to a minimal extent.

The appearance of Adam (E1,2) marks a profoundly significant moment, where the impact of consciousness upon the external character of reality is as great as the influence of form. Adam has true free choice. He has the strength of consciousness to choose a path that differs from his instinctive reaction to the moment. (This is not always good. Sometime dismissing instincts is the right choice, sometimes it is the wrong one.)

Finally the uppermost horizontal line marks the transition between this world to the world to come. At that point in our evolutionary process form will be overwhelmed by the radiant strength of enlightened consciousness. Relative to the previous stages of evolutionary development, their relationship will invert. The form coordinate (F2)

The form-consciousness correspondence is not static like that of the particle/wave duality of light. Rather, it has a dynamic component that changes with time. The horizontal axis of "Relative Predominance" measures the extent to which each mode of expression (consciousness and form) defines the constraints and topology of external reality. For example, in the primitive universe (*tohu vavohu*)[58] before any life was created whatsoever, consciousness is limited and its expression to what can be manifested through elementary substance: protons and electrons, atoms and molecules. Thus, the character of the early universe is almost entirely defined by the extremely limited versatility of rudimentary matter.[59]

As Creation proceeds, form becomes more complex and thus expressive of greater dimensions of sentience. There is a snowball effect whereby the evolution of complexity in life forms enables a



predominate of the pair. The whole nature of physicality will change. Its opacity will dissolve and reality will enclothe itself in transparent bodies of light, returning to the way it was for Adam and Chava in Gan Eden before their fall.

[58] Genesis 2:2. "And the earth was *tohu v'vohu*, and darkness was upon the turmoil/and the Divine Presence hovered above the waters". *Tohu v'vohu* is variously translated as "formless and void", "waste and void", "confused and tangled", "astonishingly empty."

[59] A metaphor: if Beethoven had been limited to an African drum and wooden flute, the materialization of his symphonic pastoral vision would have been very primitive and qualitatively different from the sophisticated and complex symphony we know as "La Pastoral". The rich and subtle details of his auditory reverie demand, for complete expression, about a 100-piece orchestra. Thus, as civilization becomes more technically sophisticated and musically versatile, there arises the possibility of an increasingly precise and complete communication of Beethoven's musical vision.

more profound revelation of consciousness. This in turn exerts a conditioning and organizing on both "self" and environment, which then becomes a catalyst for further evolutionary change. As time passes, consciousness assumes a greater mastery over the physical world by virtue of its becoming more revealed. The predominance of form decreases proportionally as it becomes more versatile and therefore more resilient and amenable to the influence of consciousness. This change is reflected by an increasing ability to react and interact with the environment. Using this criteria, consider, for example, the difference in the complexity of consciousness between an atom or an amoeba, or between a cactus and a cow.

That is to say, as Creation unfolds in time, and form becomes more complex, correspondingly higher levels of "soul" become integrated and expressed through these existing life forms. It is possible to locate on the graph the point in time when each kingdom (mineral, plant, animal and human) appears and introduces its unique dimension of "soul" into physical reality.[60]

Until the appearance of man, the form-mode prevails, an involution dominates the stage of Creation. This phase, the "evolution of biology," is a mechanical process in that it is an inevitable function of the natural laws established by Elokim (the name of G-d in the first chapter of Genesis). This process unfolds without need of "cooperation" by the life forms themselves. Its striving force is "unconscious," originating below the level of self-awareness, manifesting instead as "instinct."

Physical evolution brings the natural world to a threshold[61] from where *all* subsequent progress requires the initiative and conscious participation of "nature" through the agency of man. The unique character of man's divine soul (*neshama*) brings free will and intellect into the world, thus introducing the possibility (in fact, the obligation) of forging a return path to the Source. Therefore, every individual must take responsibility for completing the evolutionary process. The pace of this phase of Creation depends directly upon the rate at which individuals actually take this initiative. Thus the next stage in evolution of this planet is accomplished through the conscious effort of human beings to find Truth and the willingness to correct their behavior accordingly. For this reason, *t'shuva* is the only *mitzva* actually defined by *kavana* (intention)—by a sincere and profound decision to direct one's life along the path of knowing and performing His Will.

This point appears in Figure B as the intersection of the form and consciousness lines. It is the point where the balance of power inverts. By deciding to be motivated by his higher, aspiring, essential self, rather than by his lower, instinctive, animal self, man is able to nullify form. At the point where man "chooses life,"[62] physicality looses its stranglehold on reality and consciousness prevails. Judaism does not advocate the repression and denial of physical drives, but rather calls for their redirection and elevation by channeling them into spiritually productive outlets.

The re-integration of Creation—the reconciliation of natural and spiritual worlds—becomes possible only with the appearance of humanity. Our uniquely human combination of physical body

---

[60] Rambam attributes this classification of souls to Onkelos.

[61] An interesting observation: the root of the Hebrew word for evolution (התפתחות) is פתח, the root of the word for an opening or entrance way.

[62] Deuteronomy 30:3. "Life and death I put before you. Choose life."

and Divine soul enables us to act as intermediaries bringing the supernal light into a revealed state on the material plane. This is accomplished both by affirming the unity of Creation through the recitation of *Sh'ma Yisrael HaShem Elokeinu, HaShem Echad* and by performing the 613 *mitzvot* of the Torah.