It was the greatest explosion of all time. An irruption of infinite energy danced into being. It had a wild and joyful freedom about it, and like all dance it was richly endowed with coherence, elegance, and creativity. The earth is still so radioactive from this initial explosion that its core is kept hot by continuing nuclear reactions, and many atoms all over its surface — in rocks and trees, even in our own bodies — are still exploding. In our own bodies, Sahtouris (1989, 35) estimates that three million potassium atoms explode every minute.

Current theories state that after one-thousandth of a second of the so-called Big Bang, the universe had cooled sufficiently (to 100,000,000,000 degrees centigrade) for elementary particles — electrons, protons, and neutrons — to form. Three minutes later, when the temperature had dropped to 900,000,000 degrees centigrade, neutrons and protons combined to form stable atomic nuclei, initially those of hydrogen and helium. The cosmic dance of interrelating and procreating was well underway.

The universe continued to expand and cool until after about seven hundred thousand years, when the temperature fell to about 4,000 degrees centigrade, which is roughly the temperature of our sun. At this stage, the first simple atoms came into being. Below 4,000 degrees, the force of gravitation joined the cosmic dance, and atoms began to clump together forming, over thousands of millions of years, into clusters (communities?) of primordial galaxies. Within these giant clouds, hydrogen and helium gases continued to gather into ever more condensed masses, eventually giving birth to the first stars about five billion years ago.

Many of these early stars were intensely hot. They flared up and exploded in brilliant supernovas, each as bright as an entire galaxy. The force of those explosions sent heavier elements spewing out into space, condensing over millions of years into new stars, of which our sun is probably a fourth generation progeny, dated at 4.5 billion years ago.

It was about this time also that our solar system was formed from a huge cloud of interstellar dust. Most of the cloud consisted of frozen hydrogen, helium, and ice, but Planet Earth was fortunate to condense out of a part of the cloud rich in a diversity of elements, including all those necessary for the evolution of carbon-based life.

Some four billion years ago, with the appearance of the first algae and bacteria, the dance of life reached a more complex level of integration. Molecules clustered together to form the first cells; it was the beginning of biological life as we know it today.

Fish began to inhabit the waters about four hundred million years ago, and two hundred million years later the first mammals appeared on earth. Mammal and animal evolution became more elaborate and sophisticated right up to the emergence of humankind, which today we can trace back to some 4.4 million years ago (preceded by primitive forms dating back possibly to 14 million years ago), with our species Homo sapiens sapiens emerging around 40,000 B.C.E.

Both religion and theology have largely lost the central significance of our human, planetary, and cosmic story. They have become preoccupied with *fact* and to a corresponding degree have lost touch with *mystery* and *myth*. In a universe which is actually expanding (Hubble's theory of the 1920s) and will continue doing so for some millions of years yet to come, quantum theology calls for a more expansive understanding of the universe and of our role in it. The cosmic evolutionary saga is far from finished. In fact all indications are that this is a relatively young universe, which in evolutionary terms may still be growing through its adolescent phase (Sahtouris, 1989). And in the ensuing millennia or billennia, we humans will be outgrown by other species, as yet not even vaguely imagined in the universal Mind.

The evolutionary narrative is the membrane for every story ever told. It is a quantum story of unlimited potential and indescribable elegance. It is a story without beginning or end, an epic of ceaseless becoming. It embraces all the dreams and aspirations, pains and contradictions, that ever have been or ever will be. It is the context for all science and for all silence. It is the womb of creative vision.

The Potential for Self-Organization

Let's return to the story! As the explosive energy of the Big Bang began to cool — in those first microseconds of space-time — atoms began to form from subatomic particles, which themselves were produced from the cooling of energy. Other invisible forces, which today underpin all life in the universe — gravity, electromagnetism, the strong and weak forces (described in end note 13) — became operative. The universe was already displaying one of nature's most elegant and creative potentials: the power of self-organization.

The ability to self-organize seems to be a function of invisible fields (described in chapter 7), associated with all matter, from the tiniest subatomic particles to the most complex creatures, humans included. When atomic fields interact and join together, a molecular field is evoked; the interaction of molecular fields leads to the cre-

had the initial curvature been a fraction larger, or an explosion into a scattering of lifeless particles, had it been a fraction smaller. Indeed, it is only on a universal scale — at the quantum level — that we can perceive and appreciate the multiple intricacies of the cosmic tapestry. Only when we realize that we humans are totally dependent on the material of stars (carbon) for our existence, and that the very creation of that substance is something of a cosmic miracle, can we begin to contemplate *purpose*, not in terms of a final outcome, but in the very process and nature of evolution itself. (For further elucidation, see Greenstein, 1988; Sahtouris, 1989; Swimme and Berry, 1992).

These conditions are all interdependent. Nothing is brought about by our ability to discover it. It is not because we are here that the world comes to be so disposed, but rather the opposite. The planet survived — and thrived — for billions of years without our aid; and long after we have outlived our usefulness as a planetary species, the earth will continue its evolutionary unfolding.

Propensity for Self-Regulation

At the heart of the Gaia hypothesis is the controversial claim that earth, like all living organisms, functions as a self-creating, self-regulating, autopoietic system. The function of *autopoiesis* (from the Greek for "self-production") occupies a special place in the earth's story (see Jantsch, 1980). The concept was introduced in the early 1970s by the Chilean biologist Humberto Maturana (along with Francisco Varela). A system is autopoietic when its function is primarily geared to self-renewal. Whereas a machine is geared to the output of a specific product, a biological cell is primarily concerned with renewing itself. Upgrading (anabolic) and downgrading (catabolic) processes run simultaneously. Not only the evolution of a system but also its existence in a specific structure becomes dissolved into *process*. In the domain of the living, there is little that is solid and rigid.

It is in this capacity for self-organization and self-renewal that the earth story manifests its uniqueness. Throughout its evolutionary history, the earth has endured and survived several major catastrophes, many of global, universal proportion. Because these often resulted in large-scale extinction, we know relatively little about them. The nineteenth-century French geologist Georges Curvier claimed that in its long evolutionary history, Planet Earth has experienced *twenty-seven* major transitions. Many of these were cataclysmic in nature, involving severe climate changes, widespread volcanic eruptions, and meteorite impacts over large segments of the earth (see Russell, 1992, 184ff.; also Verschuur, 1978).

And yet Planet Earth not merely survives, but thrives. Perhaps one of the most fascinating examples of autopoietic, self-regulatory action was about three billion years ago when photosynthesis (the use of light in the manufacture of food) began, and the first algae and bacteria evolved. Some of these were known as blue-greens (because of their color). By assimilating the energy of light and hydrogen from the seas, they grew and thrived. But all growth is at a price, in this case, the release of a deadly poison caused by the utilization of hydrogen. "Oxygen" was the name of the poisonous substance.

We think of oxygen as good and necessary, a life-giving and life-saving gas that is essential to the maintenance of life. But for the first living creatures it was lethal; in fact, it was more destructive than ultraviolet. If the atmosphere then became full of oxygen, as it now is, the large molecules could never have formed, and life would have ceased to exist. But Mother Earth, ever inventive, and apparently never to be outdone, made an ingenious intervention.

The free oxygen combined harmlessly with dissolved rock minerals, such as iron, and while it was absorbed in this way, it remained safe. About a billion years later, however, all the iron had been turned to rust, and the oxygen began to accumulate in the atmosphere.

Initially, some bacteria responded by burying themselves in the mud where the poisonous oxygen could not get at them; the bacterial agent which today facilitates the digestion of hay in cow's stomachs is believed to be the product of this ancient self-regulatory behavior. Blue-greens invented enzymes which neutralized the oxygen's harmful effects. Others solved the problem by living together in thick colonies where those of the outer layer were burned to death and thus formed a protective cover for those underneath. The blue-greens, while creating food molecules, learned how to use the waste oxygen to burn those same molecules and thus create energy. Today we call this process "respiration." It is a classic example of how Planet Earth converts a potential threat into a resource that not only saved the world from extinction, but made possible the vast array of life forms that have evolved since then.

There is a final chapter to the oxygen story which further illustrates the extravagance of Gaia's creativity. In order to escape the poisonous effects of oxygen, the early bacteria veered more toward

the sunlight and in the process were destroyed by the radiation. A new planetary crisis was imminent, until the extra oxygen combined to form what we now call the "ozone layer" in the upper atmosphere, thus warding off the damaging effects of ultraviolet light. In Lovelock's words, a murderous intruder was turned into a powerful friend!

The story of Planet Earth is a not a descriptive tale about some object out there in space, dependent on us humans for its survival and growth. The true narrative is not about life *on* earth, but about the life that *is* earth. Could it be that we are dealing with a life form more sophisticated, creative, resilient, and integrated than our human mode, perhaps even more enduring than all the known life forms combined? Could it be that our ancient ancestors in identifying the earth with the Great Mother Goddess were in fact unraveling the mystery of our existence with a degree of wisdom and intuition which the rational mind of our time is unable to attain? The answers to these questions are likely to emanate from the planetary story itself. The unfolding narrative of evolution is a wellspring of profound wisdom.

The Creative Vacuum

As the story unfolds, the interdependent nature of planetary and cosmic life becomes all too apparent. A vital clue to the planet's relationship to other planets and stars is the nature of space itself. According to Greenstein (1988), the emptiness and vastness of space is essential to planetary existence and presumably to stellar interaction also. Our cosmos seems to need a vast amount of empty space if it is to be cool enough to generate and maintain the diversity of its life forms. Greenstein suggests that we imagine the earth as a marble, then the sun could be modeled as a medicine ball and would sit three hundred yards away. But the star Alpha Centauri would be a full 49,000 miles away and, in terms of our planet, that is considered to be the closest star.

The vastness of space is not just to accommodate the dance of life. It is an aspect of the dance itself, in fact, a very critical dimension. It is grossly misleading to suggest that it is "empty." Its fulness is a reservoir of prolific energy, which Davidson (1989) very rightly calls the "creative vacuum," and which the great scientist Max Planck once described in these words:

> As a man who has devoted his whole life to the most clear-headed science, to the study of matter, I can tell, as a result of my research about the atoms, this much: *there is no matter as such*. All matter originates and exists only by virtue of a force which brings the particles of an atom to vibration and holds the most minute solar system of the atom together.... We must assume behind this force that existence of a conscious and intelligent Mind. This Mind is the matrix of all matter. (Quoted in Davidson, 1989, 128)

In probing the nature of the vacuum, Davidson reclaims the notion that (a)ether is the fundamental stuff of "empty" space. Underpinning the ether — or perhaps inherent to it — are the various field energies, formative blueprints, a creative memory holding original impressions which, over time, become manifested in the external forms of creation. But for Davidson (1989, 125), there is an even deeper reservoir, namely, consciousness, to which he attributes divine origin and describes it as a vast holigraphically structured mega-computer where the primal power or undifferentiated energy is wrapped around with pattern, vibration, or form, giving rise to the laws of polarity or causality. It is the architect of cosmic justice, a mechanism which never fails since its power comes from the supreme consciousness of God.

The Gaia story focuses on how earth is alive from within; the vacuum is a reservoir pregnant with unlimited possibility. To describe the world as "teeming with life" sounds exhilarating, but in the light of our evolving story it may even be an understatement. The potential for life is so overwhelming, pervasive, and mysterious, it almost defies human comprehension.

Yet, we continue to analyze, rationalize, and interfere. We have created an anthropomorphism that is as deadly as it is irrelevant. We set ourselves up as the masters, not merely of Planet Earth, but of the entire universe and, in the infamous words of Francis Bacon, we ruthlessly set out to torture nature until she reveals her last secrets to us.

The Anthropic Principle

We have scarcely begun to address our insatiable compulsion toward self-inflation. This addictive drive, with its sinister undercurrents of control and manipulation, undermines the wholeness and vitality of

the quantum vision which is at the heart of our planet's story. Instead of addressing the whole, we go part of the way and end up with what seems a praiseworthy "enterprise," but in effect it is flawed in its fundamental logic. One such enterprise is what scientists have named the cosmological anthropic principle.

In 1974, the British physicist Brandon Carter coined the term "anthropic principle," which basically states that if some features of the natural world are required for our existence, then the world doesn't make sense without us. Another formulation focuses on the conviction that the universe would have no meaning unless we were here to give it meaning: the only things that can be known are those compatible with the existence of knowers.

Here we touch on one of the great unresolved debates of the quantum theory. According to the Copenhagen School (Neils Bohr and associates), reality does not exist until we observe it. Therefore, our observation creates the world with which we interact or, to use Wheeler's language, the universe in which we *participate.* The alternative, many-worlds view, suggests that our world, even if created by our observation/perception, is only one of many worlds and, consequently, apart from our observations, an objective world exists out there that can be measured and analyzed *objectively.*

In my opinion, both arguments are flawed and the consequent dualism (the either/or) becomes unavoidable. The major weakness in both arguments is the assumption that we humans, at this stage in our evolution, can pronounce the final word on how things are in the universe. There is no higher wisdom than ours — we implicitly (and often explicitly) claim — and we seem to add, subconsciously, that there never can be. This anthropomorphic strain is one of the major pitfalls of classical science and, sadly, permeates many of the scientific breakthroughs of the twentieth century.

The anthropic principle is the icing on the cake of this misguided anthropocentric drive. It brings into consciousness and validates (or tries to) what for long has been an unquestioned assumption. Now that the issue has been exposed, we can examine more openly what it attempts to state.

Barrow and Tippler (1986) provide a comprehensive overview of the anthropic principle. There are four dominant variations, offering ranging degrees of emphasis on the underlying conviction which claims that the highest, possible levels of intelligence, information, and consciousness are those developed, or due to be developed, by human beings, *in their presently evolved state.* But we humans, *in our presently evolved state,* are not the final goal of evolution. We are

not the ultimate, nor even the penultimate, chapter of the story; in fact there may be no such thing as a *final* chapter. Homo sapiens will evolve into a more highly developed creature who will view, observe, and relate to the planet (and to the universe) in a more sophisticated and enlightened way than we are capable of doing.

Yes, our universe is an intelligent organism, with an infinite capacity for enlightened, autopoietic growth and renewal. In the billions of years of future evolution, we humans will be surpassed by other more highly developed creatures. The time has come to acknowledge this fact, and to reevaluate, soberly, honestly, and humbly, our role in the grand evolutionary story.

From the beginning of time until now, every creature and species has contributed to the intelligent unfolding of life. The process of photosynthesis, which began billions of years ago, is intelligent altruistic behavior of an alive planet where all the parts cooperate under the influence of a higher intelligence which is greater than the sum of the parts. The delicate and intricate interaction of subatomic particles — along with their mysteriously poised measurements (to minute degrees of 1 percent, as in the case of the neutron outweighing the proton, or in the ability of the strong force to hold the deutron together) — illustrates a profound and elegant wisdom.

Humans and Gaia

Theologians may be quick to suggest that this is living proof of divine creation; proponents of the anthropic principle will argue that it's all in place for the sake of intelligent (human) life. But the quantum theologian (e.g., Ruether, 1992) tends to opt for a more wholistic stance and will plead that we:

- refrain from the analysis for a while and simply behold (contemplate) the sheer wonder of it all;
- open up our limited intelligence to the universal Mind, whose resourcefulness far outstretches what we humans have ever achieved;
- at least entertain the idea that the planet we inhabit is endowed with a quality of "aliveness" that supersedes our human form and may be more elaborate and dynamic than all the life forms known to us;

- open our hearts to the "call to conversion," the letting go we need to do if we really wish to be participants in the evolutionary letting-be.

Both Lovelock (1979, 1988) and Sahtouris (1989) in their explorations of the Gaia hypothesis present a grim future for us humans if we don't learn to refrain from our exploitation of planetary life and choose to continue on our ego-inflationary route of self-aggrandizement and deleterious interference. In the evolutionary story — ours and that of Planet Earth — the planet *always* wins out. Mother Earth has an amazing resilience, a very profound intelligence, and can be quite ruthless in maintaining her integrity.

In Gaian terms, we are just another species, neither the owners nor the stewards of the planet. Our future depends much more on a right relationship with Gaia than on enforcing our self-righteous claim to be masters of creation. Gaia is not purposefully anti-human, but so long as we continue to change the global environment against her preferences, we encourage our replacement with a more environmentally benevolent species. We are also discerning that Gaia's incredible complexity makes her tougher and more resourceful than we are. We are far more likely to obliterate our own species by destroying our environment than we are to kill Gaia. We would be wise to remind ourselves often that Gaia's dance will continue with or without us.

We humans have become a cosmic anomaly. We rape and pollute the very womb that nurtures and sustains. We have become a dysfunctional family, blind to our own addictions, heading headlong for self-destruction (see Wilson-Schaef, 1987; La Chance, 1991). As we approach the end of the twentieth century, time seems to be running out for Homo sapiens. The wisdom that begot the Agricultural, Industrial, and Information Revolutions is largely a spent force. Our achievements have become our atrocities. Only an honest confrontation without helplessness or hopelessness can in any way bring us to our senses. That is unlikely to happen — but what we can't do for ourselves, Gaia will do on our behalf; therein lies some semblance of hope for the future! We'll return to this subject in subsequent chapters.

Theological Implications

It is only in the past twenty years that theology has given serious thought to evolution, and as yet few theologians put cosmology

center stage. Meanwhile, cosmologists and philosophers grapple unceasingly with the imponderables of how it all began, particularly who or what caused the Big Bang and what, if anything, was there before it. Did God have to create and to what degree does God's creation inhibit or enhance human freedom?

These questions recur many times in the story of orthodox theology. They take on a fresh significance today, because they arise within a whole new cosmological context. The context is new precisely in its invitation to seek meaning from *within* rather than from *without*. Even those theologians who adopt an evolutionary perspective tend to image God as an *external* agent directing the evolutionary unfolding. On the other hand, process theologians (Whitehead, 1979; Cobb and Boswell, 1982) claim that God *co-creates* in conjunction with the evolutionary process, which often sounds as if the pace and course of evolution dictates the mode and degree of God's creative power.

To these profound and intricate questions, quantum theology wishes to bring some fresh considerations:

a. Since the whole is greater than the sum of its parts, then the "whole" of the evolutionary/creative process will always outstretch our human, scientific, and theological speculations. The evolutionary/creative process is a subject for contemplation and mystical comprehension rather than for theological discourse or scientific analysis.

b. Quantum theology asserts that the greater "whole" of the evolutionary/creative process is empowered and animated by a supernatural life force. However, it considers that life force to be inherent to the creative process rather than external to it.

c. Quantum theology is not particularly concerned about the nature of God. Since any quantum vision has to accept and integrate unanswerables and imponderables, quantum theology happily accepts the dictum: Let God be God! Orthodox theology often seems to collude with mainstream religion in subconsciously trying to "conquer" God by discovering and knowing everything about the divine reality. The outcome is nearly always an idolatrous one — with notorious validations of war and manipulation in the name of one or other omniscient, omnipotent God.

d. These reflections on the Godhead demand novel perceptions on humanity's role in the co-creative process. Since "God" is not into conquering or controlling the world, nor the evolutionary process, neither should we humans be. We are not in charge of the universe; we are participators in its growth and development. We *belong* to the universe and to its unfolding process. Our lives have no meaning apart from the universe. The universe is not an object set over against us, the subjects. No, it is the great Subject, with whom we are invited into a subjective interrelationship (explored in chapter 7).

So what is our role in the grand, evolutionary process? Perhaps we are intended to be the nervous system of Planet Earth, or as increasing numbers of scientists and philosophers are intimating, the *conscious* dimension of the universe — in the sense that reflective consciousness (the ability to reflect on the fact that we can reflect) seems to be unique to us humans. In the mechanistic worldview, we assume that we have been endowed with consciousness in order to subdue all other, "inferior" life forms. In the quantum worldview, we are invited to use this gift in the service of the universe, becoming more conscious, since consciousness is perceived to be embedded in all creation and seems to be awaiting a fuller sense of awakening; hence, Zohar's provocative and perceptive insight that we ourselves might be thoughts (excitations) in the mind of God (Zohar, 1990, 212). Perhaps the fullness of evolution itself is the conscious universe fully alive!

Beyond these speculations and reflections, the quantum vision invites us to a new theological threshold. Since all theology is about the *logos,* the Word and the wording of ultimate reality (God), then the quantum horizon becomes an energy for storytelling. In quantum terms, our theological role as human beings may well be that of narrators of the sacred, cosmological story. Beyond the academic pursuit of ultimate building blocks and the intellectual search for convincing ("provable") answers is the creative, contemplative exploration of the evolutionary story itself, where divine initiative and human response blend into one. Only when we enter deeply into that story, feel its meaning in the depth of our hearts, have we really understood what life is about. We won't have conquered the world, but we will have understood; we will have seen the Light! Then, and only then, can we be truly at peace — with ourselves and with the whole of life.

We conclude with another key principle employed by the quantum

theologian: *Our passionate desire to understand in depth will not be attained by intellectual prowess or technological achievement, but by immersing ourselves in the divine, evolutionary story and committing ourselves to the contemplation and narration of that story in each new epoch.*

ously, this is more apparent in the case of theology. Even the very name, with its focus on *logos,* conjures up narrative impact.

In the scientific literature, we occasionally catch glimpses of the narrative infrastructure. Examples that spring to mind include Einstein's rigid allegiance to the God of mechanistic science, illustrated in the oft-quoted words, "God does not play dice with the universe"; Bohr's sense of shock at the incomprehensibility of the quantum theory: "Those who are not shocked when they first come across quantum theory, cannot possibly have understood it"; Heisenberg's somber and reflective mood when he narrated: "I remember discussions with Bohr (1927) which went through many hours until very late at night, and ended almost in despair.... I went for a walk in the neighboring park and repeated to myself again and again the question: Can nature possibly be as absurd as it seemed to us in these atomic experiments?"; Feynman's poetic quip: "To do science you've got to have taste"; or Hawking's cryptic remark: "Every time I hear about Schrodinger's cat, I want to reach for my gun." Finally, there is the story of Einstein's humble sense of humor that when a newspaper announced: "One hundred scientists prove Einstein wrong," his reply was: "It would only have taken one."

In all these "throwaway" phrases, and a host of others which sporadically turn up in the scientific literature, we get unfiltered access into the struggles, the meanderings, the imaginings, and the questions of the scientific mind. But more than that, we begin to get a feel for the scientific "heart," searching and seeking out the ultimate meanings — those unattainable insights that baffle the seeker to the point of despair, but never culminate in intellectual or spiritual paralysis.

Norman O. Brown one time claimed that meaning is not in things but in between. It's not in events, nor in objects, nor even in proven discoveries that ultimate truth lies, but in the process of seeking, searching, experimenting, and discovering. Behind the external activities is an internal process which manifests itself in the unpredictable moments of surprise, humor, jest, and storytelling. The narrative infrastructure of any science reveals a depth of truth and meaning which no laboratory experiment, no matter how thorough, can convey or communicate. The deeper meaning is embedded in the story, not in the verifiable facts.

Consequently, story and the narrative process are the primary contextual framework, a type of primordial laboratory for the scientific pursuit, for the wisdom and discovery that comprises scientific exploration. Without the underlying story, science becomes a mechanistic ideology, compulsively bent on domination and manipulation, juxtaposed to other branches of wisdom and exploration, and both alienated from and alienating to the wholeness that comprises universal life.

Not only is story at the heart of scientific pursuit, but science itself, in common with all other forms of wisdom, is born out of story. It is very much the product of humankind's need to make sense and meaning out of life. But it goes even deeper: the scientific story is also a statement of the universe's own potential and desire to give expression to its inherent creativity, to narrate its evolutionary unfolding in the various manifest forms that comprise the visible and tangible world around us. When we learn to let go of our anthropomorphic stance over against the universe (as subject vs. object), and re-vision our role as co-creators within the evolutionary process, then and only then will we grasp the deeper meaning, which for science and theology alike is in the story and its narrating and not in irrefutable dogmas or in objective verification.

The Word as Story

Theology has not entirely abandoned its rootedness in story (see, for example, Shea, 1978, 1980; Wright, 1988). Christian theology claims to spring from the revealed word of God in the scriptural story of the Old and New Testaments. But as Fox (1984) astutely remarks, our theology is so focused on words that it has largely betrayed the *Word* (in its original Aramaic, *dabhar,* meaning creative energy). In our attempts to get to the theological building blocks (in what sense was Jesus God and/or man? How do you fit three persons into one Trinity? What precisely makes a sacrament a sacrament?), we have often lost sight of the story which sustains and nourishes theological discourse. And because we have neglected the *story as story,* we have, over the centuries, turned it into an ideological statement giving literal significance to something that was never meant to be taken literally (e.g., the Genesis creation story, the Virgin birth story, the parables).

Over time, facts and dogmas tend to assume ideological proportions. Truths that initially offered liberation, hope, and new life often become millstones, burdens that stifle and stultify. All the major religions today — and theology in general — suffer from narrative deprivation. Even when original myths (beginnings and endings) are still narrated, they are over stylized and couched in legalistic and devotional categories that inhibit, and frequently prevent, the story

from being retold in *today's* context, and not in that of hundreds or thousands of years ago.

Readers of this book, whether Christian or not, will have some contact with dominant Christian stories such as the Virgin Birth of Jesus, the resurrection from the dead, the miracle stories, and such well known parables as the Prodigal Son (Father) and the Good Samaritan. I wish to submit that the entire Bible, along with the sacred texts of other religions, is first and foremost *a story,* and not a record of definite facts and events. In terms of faith, what brings meaning and integration to one's experience, the facts are quite secondary. It's the story (and not the facts) that grips the imagination, impregnates the heart, and animates the spirit within (the spiritual core).

Whether or not there was an empty tomb, whether or not anybody actually saw the Risen Jesus, is not of primary significance. If through modern archaeological research we were to rediscover the remains of Jesus, thus establishing that he never rose physically from the grave, that discovery would not undermine the faith of a genuine believer. It would create immense doubt and confusion for millions who follow a dogmatic creed rather than a spirituality of the heart. (It could also be a catalyst for a profound conversion experience.)

Theologians in general and guardians of orthodox religion will find the above comments quite disturbing; some will consider them to be blatantly heretical. I invite such people to explore the pedagogy used by Jesus and by all the great teachers of the various religious traditions. Jesus did not theologize, legalize, or preach in any formal sense. Jesus *told stories,* the best known being the *parables.* Catechists and religious educators often portray the parables as simple stories to illustrate important truths. Often the parables are reinterpreted, in preaching and teaching alike, in terms of immediate daily and personal experience. A sense is conveyed that everybody and anybody can apply the parables to contemporary experience and get the full impact of the original message.

This is a reductionistic approach, with the accompanying risks of oversimplification, misinterpretation, and narrative deprivation. Often the original context is not appropriately acknowledged. Scant attention is given to the hermeneutical task of translating ideas, concepts, and language from one culture to another. Consequently, the narrative impact, along with the inherent call to change and conversion, is often negated.

The parables of the Christian story, and corresponding narratives in other faith systems, bear an archetypal, primordial significance.

They are not just ordinary stories; in fact, there is no such thing as an "ordinary" story. Their original context and impact is one of a newly emerging culture engaging with an established, orthodox one and confronting it with its inevitable demise. The parables in the New Testament largely belong to the vein of prophetic discourse in the Old Testament, where the old order is crumbling and a new vision is struggling to be born. The parables are transitional stories that are intended to disturb and challenge the hearers, and motivate them to move into a radically new way of engaging with the world and the call of the times.

Bausch (1984, 117–37) delineates six characteristics of the New Testament parables:

- They uncover our competitiveness and envy and invite us to brotherhood and sisterhood instead.
- They uncover our wrong centering and invite us to a right centering.
- They uncover our need to hoard and exclude and invite us to share and include.
- They uncover our assumptions and challenge us to turn them around.
- They uncover our timidity and invite us to risk all for the sake of God's Kingdom.
- They uncover our self-centered despair and distrust and invite us to hope.

The Central Myth of the Christian Story

In the Christian context, the parables serve as subplots in an even more embracing story, which the Gospel writers invariably call the "Kingdom of God" or, as in Matthew's Gospel, the "Kingdom of Heaven." This is the central myth of the New Testament, the core message of Jesus for humanity and for the world. It is the archetypal truth that underpins all that Christianity stands for, the fundamental norm that makes Christianity unique, not in the sense of being apart from, but in what it has to share with the other great religions and with all people who embark on the spiritual journey of life.

What Jesus meant by the "Kingdom" (what others prefer to call the "New Reign of God" or, in feminist terms, the "Kindom") is

So how do we get sufficiently close to obtain the crucial information without getting sucked into the depths of no return? Hawking's response is highly speculative but, nonetheless, commands the respect and credibility of many scientists. In quantum terms, empty space is never really empty. It is always active and cluttered. Pairs of elementary particles like electrons and their anti-matter opposites (positrons) exist for a fraction of a second before annihilating each other. At an event horizon, it is conceivable that, prior to annihilation, one particle gets caught in the grasp of gravity, but the other escapes back into universal space. To an observer, it would look as if the second particle had just popped out of the black hole. In fact, the escapee has become a new particle in its own right having assimilated some of the properties of the black hole.

Let us assume that this process is happening on a large scale with perhaps millions of particles impinging upon the event horizon. What in fact is transpiring, in Hawking's opinion, is that the black hole is gradually "evaporating" as it explodes more and more "new" particles into the universe. In time, over millions or billions of years, the orderliness of the universe will absorb the disorder of the black hole.

Quite an amount of research and exploration centers on the black hole phenomenon, briefly but comprehensively surveyed by Powell (1993). What is progressively emerging is that black holes are not as destructive as we once assumed. Indeed, evidence to the contrary is accumulating, suggesting that they may be reservoirs of enormously creative energy.

The black hole is a metaphor of profound scientific and religious significance. It has a Bermuda triangle connotation of mysterious alien power from the clutches of which nothing can escape. And yet, if Hawking and other scientists are right, it possesses crucial information on the origin, meaning, and creativity of our world. But more than that, its power to captivate and destroy may not be as definitive as we have long assumed.

If our present universe began with the explosion of a *singularity*, as is widely believed, and that singularity was itself the product of black hole activity, which would normally be the case, — then our universe originated from a black hole. Such speculation has led scientists like Hawking (1993) to suggest that our cosmos may consist of many universes, born from the mysterious forces which defy human intelligence but continue to fascinate the human imagination. According to these speculations, the black hole produces a worm tunnel in space-time, and whatever disappears down its singularity exists

somewhere else at another time through a reciprocal *white hole* (an object from which matter and radiation escape, but nothing falls in). There may well exist an intriguing interplay of order and disorder where the forces of life do not merely win out, but stretch the will-to-live to proportions our feeble brains have not as yet even vaguely comprehended. (More on worm holes in Boslough, 1992, 189–91, 206–9).

What is worth noting at this juncture is that we humans have little or no control over the quantum behavior at the heart (singularity) or at the verge of the black hole (although the Copenhagen school would claim that whatever is happening there is caused by our perception or observation of it). The electrons and positrons are doing their own dance on the periphery where the forces of life and death interact in fascinating ways. Perhaps it is one of the few situations where we humans can do little other than stand still, contemplate, and behold the wonder inherent in the creative process itself.

There is a paradoxical quality to black holes, whereby their destructive power of absorption seems to be a precondition for their life-giving power of "evaporation." The particles that escape may be endowed with information about the black hole, obtained from its counterpart that has been sucked into the black hole; in this way we may obtain access to a profound cosmic wisdom which, otherwise, remains trapped within the entropy of the black hole. Perhaps here we have on a grand cosmic scale an insight known to mystics for centuries: abnegation is a precondition for fulfillment; struggle is a pathway to happiness; sickness is the shadow side of health; failure is success in disguise; Calvary precedes resurrection; darkness gives way to light.

The Theory of Chaos

What the black hole represents as a quantum phenomenon stretches the human imagination to its absolute limits. We are only at the earliest stages of this fascinating and enormous exploration. Not at all unrelated to these considerations is the theory of chaos, also of recent discovery and far more comprehensible (but no less mysterious) than the black hole phenomenon. Readers are likely to be familiar with the notion of chaos from the popular work of James Gleick (1987).

Now that science is looking, chaos seems to be everywhere, and it provides the crucial link to interpret and comprehend aspects of universal life that heretofore tended to be regarded as deviations. Be-

cause it is a science of the global nature of systems, it has brought together thinkers from widely diverse fields of study. In fact, many scientists now believe that the theory of chaos may be as central to twentieth-century exploration as relativity and quantum mechanics.

In classical science, chaos was attributed to randomness, a freak of nature that science might one day understand and control. Classical examples of chaotic behavior include the dripping of a water tap, the turbulence of a river, the design of snowflakes, the unpredictability of weather, the fibrillation of the human heart. Now that chaotic systems are being mathematically modeled, we are discovering hidden patterns of order and beauty embedded in the chaos — the approach adopted by Gleick (1987), Stewart (1989), Feigenbaum (1978, 1979), Mandelbrot (1977), and Wilson (1983) in his development of renormalization. There is an alternative approach, developed primarily by Prigogine and Stengers (1984), suggesting that chaos is a precondition or stimulant for activating the self-organizing creativity inherent in all living systems. These two approaches may be considered complementary rather than opposed to each other.

What in fact is happening is this: advocates of many scientific disciplines are acknowledging that our universe, at all levels of existence, has a strange and amazing propensity that often comes to light most elegantly in dealing with irregularities and chaotic behavior. Feigenbaum Constants, named after the American physicist Mitchell Feigenbaum (1978, 1979), offer an intriguing example. In attempting to calculate movement in irregular or chaotic systems such as dripping taps or pulsating stars, researchers tend to encounter period-doubling, where the solution curve breaks into two directions, known as a bifurcation. On this first break, the curve can take on two values and for some time it will oscillate between the two. Further on, more bifurcations occur leading to what is known as a bifurcation tree. The rate of dividing or branching gets faster until an infinity of possible branches is reached. This point is often described as the onset of chaos.

In numerical terms, the critical value at which chaotic behavior begins is calculated to be 3.5699. The gaps between successive branchings become closer and closer; one finds that each gap is slightly less than one-quarter of the previous one, a ratio that tends to have the fixed value of 1/4.669201. Feigenbaum also noticed that the rate of shrinkage between the prongs on the bifurcation tree is also close to a standard two-fifths of the previous one and calculated to the numerical value of 1/2.5029. We are describing a phenomenon known as scale-invariance: as we examine the detailed nature of

the bifurcation tree, we discover within the detailed (deep) structure patterns which enable us to comprehend and understand the whole.

Feigenbaum initially came across the curious magic numbers 4.669201 and 2.5029 by accident while toying with a small calculator. The significance of these numbers lies not in their values but in the fact that they recur, again and again, in completely different contexts. It seems that chaos has universal features and that Feigenbaum's numbers are fundamental constants of nature. Thus, although chaotic behavior is by definition dauntingly difficult to model, there is still some underlying order in its manifestation, and we now have mathematical models that enable us to understand the principles that govern this particular form of complexity.

The theory of chaos draws together many strands of research on the complexities and irregularities inherent in nature. Gone are the days when the isolated building blocks were the main target of research and exploration. We now acknowledge that our universe cannot be broken down into a few simple elementary units of matter. Not only is that ultimate simplicity based on false assumptions, but it undermines the very creativity of life which requires *complexity* as an essential dimension of all living systems.[17]

Today chaos has become big business. Peters (1991), Wheatley (1992), and Chorafas (1994) are all specialists of the commercial, business world who are encouraging their colleagues in commerce and finance to explore the possibilities for growth presented by a fluctuating, chaotic market. Arbuckle (1988) suggests that contemporary transitions within church life need to be understood and interpreted in a way that accommodates (rather than denies) chaotic dimensions. Hayles (1991) provides a fascinating and comprehensive review of how contemporary literature explores the metaphor of chaos. Around the world, mainstream institutions — political, economic, social, and religious — are scarcely able to hold together the chaotic forces that seem to threaten the very fabric of our "civilized" society. Chaos is all around us. Chaos abounds! (For a recent survey on chaos theory in a quantum context, see Gutzwiller, 1992).

The major problem confronting us is not the chaos itself but our attitudes toward it. By and large, we *deny* its very existence, because we are scared of its impact. Why? Because we perceive and interpret its significance within an old paradigmatic context. Within the old paradigm, chaos was considered to be evil, disruptive, dangerous; it threatened the status quo of our patriarchal value system, and threatened our power as the managers of a hierarchical, orderly system. Within this paradigm, there was no room for deviation,