Chaos in Myth and Science

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We are learning that chaos is essential to the survival of life. Our challenge now is to restore goodness to chaos and disorder, to replace Tiamat on her rightful throne, in mythology and in daily life, and to reestablish the partnership of cosmos and chaos, so necessary to creation. This will require a major modification of our mythological foundations, unchanged these past millennia: no mean feat.

Dynamical systems theory, a relatively new branch of mathematics, concerns abstract theories of motion, without reference to mass, force, or any other physical property. It contains not only chaos theory, but an extensive strategy for building models for complex processes as well. One of the most complex processes to which this strategy has been applied is the process of history, including the evolution of human consciousness.

In these new mathematical models, simple forms called attractors are observed as the representations of the stable (or observable) states. There are three types of attractors. Point attractors (also called static attractors) model the stationary states of a system; they represent the system at rest. Periodic attractors consist of a cycle of states, repeated again and again, always in the same amount of time; they represent the system in oscillation. Chaotic attractors consist of fractal (infinitely folded) sets of states, over which the model system moves, apparently at random; they represent the system in a state of agitation or turbulence.

These three mathematical objects were not discovered all at once. First the point attractor emerged, soon after Newton developed the basic mathematics for dynamical systems (the branch of mathematics now known as ordinary differential equations) circa 1700. The periodic attractor came into general use around 1850, spawning a new branch of mathematics, known as nonlinear oscillation theory. And the chaotic attractor, although known in one form (the so-called homoclinic tangle) to Poincaré in 1885, emerged into scientific consciousness only around 1961.[1]

The application of the chaotic attractor model to the various sciences began in 1974. Now known as chaos theory, it provides new methods for understanding data that previously were regarded as noise. Since 1974, a great deal of noise has been discovered to be

"signal." That is, chaos theory has provided tools for analyzing chaotic data and finding order in them. One of these tools, called attractor reconstruction, actually makes a computer graphic drawing of the dynamical model (chaotic attractor) for the data.

When dynamical models change, their attractors (or observable states) may change in type or even disappear. These events, called bifurcations in dynamical systems theory, are used to model important transformations in complex systems and processes, such as cultural history. Thus, the dates 1700, 1850, and 1961 mark bifurcations in the mathematical understanding of dynamical processes. What about the ordinary understanding of these three kinds of dynamical behavior—the static, the periodic, and the chaotic?

According to a folk theory in mathematical vogue, a mathematical object will emerge into the collective consciousness soon after the human mind evolves to the necessary complexity to support the cognition of that object.[2] That is, the brain and mind evolve, consciousness evolves, language evolves, and mathematical objects are "discovered" as soon as people are able to understand them. Extrapolating this evolutionary view to the grand scale of the history of consciousness, we may transcend the level of mathematical model and look for the emergence of the kinematical concepts: static, periodic, and chaotic processes. There results a simple division of recent history into three ages, which correspond to the three kinematical concepts, or paradigmatic types of behavior: the static, the periodic, and the chaotic.

The emergence of the static concept might have preceded the development of language, but for practical purposes let us begin with this important development. No one knows whether language developed with *Homo sapiens* about fifty thousand years ago, or much earlier, or later. Since we know so little about our parent species, we will restrict our attention to the past fifty thousand years. The first bifurcation in consciousness in this hypothetical series, the emergence of the static concept into awareness, might coincide with the development of linguistic structures such as *stand still.* The first material manifestation of this idea might be the development of agriculture, the Neolithic revolution, around 8000 B.C. Thus began the Static Age.

Later came the concept of cyclic repetition. Although there are artistic representations of the phases of the moon dating as far back as 30,000 B.C., the material manifestation (or realization) of the idea is the invention of the wheel, around 4000 B.C. Here began the Periodic Age.

The chaotic process may have emerged into awareness in remote antiquity, when it was represented by symbols such as serpents, sea monsters, clouds, and goddesses, including Innana, Ishtar, and Tiamat. Perhaps because of the repression of the chaotic by the law-and-order gods of the patriarchal society, this concept did not fare well in the history of consciousness. But many concepts emerge in mathematical studies before appearing in the material record as an artifact of human society. For example, the circle concept (in the form of the cycle of phases of the moon) was known to the epi-Paleolithic mathematicians of Cro-Magnon long before its appearance as the material wheel. Similarly, the chaos concept was known as a mathematical object to Poincaré, the great French mathematician, a century ago. Yet its material realization is the computer model first observed by Ueda in November 1961. And here began the Chaotic Age.

As we now know that the solar system is chaotic, and that the motions of the sun strongly influence our global climate (especially the ice ages), we should not expect history to follow periodic cycles either. The dates of the most recent ice ages have been accurately determined, and it seems possible that Neolithic revolutions occurred in previous interglacial periods. There have been various attempts to identify the glaciations with a periodic process, but recently it has been suggested that they occur chaotically. Conceivably, a new Static Age could occur again after the next glaciation (or nuclear winter) recedes. Thus, the dynamical cycle of three ages might be recurring chaotically in the future, giving realization to ancient theories of the ages of the world. As devotees of chaos, we do not expect history to be periodic!

Cosmos means order, or arrangement, and a *cosmogony* is a theory of the origin of the universe (the root *gonos* signifying birth). Most

cultures seem to have a developed cosmogony, and anthropologists see this as an indicator of cultural sophistication. In fact, the development of a cosmogony is a step in creation itself, a kind of cultural self-reference. Our own cosmogony (including the version prevalent among astrophysicists) may be understood as an outgrowth of that of the ancient Babylonians,[3] in whose early myths we find chaos playing a special role. *Chaos* now means disorder, but in ancient myths there are important variant meanings, to which we now turn.

Our literature begins in Mesopotamia, in a milieu of patriarchal dominance, at a time when the mythology of the displaced goddess culture is still in a process of transformation.[4] Some outstanding features of the widespread goddess culture of the early Neolithic are peace, partnership of women and men, and love of the earth. Also, it has been suggested, the partnership of chaos and order survived until the patriarchal domination, around 4000 B.C.[5]

The earliest written material documents the goddess worship of the Semitic people of Mesopotamia. On Ishtar, worshiped since 5000 B.C., we have the following, in the rendering of Merlin Stone:[6]

> Queen of Heaven, Goddess of the Universe,
> the One who walked in terrible chaos
> and brought life by the law of love
> and out of chaos brought us harmony
> and from chaos She has led us by the hand.

In another early cosmogony, known from a Sumerian cuneiform text of circa 2000 B.C., Nammu, the goddess who gives birth to Heaven and Earth, is referred to by an ideogram signifying *sea*.[7] A contemporaneous cosmogony from Eridu, a Babylonian seaside town, is known from a bilingual (Sumerian and Babylonian) cuneiform tablet dating from before 700 B.C. and discovered in 1891. The cast of characters includes Apsu and Tiamat, the male and female aspects of the watery deep. Apsu ("the Deep") is the home of the culture-god, Ea; Tiamat, the watery chaos, is enemy of the gods of light and law, and is pictured as a dragon. The creation story begins with this description:

No holy house, no house of the gods in an holy place had as yet been built,
No reed had grown, no tree planted,
No bricks been made, no brick-mold formed.
No house been built, no city founded,
No city built, no man made to stand upright;
The deep was uncreated, Eridu unbuilt,
The seat of its holy house, the house of the gods, unerected:
All the earth was sea,
While within the sea was a current. . . .[8]

Later (circa 1800 B.C.) is the better known *Enuma Elish,* also known as the *Epic of Creation.*[9] At this time Babylon had become the Big Apple in Mesopotamia, and Bel-Merodach (better known as Marduk, the city-god of Babylon) had replaced Ea as Mr. Big. Bel was a masculine form of Belili, the Sumerian mother goddess. Many gods underwent sex changes during the cultural transformation (bifurcation) from partnership to patriarchal society. *Enuma Elish* is an epic hymn in honor of Marduk and his overthrow of Tiamat and the powers of chaos. The epic begins thus:

When above unnamed was the heaven,
And earth below by a name was uncalled,
Apsu in the beginning being their begetter,
And the flood of Tiamat the mother of them all,
Their waters were embosomed together (in one place),
But no reed had been harvested, no marsh-plant seen;
At that time the gods had not appeared, any one of them.
By no name were they called, no destiny was fixed.
Then were the gods created in the midst of heaven. . . .[10]

Then unrolls the creation scenario. The appearance of the gods of light and order was followed by the revolt of Tiamat. Then the forces of darkness and chaos were overthrown by Marduk (originally a sun-god), who split Tiamat in half like the shell of an oyster, making the sky and the sea. Next came the regulation of the solar system and calendar, the creation of plants and animals, and the making of humanity.

In Cretan mythology, there is a contemporaneous cosmogony in which Gaia brings forth Earth and Eros from Chaos. The Orphic tradition in Greece is said to derive from Crete. In the oldest Orphic myths, the first principles are Earth, Night, and Heaven. The oldest Greek literature includes Homer (*Iliad, Odyssey*) and Hesiod (*Theogony, Works and Days*). In Homer, there is a cosmogony in which Night is the supreme principle, and Oceanus and Tethys are the father and mother of the gods, including Zeus, modeled on Marduk. It is not certain which of these two traditions is older.

In Hesiod's *Theogony,* written around 700 B.C. (verses 116–136), we find yet another cosmogony, in which Chaos (feminine) is supreme. Here are verses 116–122, in the faithful translation of Athanassakis.

> Chaos was born first and after her came Gaia
> the broad-breasted, the firm seat of all
> the immortals who hold the peaks of snowy Olympos,
> and the misty Tartaros in the depths of broad-pathed earth
> and Eros, the fairest of the deathless gods;
> he unstrings the limbs and subdues both mind
> and sensible thought in the breasts of all gods and all men.[11]

Then came Erebos and Night, Ether and Day, Ouranos and the other gods. This is the first occurrence of the word *Chaos* as far as we know, and its most probable meaning is gap—referring to the gap between the sky and earth, or the gaping void. It did not acquire its current meaning, "any condition or place of total disorder or confusion," at least until the Stoics (500 B.C.). In order to prevent the confusion of Hesiod's Chaos with disorder, it is sometimes translated as Void.[12]

In Hesiod, Gaia means the Earth, and Eros is Desire, the immanent creative energy, the soul of all the unions of the creation story. More abstractly, we may think of Gaia and Eros as Matter and Spirit. For Hesiod, there are three primal cosmic forces: Chaos, Gaia, Eros. From Chaos issue Darkness and Light, Night and Day. From Gaia come Mountains, Sea, and Sky. And from them are born, in turn, all the other deities, in four generations. A later Orphic cosmogony (probably sixth century B.C.) begins with Cronus

(Time), from which Ether and Chaos emerge. It is usually said that the adaptation of the word *cosmos* to indicate the order of the universe originated about this time with Pythagoras. However, it is more likely that this usage originated with Heraclitus or Parmenides, circa 500 B.C.[13]

Finally, we may consider the Hebrew cosmogony from Genesis 1. This chapter is said to date from the preexilian period, before 800 B.C., but it is based on older myths, derived from Babylonia. The Dartmouth Bible enters the first two verses as follows:

> In the beginning God created the heaven and the earth. And the earth was without form, and void; and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters.

Here we may recognize several Babylonian influences: (1) "God created the heaven and the earth" recalls Marduk's rearranging of Tiamat; (2) the phrase "without form, and void" (Hebrew *tohu wabohu*) reflects the watery chaos aspect of Apsu and Tiamat; (3) "the waters" (Hebrew *tehom,* which is philologicaly related to *Tiamat*) suggests Mummu, the flood, offspring of Apsu and Tiamat.

Here is a tentative table of equivalences:

Cosmogonical Principles

Babylonian	Hebrew	Greek	English	Connotations
Apsu	Tehom	Oceanus	Deep	father, ocean, god
Tiamat	Tohu	Chaos	Void	mother, ocean, goddess, sea serpent
Mummu	x	x	Flood	son of ocean, mist
Marduk	Yahwey	Zeus	God	law and order, cosmos
x	x	Gaia	Earth	matter
x	x	Eros	Desire	spirit
Anu	x	Ouranos	Sky	heaven
x	x	Tartaros	far west	underworld (Cretan)

In summary, the creation of the universe in our tradition means the subjugation of chaos by cosmos. Ours is a universe of law and order. This tradition dates from Eridu, at least as early as 2000 B.C. Compare the Sanskrit *Rg Veda,* hymn 190 of mandala 10, where there is no contest: "Universal form and harmony were born of cosmic will. . . ." Note that throughout, creation means creation in form, not creation from nothing.[14]

Most cultures have not only mythical creations, but mythical histories as well. The oral traditions of a cultural group seem to coalesce into a consensual reality, or mythical record, filling in the period from creation until the dawn of recorded history. The play of the gods and mythical heros, their family trees and wanderings, are committed to memory by successive generations in the form of epic poems and dramas. In broadest outline, these oral histories are divided into mythical ages of the world.

First, we consider the Babylonian system, probably the source for many narratives of this type. Its cycles and ages were modeled on the astrological zodiac, or path of the sun. The Babylonian zodiacal cycle is divided into twelve signs in four quarters, belonging to Marduk (Jupiter: spring equinox), Ninib (Mars: summer solstice), Nebo (Mercury: fall equinox), and Nergal (Saturn: winter solstice). These represent at once seasons, directions, planets, and gods of the holy trinity (the rulers of the zodiac: Sun, Moon, Venus). The moon (the star of the upper world) and the sun (star of the lower world) are combatants in the Babylonian system. Because of the astronomical phenomenon of the precession of the equinoxes, the zodiacal constellation, or sign, in which Marduk's equinox falls, changes every twenty-two hundred years or so. The period from about 5000 B.C. to 2800 B.C. began in the sign of the Twins, and thus was called the Age of the Twins. Next was the Age of the Bull, then the Age of the Ram. In this progression, virtue decayed from perfection in the first age, the Golden Age, heading for destruction at the end of the 26,400-year cycle of the Great Year (twenty-two hundred years for each of twelve signs). There are many complications due to the frequent calendric reforms made for political reasons by Baby-

lonian rulers.[15] For the early Greeks, this scheme had apparently decayed into the four declining ages: Golden, Silver, Bronze, and Iron.

One of the most evolved (and best known) of the mythical chronologies is the Hindu doctrine. In the form usually encountered, this has cycles called days of Brahma, or *mahayugas,* each lasting 4,320,000 years (12,000 360-year intervals). Each mahayuga is divided into four ages, or *yugas: krta* (activity), *treta* (third), *dvapara* (second), and *kali* (conflict). This system illustrates two features shared by most of the fully developed chronologies: A creation occurs after each catastrophic annihilation, or end of the cycle, and each age represents a decline in virtue. The length of each yuga is proportional to its virtue. Thus, *krta* has forty-eight hundred intervals, *treta* has thirty-six hundred, *dvapara* has twenty-four hundred, and *kali* has twelve hundred. Length and virtue thus decline in the proportions four, three, two, and one. According to this version, we are now in a *kali* yuga of 432,000 years.[16]

In another version, less well known, the twenty-four thousand-year astronomical cycle is divided equally in two parts, each called a *daiva* yuga (electric cycle). The cycle begins with the precession of the fall equinox into Aries. Then the first half, or declining arc, has four ages, during which mental virtue is lessening: the *satya* yuga (age of truth) of forty-eight hundred years, the *treta* yuga (third age) of thirty-six hundred years, the *dwapara* yuga (second age) of twenty-four hundred years, and the *kali* yuga (age of conflict) of twelve-hundred years. The other half, or ascending arc, likewise has four ages, but they occur in the reverse order, signifying increasing mental virtue. According to this version of the Hindu chronology, we are now in the early phase of an ascending *dwapara* yuga that began around 1700.[17] This version combines periods of declining and ascending virtue into a full cycle, bridging the Asian and the Old Testament traditions.

We can see that our traditional creation myths begin in the middle Neolithic period, around 4000 B.C., the time of the first wave of invasion by the Kurgan people from the northern steppes, the patriarchal domination of the goddess culture, the introduction of the wheel, and the onset of the Periodic Era.[18] The domination

of chaos by cosmos, characteristic of *Enuma Elish* and Genesis, coincides with this important bifurcation.

An important element in *Enuma Elish* is the cosmic battle with a snake-god, a common feature in mythologies throughout the Near East. Conflicts similar to that between Marduk and Tiamat occur in the victory of the storm-god over the dragon in the Hurrian-Hittite story *Illuyanka* and in the daily struggle of the Egyptian sun-god Re with the dragon Apophis.

In the Babylonian myths, the serpent is identified with the disorderly currents in the ocean, which connect with the current meaning of the word *chaos*. As noted earlier, when the word emerged in Hesiod's *Theogony,* it may have meant the gap between the sky and earth, without any suggestion of disorder. But within a few centuries it acquired this meaning, which is definitely part of the original signification of Tiamat. Further, it seems likely that Tiamat developed in Sumer from earlier mythical serpents, representing disorder and creativity in the goddess religion of the early Neolithic.[19] Thus, Hesiod's concept of chaos merged with an earlier tradition, to form our concept of chaos.

When Genesis 1 was written, Chaos and Tiamat reappeared as *tohu wabohu* and *tehom*. But despite the obvious similarities, there are important differences between *Enuma Elish* and *Genesis*. Chief among these is the omission in the biblical narrative of the cosmic battle theme, common to most of the Near Eastern precedents, in which order subdues chaos after a titanic struggle. Monotheism may be the basis for this transcendence of conflict in creation, but remnants of the pagan combat theme do survive in Genesis, where "they practically always appear as a literary device expressing the evil deeds and punishment of the human wicked in terms of the mythical conflict of God with the rebellious forces of primeval chaos."[20]

Here primeval chaos and evil are identified: a bad omen for the essential chaos of life and creativity. Further, the cosmic battle theme may be the source of the mythical concepts of heaven and hell. Apsu and Tiamat, sky and underworld, male and female, order and chaos, heaven and hell, good and evil: all are the same. As

Heraclitus says, "Listening not to me but to the Logos, it is wise to acknowledge that all things are one."[21]

Darwin's classic work *The Creation of the Species* appeared in 1859, while *Enuma Elish* came to the attention of the public in 1875. These two events gave rise to paleontology and the demise of the Genesis cosmogony. Our chronology, based on paleontology, archaeology, astrophysics, historical scholarship, and radiological dating technology, may be compared with the traditional chronologies. The modern version of the ages of the world is firmly established for the recent past but becomes increasingly fictive as we go farther back. The modern theory of the Big Bang, favored by astrophysicists, may be regarded as a creation myth and as a derivative of the Babylonian cosmogony.[22] The whole theory is dependent on evolutionism, a theory that conflicts with the declining virtue aspect of the traditional theories of the ages. Intrinsic to Christianity, evolutionism developed explicitly since Spenser and Darwin, a century ago, along with paleontology. It divides the history of the cosmos into ages, epochs, eras, and eons, in many different ways, depending on the branch of science. In the interesting division proposed by Eric Chaisson, the past has the Era of Energy (a brief flash after the Big Bang), the Era of Matter (the first ten billion years), and the Life Era (about the last five billion years). With luck, an Era of Consciousness will be forthcoming.[23]

Our world is troubled by global problems, largely caused by the growing human population. Many of us have looked for an evolutionary leap in human consciousness and social organization to a new plateau on which these problems may have solutions. The transformation to the golden age that we seek may be under way, with the rediscovery of chaos by modern science as one of its first signs. This event may be the beginning of the transition from the Life Era into the Conscious, in Chaisson's chronology, as well as the bifurcation from the Periodic to the Chaotic Age, in our dynamical chronology. The conquest of chaos (associated with creativity and evolution since the early Neolithic) by the forces of law and order (meaning fixed or periodic processes, according to dynamics) is a basic feature of the

dominator society. To achieve this transformation, we must recognize how, in our day-to-day lives, we help maintain the repression of chaos and creativity.

In our current paradigm, order is to chaos as good is to evil. This has been the status quo for millennia. While culture says disorder is bad, chaos is obviously the favorite state of nature, where it is truly good. But this truth has been banished to the collective unconscious for all these centuries. From the shadows of the unconscious it pushes forth into our consciousness and literature in poetry and song, romance and struggle. It erects heretical monuments in the history of our art, architecture, music, science, and philosophy.

Now, with the aid of chaos theory and large computers, science has discovered the order within chaos. And as chaos becomes acceptable to science, it is seen everywhere, particularly in the life and social sciences, where it invariably provides the substrate of life, evolution, and creativity.

We are learning that chaos is essential to the survival of life. Our challenge now is to restore goodness to chaos and disorder, to replace Tiamat on her rightful throne, in mythology and in daily life, and to reestablish the partnership of cosmos and chaos, so necessary to creation. This will require a major modification to our mythological foundations, unchanged these past millennia: no mean feat.

In *The Chalice and the Blade,* Riane Eisler proposes an anthropological theory in which these are two basic forms of social organization, the partnership (or "gylanic") and the dominator (or "androcratic") forms. The partnership form characterized the early Neolithic period and gave way around 4000 B.C. to the dominator form, which includes both matriarchy and patriarchy. This bifurcation coincides with the discovery of the wheel and the beginning of the Periodic Era now coming to a close. According to Eisler, the peaceful partnership society of the garden of Eden finally disappeared altogether by 1500 B.C. in Minoan Crete. But it lives on in our collective unconscious as a memory. This racial memory wells up from time to time of itself, in "gylanic resurgence waves." For example, the early Christians and the eleventh-century renaissance of the troubadours in the south of France were

waves of resurgence of the gylanic culture of Minoan Crete. As Eisler says:

> Moreover, these historical dynamics can be seen from a larger evolutionary perspective. . . . The original cultural direction of our species during the formative years for human civilization was toward what we may call an early partnership, or protogylanic, model of society. Our cultural evolution was initially shaped by this model and reached its early peak in the highly creative culture of Crete. Then came a period of increasing disequilibrium or chaos. Through wave after wave of invasions and through the step-by-step replicative force of sword and pen, androcracy first acted as a "chaotic" attractor and later became the well-seated "static" or "point" attractor for most of Western civilization. But all through recorded history, and particularly during periods of social instability, the gylanic model has continued to act as a much weaker but persistent "periodic" attractor. Like a plant that refuses to be killed no matter how often it is crushed . . . gylany has again and again sought to reestablish its place in the sun.[24]

We now seek to replace dominance with partnership, in a context of psychological and mythological factors deep within the collective unconscious system of global human society.

With chaos and cosmos we have a conflict situation similar to, and related to, the gender-based cultural bifurcation Eisler describes. During the millennia since the beginning of monotheism and the association of chaos with evil in our mythological and religious foundations, there have been revolutionaries of chaos, tossed up into history by "chaotic resurgence waves." Heraclitus (500 B.C.), Jesus (30 A.D.), and Hypatia (350 A.D.) are the best-known chaos revolutionaries of ancient times. More recently, Giordano Bruno (1600), William Whiston (1700), Immanuel Velikovsky (1950), and Wilhelm Reich (1957) stand out. All suffered persecution: crucifixion, burning at the stake, dismemberment, or some such fate.

Naturally, we do not wish to stand out in this way! Perhaps we need not take any intentional action, for we see now that science is in a major upheaval at last, and science is one of the primary watch-

dogs of the law-and-order domination of society. Its main strategy is to suppress any experience contrary to its dogma, somewhat as organized religion did in the medieval period. Before the Periodic Age, science banished oscillation. Scientists finding oscillation in their laboratory data, in many fields, would jettison the data, as dogma demanded homeostasis. Before the recent dawn of the Chaotic Age, science banished nonperiodic behavior. All disorderly data were called noise and rejected. Now, at last, anything goes. Rest, oscillation, chaotic behavior: All are admitted in the scientific observation of nature.

However, there still exists an evil shadow over chaos. In *Order Out of Chaos,* one of the first books about the reenchantment of science, Prigogine and Stengers say:

> Our vision of nature is undergoing a radical change toward the multiple, the temporal, and the complex. . . . A new unity is emerging: irreversibility is a source of order at all levels. Irreversibility is the force that brings order out of chaos.[25]

They identify reversibility as the disenchanting hypothesis of science and irreversibility as its reenchantment. The role of this reenchantment is creativity and evolution: to bring forth order from chaos. Our brief is different, for we agree with Homer:

> Creation came out of chaos, is surrounded by chaos, and will end in chaos.

That is, order does not come from chaos and leave chaos behind. With no ongoing chaos, there can be no ongoing creation—that is, evolution.

In short, science is rediscovering chaos, and this is seen as a major paradigm shift. Perhaps, with conscious attention, this may evolve into a reenchantment of the world, in which (instead of switching from the domination of chaos by cosmos to the reverse) chaos and cosmos enter into partnership (spiritual gylany along with gender gylany) and we regain the garden of Eden, with our creativity intact: Tiamat rejoined!

NOTES

[1] Abraham and Shaw, *Dynamics, the Geometry of Behavior,* 4 vols. (Santa Cruz, Calif.: Aerial Press, 1982–1988).

[2] Christopher Zeeman, personal communication.

[3] For an account of the role of myth in general evolution theory, see Rupert Sheldrake, *The Presence of the Past: Morphic Resonance and the Habits of Nature* (New York: Times Books, 1988), 255–258.

[4] For a study of this transformation, see Riane Eisler, *The Chalice and the Blade: Our History, Our Future* (New York: Harper & Row, 1987), ch. 4.

[5] Riane Eisler, private communication. See also Merlin Stone, *Ancient Mirrors of Womanhood: Our Goddess and Heroine Heritage,* 2 vols. (New York: New Sibylline Books, 1979) vol. 1, 99–130.

[6] Merlin Stone, vol. 1, 107.

[7] From Eisler, 21, 64. See also Joseph Campbell, *The Mythic Image* (Princeton, N.J.: Princeton University Press, 1974), 77, 157; and Stone, 1979, vol. 1, 82.

[8] From A. H. Sayce, in James Hastings, *Encyclopedia of Religion and Ethics* (New York: Scribner, 1955), 128–129.

[9] Alexander Heidel, *The Babylonian Genesis: The Story of Creation* (Chicago: University of Chicago Press, 1942), 14.

[10] Sayce, in Hastings, 129.

[11] Apostolos N. Athanassakis, *Hesiod, Theogony, Works and Days, Shield: Introduction, Translation, and Notes* (Baltimore, Md.: Johns Hopkins University Press, 1983), 16.

[12] G. S. Kirk and J. E. Raven, *The Presocratic Philosophers* (Cambridge, Mass.: Cambridge University Press, 1957), 26–27. Also, Norman O. Brown, *Hesiod's Theogony* (Indianapolis, Ind.: Bobbs-Merrill, 1953), 56.

[13] Charles H. Hahn, *Anaximander and the Origins of Greek Cosmology* (Philadelphia, Pa.: Centrum, 1985), App. I.

[14] I am grateful to Paul Lee for his many comments on this material.

[15] Alfred Jeremias, in Hastings, 183–187.

[16] H. J. Jacobi, in Hastings, 155–202.

[17] Swami Sri Yukteswar, *The Holy Science* (Los Angeles: Self-Realization Fellowship, 1984), 7–19.

[18] According to Marija Gimbutas, see Eisler, 250.

[19] See Eisler, 86–87. Note that there are different kinds of creation: creation from nothing, creation from within, creation from without. See Eisler, 28, for a similar distinction between actualization power and domination power.

[20] Nahum M. Sarna, *Understanding Genesis* (New York: McGraw-Hill, 1966), 21.

[21] Fragment 118, see Philip Wheelwright, *Heraclitus* (Princeton, N.J.: Princeton University Press, 1959), 102–103.

[22] Rupert Sheldrake, *The Presence of the Past* (New York: Times Books, 1988), 257.

[23] Eric Chaisson, *The Life Era: Cosmic Selection and Conscious Evolution* (New York: Atlantic Monthly Press, 1987), 201.

[24] Eisler, 137.

[25] Ilya Prigogine and Isabelle Stengers, *Order out of Chaos: Man's New Dialogue with Nature* (Boulder, Colo.: Shambhala, 1984), 292.