

## CHAPTER 9

### EVOLVING INSTITUTIONS OF HUMAN MEANING: ART, RELIGION, AND SCIENCE

*As soon as the important faculties of the imagination, wonder, and curiosity, together with some power of reasoning, had become partially developed, man would naturally crave to understand what was passing around him, and would have vaguely speculated on his own existence.<sup>i</sup>*

Charles Darwin

Darwin clearly recognized that the raising of ultimate questions would be one of the defining characteristics of our species. This craving is, I have argued, powerful evidence of the existence of a human drive to comprehend.

Broadly speaking, the three institutions reviewed in this chapter provide humans with ways to fulfill our innate drive to comprehend *all* matters. But their most important common denominator, for the purposes of this book, is their focus on the existential questions of *human meaning*: What does it mean to be human? Who are we? Where did we come from? Where are we going? These are the persistent questions that our human drive to comprehend is pushing us to answer. All three institutions, throughout their histories, have offered ways to address these fundamental questions. All three have helped people put meaning into their lives.

#### **The Institution of Art and Human Meaning**

Art in its many forms has been found in all cultures of all times, a strong indication that our hypothesized drive to comprehend—a drive to make sense of the world and give meaning to it—is genetically innate. Artistic representation manifests a conscious awareness of the people, creatures, and things around us—what they look like, what they do, what makes them important or interesting. Much of art brings out the human response, the feelings that these external signals evoke in us. The fact that a particular thing is singled out to be portrayed seems to confer some kind of meaning on it. The universality of representational decoration is a strong indicator that the drive to comprehend is not only innate but independent. Put simply, there is no discernable

dA, dB, or dD value in drawing a picture of a tree on one's leather water bag, but every culture does something like that.

Art has been used to represent the full range of human emotions and an ever-widening range of human experiences. This may indicate not only the postulated independence of dC from the other drives, but also the wide scope of dC itself. It seems that we are interested in making sense of as many of our human traits and experiences as possible, whether or not those traits and experiences or our comprehension of them have any particular survival value. Put another way, everything about us has the potential to be meaningful.

Some forms of art are more explicit than others about putting meaning into people's lives. Art has been used to evoke the sacred; to induce or declare or bemoan love; to acknowledge and respond to beauty; to praise, condemn, and satirize; to spread joy and express sorrow; to formulate intuitions about emerging social hazards—in short, to declare what *matters*, what has meaning.

Given the artistic sophistication displayed 40,000 years ago in the caves at Lecaux, art might well have been a part of hominid life as far back as late *H. erectus*. It has been argued persuasively that art must have predated language. Evolutionary psychologists are developing evidence that some of the arts, such as music, constitute an innate skill set. Perhaps there are also innate latent skills for painting, poetry, and so on.

Art can be insightful by its anticipation, often unintended, of subsequent scientific developments. In this regard, the recent findings of psychologists about the nature of psychopathy are now throwing new light on a phenomenon that has been a favorite interest of artists for centuries. Experts on Shakespeare could doubtless name a half-dozen candidate free-riders in Shakespeare's writings, starting perhaps with Iago, Shylock, Richard III and perhaps even Lady Macbeth. Is there any better summary available of what must go on in the mind of the psychopath than that offered by Shakespeare as these words of Richard III?

Why, I can smile and murder whiles I smile,  
And cry "Content!" to that which grieves my heart,  
And wet my cheeks with artificial tears,  
And frame my face to all occasions....  
I can add colours to the chameleon,  
Change shapes with Protheus for advantages,

And set the murderous Machiavel to school.

Can I do this, and cannot get a crown?

Tut, were it further off, I'll pluck it down.

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Think also of Dickens' villains. On the contemporary literary scene, we would think of Truman Capote's *In Cold Blood* and Graham Greene's *The Third Man*, and the films, *Psycho*, *A Clockwork Orange*, *Silence of the Lambs*, *The Bad Seed*, and *Dr. Strangelove*. Think of the cultural pervasiveness of the devil symbol in various forms. The list could go on and on. It appears that the weird, almost inhuman, characteristics of psychopaths have always been of fascination to artists.

The question of the meaning of human existence is latent as a theme in many works of art. Religious paintings are an obvious example. Poetry often addresses these questions. Among well-known modern painters, Paul Gauguin has probably been the most explicit in addressing the ultimate questions. The set of paintings he did late in life during his final stay in Tahiti and the Marquesas Islands are named for each of the four questions posed in the lead paragraph above. Gauguin went to the South Pacific seeking his dream of a perfect utopian society. Of course, he did not find his "noble savages," yet his paintings reflect his vision of the serenity of what island life might have been like before the disrupting effect of civilization. The ultimate questions are clearly addressed explicitly not only in paintings, but also in sculpture, poetry, music, literature, theater, dancing, and now in photography and film. Today, even though the arts are supported not only by private patrons but also by museums, universities, and governments, they still spring from the deep insights of the individual artist and give voice to our shared human values and our collective unconscious.

### **The Institution of Religion and Human Meaning**

The practice of religion is another human universal. No human group has been discovered that does not have a set of religious beliefs. Other mammals show no evidence of having a religion. Given the mental capacity of humans and our drive to comprehend, it was inevitable, as Darwin said, that they would ask the ultimate questions. But beyond that, it was also inevitable that they would turn regularly to supernatural explanations whenever they had no

natural explanations. The supernatural seems to have always been the default explanation; hence the universal rise of religion.

While religion has risen primarily in response to the independent drive to comprehend, it also plays a role in fulfilling the other three drives. The clearest connection is to the drive to bond with its related moral skill set. All religions are closely associated with morals and ethics. Religious leaders always offer their communities a set of rules to live by. They serve as guardians of the critical bonds, the public commitments that people make to each other. They administer the oaths of office, the marriage vows, the rites of passage into adult status, and the funeral rites. Religion has also been inevitably involved, in a lesser way, with the drives to acquire and to defend. It is probably universal that people are taught to pray for their “daily bread” (dA). In regard to dD, we have only to think of the many wars that have been fought to defend or propagate the faith, or—if fought for some other reason—at least fought with God’s blessing or “with God on our side.”

Nevertheless, I argue that religion’s primary function is to address humans’ deep desire to have a sense of meaning in their lives and to answer their ultimate questions. Such belief systems are highly valued possessions. They provide stability and courage in the face of the brevity and hazards of life and in the face of the vast unknown. And only a being with the drive to comprehend would be bothered by the unknown, unless it were perceived to be a threat.

All belief systems that have survived the test of time surely deserve respect, even when we disagree with them. Each of them contains truths about the world that must be retained. No doubt, each also contains elements that one hopes will gradually be replaced by more accurate beliefs. It is not hard to see that, as religions became established in prehistoric times, the sheer limits of what was known to the people of each separate tribe gave them little choice but to associate their vision of the Creator(s) with their own tribes. Since, as far as they were concerned, *they* were what the Creator had created, it would have been natural for each tribe to think of itself as the *chosen* people.

### **Defeat of the Gnostic Christians**

In historic times, religions have tended to move from polytheism to monotheism and from being strictly tribal faiths toward being universal, at least aspiring to recruit all people to a single faith. In Chapter 7, we saw one crucial step along this way, when Constantine the Great

co-opted orthodox Christian leaders to join him in ruling the Roman Empire as the exclusive established religion. In the light of the RD theory, this proved to be a very mixed blessing. The little-known story of the Gnostics Christians throws fresh light on this fateful event in the history of religion.

Historians have fairly recently found a number of ancient documents that throw important new light on the early history of Christianity as an institution. The bulk of these documents was found in a cave at Nag Hammadi in Egypt and, taken together, they have become known as the “Gnostic Gospels.” This is also the title of a book by Elaine Pagels, the leading historical analyst on these documents.<sup>ii</sup> Her work is especially useful for the purpose of this book because she analyzes the Gnostic interpretation of Christ’s life and teachings by contrasting it to the orthodox version of Christianity that eventually prevailed, thereby illuminating the evolving nature of the Christian Church as an institution. Pagels’s discussion of these ancient texts will probably challenge the assumptions of many readers on the sensitive issue of religious doctrine, so once again I will quote extensively in order to assure the reader that I am not tilting the story.

As Pagels explains:

The Nag Hammadi texts, and others like them which circulated at the beginning of the Christian era, were denounced as heresy by orthodox Christians in the middle of the second century... This campaign against heresy involved an involuntary admission of its persuasive power; yet the bishops prevailed. By the time of the Emperor Constantine’s conversion, when Christianity became an officially approved religion early in the fourth century, Christian bishops, previously victimized by the police, now commanded them. Possession of books denounced as heretical was made a criminal offense. Copies of such books were burned and destroyed. But in Upper Egypt, someone, possibly a monk from a nearby monastery... took the banned books and hid them from destruction—in the jar where they remained buried for almost 1,600 years.

But those who wrote and circulated these texts did not regard *themselves* as “heretics”... Many claim to offer traditions about Jesus that are secret, hidden from “the many” who constitute what, in the second century, came to be called the “catholic church.” These Christians are now called Gnostics, from the Greek

word *gnosis*, usually translated as “knowledge.” For as those who claim to know nothing about ultimate reality are called agnostic (literally “not-knowing”), the person who does claim to know such things is called gnostic (“knowing”)... As the Gnostics use the term, we could translate it as “insight,” for *gnostic* involves an intuitive process of knowing oneself. And to know oneself, they claimed, is to know human nature and human destiny. According to the Gnostic teacher Theodotus, writing in Asia Minor (c. 140-160), the Gnostic is one who has come to understand. “who we were, and what we have become; where we were ... whither we are hastening; from what we are being released; what birth is, and what is rebirth. Yet to know oneself, at the deepest level, is simultaneously to know God; this is the secret of *gnosis*.”<sup>iii</sup>

Clearly the Gnostics were focusing intensely on the ultimate questions of the meaning of human existence, primarily by means of knowing one’s inner self. In terms of this book, they were focusing on the role of the unconscious in conscious behavior. Pagels briefly explains why the Gnostics were considered heretical by the Christians of the day who became known as “orthodox”:

Gnostic Christians undoubtedly expressed ideas that the orthodox abhorred. For example, some of these Gnostic texts question whether all suffering, labor and death derive from human sin, which, in the orthodox version, marred an originally perfect creation. Others speak of the feminine element in the divine, celebrating God as Father *and* Mother. Still others suggest that Christ’s resurrection is to be understood symbolically, not literally. A few radical texts even denounce catholic Christians themselves as heretics, who, although they “do not understand mystery ... boast that the mystery of truth belongs to them alone.” Such Gnostic ideas fascinated the psychoanalyst C. G. Jung: he thought they expressed “the other side of the mind”—the spontaneous, unconscious thought that any orthodoxy requires its adherents to repress.<sup>iv</sup>

Pagels goes on to examine what she believes to be the more fundamental reasons for the orthodox Christian leaders’ adamant opposition to the Gnostics. In her chapter, “One God, One

Bishop,” she cites the Gnostics’ challenge to the emerging church hierarchy of bishops, priests, deacons, and laity. For example, the author of the *Apocalypse of Peter* ridicules the claims of orthodox church officials: “Others... outside our number... call themselves bishops and also deacons, as if they had received their authority from God... Those people are waterless canals.” In contrast, says the *Tripartite Tractate*, “children of the Father [the Gnostics] ... join together as equals, enjoying mutual love, spontaneously helping one another [suggesting an emphasis on dB]. But the ... ordinary Christians wanted to command one another, outrivaling one another in their empty ambition; they are inflated with lust for power, each one imaging that he is superior to the others.” The Gnostics acted on their views in their worship services. For instance, one of their most severe critics, Iranaeus, explained: “When they met, all the members first participated in drawing lots. Whoever received a certain lot apparently was designated to take the role of *priest*; another was to offer the sacrament as *bishop*; another would read the Scriptures for worship, and others would address the group as a *prophet*, offering extemporaneous spiritual instruction. The next time the group met, they would throw lots again so that the persons taking each role changed continually.”<sup>v</sup> Given such radically different views of the proper authority structure of the Church, Pagels argues, it is no mystery why the orthodox hierarchy opposed the Gnostics.

In her chapter, “Gnostic: Self-Knowledge As Knowledge of God,” Pagels comes to what she believes was the most fundamental difference between the orthodox and gnostic views of the Christian faith. She starts by quoting from John 14:5, in which Thomas asks Jesus, “Lord, we do not know where you are going, how can we know the way?” She then quotes Jesus’ answer to the question in John 14:6 and the answer to the same question in Gnostic texts. In John, Jesus says, “I am the way, the truth, and the light; no one comes to the Father, but by me.” In the Gnostic *Gospel of Thomas*, the answer is: “There is light within a man of light, and it lights up the whole world. If he does not shine, he is darkness.” As Pagels says: “Far from legitimizing any institution, this [Gnostic] saying directs one instead to oneself—to one’s inner capacity to find one’s own direction, to the ‘light within.’” She then adds:

According to the [Gnostic] *Gospel of Thomas*, Jesus ridiculed those who thought of the ‘Kingdom of God’ in literal terms, as if it were a specific place. Instead, it is a state of self-discovery: Rather, the ‘Kingdom is inside of you, and it is outside of you. When you come to know yourselves, then you will be known, and you will realize that you are the

sons of the living Father.’ That ‘Kingdom,’ then, symbolizes a state of transformed consciousness.<sup>vi</sup>

In our terms, Jesus is advising us to be guided by our unconscious drives and by our conscience, not by external authorities.

The tensions around such fundamental differences in doctrine built to a crisis between the two branches of the church.

By the year 200, the battle lines had been drawn: both orthodox and gnostic Christians claimed to represent the true church and accused one another of being outsiders, false brethren, and hypocrites. How was a believer to tell true Christians from false ones? Orthodox and gnostic Christians offered different answers, as each group attempted to define the church in ways that excluded the other. Gnostic Christians,.. pointed to qualitative criteria.... Quoting a saying of Jesus (“By their fruits you shall know them”) that required evidence of spiritual maturity to demonstrate that a person belonged to the true church. But orthodox Christians, by the late second century, had begun to establish objective criteria for church membership. Who ever confessed the creed, accepted the ritual of baptism, participated in worship, and obeyed the clergy was accepted as a fellow Christian. So the orthodox Ignatius, Bishop of Antioch, defines the church in terms of the bishop, who represents that system: “Let no one do anything pertaining to the church without the bishop.... To join with the bishop is to join the church; to separate oneself from the bishop is to separate oneself not only from the church, but from God himself.” Apart from the church hierarchy, “there is nothing that can be called a church.”<sup>vii</sup>

The two sides of this dispute had pushed each other to extreme positions. The orthodox insisted that the religious faith of ordinary people must be entirely guided and ruled by an institutional authority. In contrast, the Gnostics insisted that there was no religious value at all in an institutional authority. (They both could have profited from the insights of the Constitution Framers, who saw the innate potential for goodness in humans but also recognized that humans were flawed, “not angels,” and therefore needed the institutional aids of government to stay on-track.)

In the end, the Gnostics were totally and brutally suppressed by Roman force, their Gospels were destroyed, and the Roman Catholic Church ruled through its hierarchy in dual harness with the Byzantine Emperors, beginning with Constantine the Great. In time, the position of the Pope, imbued with great power and wealth, undoubtedly became a tempting target for gifted free-riders, as we have already seen with emperors, kings, and CEOs. And indeed, history suggests that some popes probably were free-riders without conscience.

The clash of the Gnostics and the orthodox Christians sheds a most interesting, although disturbing, light on how the four-drive nature of human beings played out in this religious history. The defeat of the Gnostics might seem, from the passages I have quoted from Pagels, to be, in RD theory terms, a defeat for dB. In a shorter time frame this was true. However, in the longer term it can be seen as a victory for dB, perhaps an excessive victory. While the original Roman ‘converts’ to Christianity were probably being coerced to accept the Creed out of their fear of Roman power, their descendents would have learned to accept the tenets of the Church as a matter of sacred faith. In this way the creation of a Christendom encompassing nearly all of Europe was a case of the fulfillment of bonding on a huge scale. Constantine seems to have understood how important shared religious beliefs could be in binding a community together. Being, as I suspect, a free-rider, he was interested in how much power such a unified community could afford him and had no qualms about doing whatever it took to make the most of this powerful tool to bind his subjects together and strengthen his empire. He insisted at the Council of Nicea sessions that the fractious leaders of the orthodox Christian church all pledge allegiance to a single Christian doctrine, which he could then enforce with his power throughout the Roman Empire. This made it possible for him and the Pope to outlaw the Gnostics as “heretics” who would not pledge allegiance to the Creed.

In taking this decisive step, Constantine made Christianity so strong an institution that it not only supported, but long outlived the Roman and Byzantine empires. But at what a cost. By forcing obedience to a frozen creed, he dangerously shut down the spirit of open inquiry implicit in the drive to comprehend. This threw off the balance of the four-drive system. Any search for more accurate answers to any question was a threat: all answers were to come from the state-church hierarchy. This blocked the development of science and the search for new ways to increase economic productivity. Its excessive emphasis on dB created the unbridgeable gap in the population between the saved and the dammed. This set the stage for the executions of

heretics during the Inquisition. What's more, by enforcing total obedience to the church hierarchy, he made the Catholic Church vulnerable to being dominated by free-riders like himself.

While the Roman Church was later forced to share its dominion over Christianity with the Orthodox branch based in Constantinople, its central creed went basically unchallenged until Martin Luther once again proclaimed that each individual could reach for answers to the ultimate questions within his own inner soul without clerical intercession. Protestantism was launched and spawned its highly diverse denominations. The spirit of inquiry (dC) was released again to help restore the check and balance system of human nature. Pagels names the Quakers, the Society of Friends, as perhaps the most Gnostic-like denomination of them all today. They have no clerics and counsel one another as friends, in order to seek the "inner light," to be non-violent, and to be known to others by their "good works."

### **The Institution of Science and Human Meaning**

As indicated in Figure 4.2, I believe that the transition to civilization—the first big change in human affairs created and transmitted exclusively by culture—was initiated by four major technical innovations: settled agriculture, domestication of animals, metallurgy, and writing. These triggers of massive change can be ranked in importance with two earlier triggers, the control of fire and cooking and the development of language. The last transition of comparable importance was the emergence of systematic science, the current cutting edge of change.

While science had long played a role in human affairs, it became a trigger of significant change only in the last five centuries. The period known as the Enlightenment brought a flowering of scientific thinkers who built on one another's insights, addressing the whole range of topics that we now submit to systematic scientific inquiry.

Listing chronologically even a few of the names and their scientific fields of study will show the astonishing scope of the emerging sciences:

- Copernicus (1473-1543), the first modern astrophysicist, revolutionized thinking about the solar system.
- Bacon (1561-1626) provided the first explanation of the scientific method.
- Galileo (1564-1642) was the first systematic scientist of physics and general science.

- Harvey (1578-1657) discovered blood circulation and launched the science of physiology.
- Hobbes (1588-1679) was the first modern political scientist.
- Descartes (1596-1650) was a gifted mathematician and father of modern philosophy.
- Willis (1621-1675) was the father of modern neuroscience and neurology.
- Boyle (1627-1691) was the originator of modern chemistry.
- Locke (1632-1704) was a philosopher of cultural determinism and proposed the first modern model of constitutional government.
- Newton (1642-1727) was the first scientist who combined physics and advanced mathematics.
- Montesquieu (1689-1755) was the first modern political historian.
- Thomas Reid (1719-1796) was a pioneer of psychology who argued that all humans have the capacity to understand their environment with “common sense.”
- Hume (1711-1776) was the skeptical political scientist who influenced the Constitutional Framers.
- Adam Smith (1723-1790) was the first scientific economist and also a moral philosopher.
- Darwin (1809-1882) was the first to propose a general scientific theory of biology.

From this sustained burst of creativity, science has flowered and become so powerful an influence in human affairs that it is fair to say that it is now *the* cutting edge of change in the world. The benefits have been enormous. Science made possible the industrial and information revolutions as well as the revolution in health care. It has doubled the life span of the average human and triggered another wave of population growth. It has greatly increased human economic productivity, with corresponding increases in the standard of living. It has enabled people to use their bodies less as machines for heavy labor and more as equipment with which to guide machinery and to create new ideas, artifacts, and knowledge. It has enabled us to understand the smallest units of matter as well as the remotest objects in space and time. It has led to the mapping of the genome and of the details of the human body, most recently the brain.

Science has also brought great risks to humankind. Starting with the controlled use of gunpowder, it has escalated our capacity to harm each other, finally arriving at what seems to be the ultimate weapon of mass self-destruction, the nuclear bomb.

Throughout its comparatively short history, science has had a very different role to play in society than religion, even though it is clearly energized by the same drive to comprehend. Science, as an institution, has never explicitly taken upon itself the task of giving meaning to human life in the way that religion and art do. It has undertaken the specialized role of pursuing *natural* explanations of *all* phenomena, including the nature of humans. Yet science's string of successes, on its own limited terms, have been so spectacular—and not only continuous but accelerating—that it has become a giver of human meaning in spite of itself. It is science that has made it possible for humanity to set goals for itself such as continual material progress, mastery of the world and even our solar system, and the defeat of—rather than submission to—the major ills that have always beset us. Such goals were unimaginable before the rise of science; they seem both natural and uplifting now. Science, as an institution, has indeed made a profound impact on what it means to be human.

For a time, the various natural sciences were split out into separate disciplines, with each pursuing its own specialized questions. But over the last fifty years this fragmentation has reversed and great progress has been made in unifying these sciences—the goal that E. O. Wilson calls “consilience.” Now physicists, chemists, and biologists can generally work back and forth between their disciplines and explain a phenomenon of mutual interest in a shared language of scientific propositions.

Although human behavior is only one of the many phenomena that science has undertaken to explain, it is the topic that has brought science into its most intense conflict with religion. For here, too, science confers meaning without meaning to. As science advances in its search for natural causes, religion is inevitably forced to retreat as it loses its basis for one supernatural answer after another. Copernicus destroyed religion's supernatural belief in the earth as the center of the universe with the sun and stars revolving around it. Darwin's theory of evolution undercut religious belief in the direct and separate Divine creation of each and every species, especially humans. This process has been extremely distressing to the followers and leaders of all religions, as is painfully clear in the continuing rejection of Darwin's theory of human evolution by many religious believers.

Is it conceivable, in spite of their contentious, often bitter, history, to foresee a convergence of these two major realms of human life? Is any agreement even imaginable on the ultimate questions that humans everywhere persistently ask? Can the new findings of science,

when added to the most basic and enduring wisdoms of the traditional religions of the world, help us find shared avenues toward answers to these ultimate questions? These queries will be the focus of the remainder of this chapter. To answer them, I will draw both on neglected insights of Darwin and on the latest findings of astrophysics and brain studies.

### **Possible Convergence of Religion and Science on the Meaning of Human Existence?**

Let me now quote again the passage of Darwin that I cited earlier: “The belief in unseen or spiritual agencies...seems to be universal... Nor is it difficult to comprehend how it arose. As soon as the important faculties of the imagination, wonder, and curiosity, together with some power of reasoning, had become partially developed, man would naturally crave to understand what was passing around him, and would have vaguely speculated on his own existence.”<sup>viii</sup> Many people, if they did not know that these were Darwin’s words, would identify these comments as being of a religious nature. Yet Darwin was speaking as a scientist in making these statements about the universal nature of humans. Naturally, he expected his observations to be subject to the normal rules for testing scientific propositions. This by itself suggests convergence.

In Chapter 5, I also quoted Darwin at some length about morality. He said that a sense of morals would inevitably arise in any species with strong social instincts (dB in our terms) and significant reasoning powers (dC in our terms), and that the development of an innate moral sense or conscience in humans was by far the most important feature distinguishing humans from the lower animals. Again, most people, if they did not know the source of these comments, would take them to be religious. Yet Darwin was speaking about human behavior as a scientist. His propositions about morality and conscience are subject to empirical testing like any other scientific proposition. And the scientific study of the human drive to bond and the related innate moral sense is proceeding with this testing. Again, one senses convergence.

Finally, consider the sentence with which Darwin choose to conclude his revolutionary book, *On the Origin of Species*: “There is grandeur in this view of life: with its special powers having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms, most wonderful and beautiful, have been and are being evolved.”<sup>ix</sup> Again, we must recognize that Darwin, the ultimate scientist, was speaking as a scientist, not as a religious

leader. Yet he was speaking of the supernatural Creator of the universe and, via evolution, of all living creatures, especially humans. What a remarkable basis for convergence!

Can we possibly understand Darwin's last sentence as a scientific statement? If we can do this, Darwin will truly have shown us the way toward a convergence on the most basic issues addressed by religion, and, according to Darwin, also by the science of human behavior.

Although the several converging leads that Darwin offered were grossly neglected after his death, they have recently been revisited by a few scientists and religious scholars. There is, I believe, the very beginning of movement toward the unification of religion and science. What an achievement it is to even conceive of such an attempt. How many open festering wounds of the world might be healed if a convergence could actually take place?

Kenneth Miller, a biologist at Brown University, is the latest scholar to systematically address this issue. His book, *Finding Darwin's God: A Scientist's Search for Common Ground between God and Evolution*,<sup>x</sup> is a comprehensive report on the current dialogue between science and religion. Miller addresses all of the various attacks on evolutionary theory that have been generated by various religious leaders. He then assembles the detailed scientific evidence and totally discredits each of these attacks. This includes the most recent attack based on the "intelligent design" of life.<sup>xi</sup> In summary, he cites the conclusions of a 1998 report by the National Academy of Sciences: "Compelling lines of evidence demonstrate beyond any reasonable doubt that evolution occurred as a historical process." Miller himself says, "It is no longer possible to sustain scientifically the view that living things did not evolve from earlier forms or that the human species was not produced by the same evolutionary mechanisms that apply to the rest of the living world."<sup>xii</sup> The evidence is solid: Evolution is a fact, a proven theory.

Miller then asks why the religious attacks on evolutionary theory are so persistent and so deeply felt. He points out that it is partly because some evolutionary biologists have made very aggressive statements about the most basic religious doctrines. For example, he quotes the late-nineteenth-century German naturalist, Ernst Haeckel: "The cell consists of matter called protoplasm, composed chiefly of carbon with an admixture of hydrogen, nitrogen, and sulfur. These component parts, properly united, produce the soul and body of the animated world, and suitably nursed became man. With this single argument the mystery of the universe is explained,

the Deity annulled, and a new era of infinite knowledge ushered in.”<sup>xiii</sup> So much for the doctrine that God is the ultimate and original Creator.

Next he cites the biologist David Hull: “Whatever the God implied by evolutionary theory and the data of natural history may be like, He is not the Protestant God of waste not, want not. He is also not a loving God who cares about His productions. He is not even the awful God portrayed in the book of Job. The God of the Galapagos is careless, wasteful, indifferent, almost diabolical. He is certainly not the sort of God to whom anyone would be inclined to pray.”<sup>xiv</sup> So much for the doctrine that God is good, caring, and loving.

Next he cites Richard Dawkins, who argues that a world ruled by evolution is very different from one designed by a Creator. Such a world “would be neither evil nor good in intention. It would manifest no intentions of any kind. In a universe of physical forces and genetic replication, some people are going to get hurt, other people are going to get lucky, and you won’t find any rhyme or reason in it, nor any justice. The universe that we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil and no good, nothing but blind, pitiless indifference.”<sup>xv</sup> So much for God the purposeful Creator.

Finally, he cites Stephen Jay Gould’s position that the existence of humankind is a chance event, with a probability of one in a million or more. In his book, *Wonderful Life*, Gould calls the existence of humans “a wildly improbable evolutionary event,” “a detail, not a purpose,” and “a cosmic accident.”<sup>xvi</sup> So much for the idea that God created humans in His likeness.

This is extreme ideological warfare. Is it any wonder that religious leaders fight back? They feel, with the deepest conviction, that the view of the universe offered by Haeckel, Hull, Dawkins, Gould, and others is false at the most fundamental level. How can there be any convergence of these positions?

Miller then reverses his story and develops a step-by-step case for a possible convergence based on *scientific findings* that the biologists quoted above had not taken into account. He starts with Newton and his law of gravity as a way to address the fundamental question of whether the universe was created by an infinitely wise Creator with a purpose or by some natural process. Building on Newton’s ideas, physicists can now calculate the gravitational constant throughout the universe. It is, as I understand it, 0.000000000066732 meters cubed per kilogram per second squared. What if this value were just a little larger or a little smaller? “It turns out that the

consequences of even very small changes in the gravitational constant would be profound. If the constant were even slightly larger, it would have increased the force of gravity just enough to slow expansion after the Big Bang.”<sup>xvii</sup> Miller then quotes the world-famous mathematical physicist, Stephen Hawking: “If the rate of expansion one second after the Big Bang had been smaller [because of a larger gravitational constant] by even one part in a hundred thousand million million, the universe would have collapsed back into itself before it reached its present size.”<sup>xviii</sup> Conversely, Miller continues, “If it [the gravitational constant] had been smaller, the dust from the Big Bang would just have continued to expand, never coalescing into galaxies, stars, planets—or us. Moreover, gravity is only one of four fundamental forces in the universe. If any of the other three, the strong nuclear force, electromagnetism, and the resonance level of electrons, were of a different absolute value than they in fact are, life as we know it would be impossible.”<sup>xix</sup> In summary, he quotes Hawking again: “The odds against a universe like ours emerging out of something like the Big Bang are enormous. I think there are clearly religious implications.”<sup>xx</sup>

Hawking went on to make his implications even clearer: “This means that the initial state of the universe must have been very carefully chosen indeed if the hot big bang model was correct right back to the beginning of time. It would be very difficult to explain why the universe should have begun in just this way, except as the act of a God who intended to create beings like us.”<sup>xxi</sup> This amazing conclusion of Hawking’s is due to the incomprehensible enormity of the odds *against any natural explanation*. Remember that in the instant before the Big Bang all matter was contained in an infinitesimal space. Then in an infinitesimal dot of time it was released to follow the precise laws discovered by physics, becoming the still-changing vastness of our observed universe, including all living beings, including ourselves. Hawking came to his conclusion in his book, *A Brief History of Time*, after discussing in detail all the available alternative natural explanations of the Big Bang and finding each of them seriously flawed. While he does not totally rule out the possibility of finding a viable alternative natural theory to the Big Bang explanation in the future, he does not see *any* prospects.<sup>xxii</sup>

At this point people who understand and accept the basis for Hawking’s conclusion can feel *scientifically* justified in adopting either of two positions. Some people, probably many scientists, would declare themselves agnostics in the face of an unknowable mystery. Some people—certainly many religionists but also a growing number of scientists—would declare for

a supernatural Creator of the universe as the more probable hypothesis. I think these people would accurately be called Deists. (I confess that Hawking's arguments have moved me from the ranks of the agnostics to the ranks of the Deists.) No one, who agrees with Hawking's analysis, would be scientifically justified in dogmatically calling his or her self an atheist or a theist. Both groups, agnostics and Deists, might be able to agree that neither conclusion can *ever* be disproved by scientific testing. And, most importantly, both groups could potentially agree to respect the other group's way of thinking, even in disagreement. This, I argue along with Miller, might be the basis for a limited—but very important—form of reconciliation between science and religion.

Of course, both scientists and religionists currently have significant mental blocks standing in the way of reaching even such a limited agreement. The trouble for scientists is that the proposed resolution clearly violates the code of most scientists that they should *never* resort to supernatural explanations of events. Instead, they have been taught that, with sufficient creativity, persistent hard work, and some inspiration, they can eventually find a natural explanation for every phenomenon. This assumption is accepted as a matter of faith, of course, since no one can yet claim to have all the evidence needed to support it. But the record of science so far has supported this faith—all the way up to the Big Bang theory. And there it seems to stop. Here is how the well-known astrophysicist at USC, Robert Jastrow, expresses the mental problem that scientists face: “For the scientist, who has lived by his faith in the power of reason, the story ends as a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock; he is greeted by a band of theologians who have been sitting there for centuries.”<sup>xxiii</sup> Jastrow's story makes it clear why it will be so very difficult for scientists to acknowledge the implications of their own Big Bang theory of the creation of the universe. Some scientists are responding by desperately searching for alternative explanations which, for instance, postulate millions upon millions of universes popping off endlessly in the random search for a relatively stable, life-supporting universe like ours. But as other scientists point out, even such multiverse theories still beg the question of the “first mover.”

Obviously, Miller is one of the scientists who endorse the supernatural Creator hypothesis, but also, as the title of his book indicates, one who points to Darwin as the pioneer among modern scientists of that group. His argument moves on directly to the issue addressed in

this book, evolution and meaning of human behavior. Miller first cites Ian Barbour, the physicist and religious scholar: “Natural laws and choice may equally be instruments of God’s intentions. These can be purposeful without an exact predetermined plan.”<sup>xxiv</sup> This argument gets Miller around the teleological or deterministic hurdle. Miller then goes on to say, “Given evolution’s ability to adapt, to innovate, to test and to experiment, sooner or later it would have given the Creator exactly what He was looking for—a creature like us.”<sup>xxv</sup> This argument puts Miller clearly on the side of putting meaning into human existence. But his use of the word “looking” opens the door again to the teleological problem. Miller is suggesting that the Creator has an end-state intention for humans.

At this point, I will spell out how I think Miller is in error in this regard and what I see as the more clearly reasoned implications of the more probable scientific theory of the origin of the Big Bang. It may seem that, in doing this, I have joined the ranks of the religionists acting strictly on faith. But this is not the case. I will continue to speak as a scientist, exploring the logical implications of the *scientific* hypothesis that the universe had a supernatural Creator.

I would change one word in Miller’s sentence. I would substitute the word “hoping” for the word “looking.” The Darwinian theory of human behavior proposes that the human who emerged from the evolutionary process has a pre-wired *requirement* to make morally significant choices in a way that is *not* predetermined. Accordingly, it is as much within the power of humans to make choices that lead to the destruction of our species as it is to make choices allowing us to stay on the track of continued life and development. Logically, then, it must be the Creator’s *hope*—but not the Creator’s *will*—that humans, as part of the Creator’s Divine Experiment, can stay on the path of life. If it were the Creator’s *will* that we “succeed,” it does not seem logical that we would have been created with a capacity to fail instead.

Therefore, even though we, as humans, cannot expect to envision the Creator’s *hope* for our longer-term human story, we can judge whether or not we are staying on-track. Are we—as individuals, as members of collectives, or as an entire species—becoming more peaceable, more healthy, more prosperous, more knowledgeable, more caring, more just, more creative, and more secure in a sustainable relation with our earthly environment? And are we raising the next generation to excel on this path of *values* beyond our own achievements? These are the enduring values of all humankind that emerge from the wise interplay of all four drives. As the eminent sociologist George Homans argued, these values can never be satiated. This clearly is the path of

life. Or, on the other hand, are we becoming more violent, more exploitive, more addicted, more impoverished, more ignorant, more paranoid, and more destructive to our environment? By asking these questions, we can judge with reasonable accuracy whether we are fulfilling the Creator's *hope* for humankind as a species, and the Creator's *hope* for each and every human. Are we *staying on-track*? Are we making the *hard choices* that keep us on-track, the hard choices our brains are actually designed to make? These are the questions we must be asking ourselves over and over again. *Working on these questions is what it means to be human.* This is how humans can best experience a sense of fulfillment in their lives. These, I argue, are the logical implications of the more probable scientific hypothesis of the origin of the universe in the Big Bang, in combination with the renewed Darwinian theory of human behavior.

It also logically follows that the Creator can *never* intervene directly in human affairs if the Creator's *hopes* are to be fulfilled. Any intervention by the Creator, while arguably within the scope of the Creator's power, would signal a loss of faith in the human capacity to learn to make the right choices, the hard choices, by our own free will. Any intervention would signal the failure of the Creator's Experiment. This is the sound reason that many theologians have offered us as an explanation for the existence of human suffering and for the existence of evil in the world. We have been given the freedom to make mistakes, and even to be evil, as the price of having the freedom of choice in the first place. There is no other way. So we must accept that we, as a species, are steering on our own in the universe, either toward life or toward self-extermination. But here, too, there is evidence of convergence. The Darwinian theory of human behavior identifies us as a species, which has *evolved* to be a moral actor, a maker of hard choices. This is entirely consistent with those theologies that describe us as having been *created* to be a moral actor, capable of sin but not doomed to it.

We can take comfort in the thought that we must, by logic, be the "*hoped-for*" *species* for our tiny planet, although one hopes we are not the only such species in the vastness of the universe. Our species has come a very long way without self-destructing in some evolutionary cul-de-sac. We, as a part of the hominid line, have escaped some close calls and more such challenges must lie ahead. But we have moved well beyond a total reliance on the blind, random, trial-and-error process of natural selection. The accomplishments of our species to date are truly extraordinary.

It will clearly be difficult for mainstream scientists and for mainstream religious believers to embrace the convergence of beliefs offered above. Miller has reported, in a private conversation, that his book has generated about as much “hate” mail from scientists as from religious believers. The former would excommunicate him from the scientific community while the latter would dispatch him to hell.

I have already discussed above what makes it hard for scientists to accept convergence. What are the main mental sticking points for religious believers?

First, how can *all* religions come to believe they are *all* worshiping the same Creator? In this regard, science can help by providing the Big Bang theory as the ultimate argument for a single supernatural Creator. Every religious believer can potentially see that our one and only universe is the product of a single Big Bang (the scientific term for it is, in fact, a “singularity”) and thus, if it was produced by a Creator at all, it must have been produced by a *single* Creator. Each religion can still use their traditional symbols and rituals to worship the one Creator and all humans can be taught that all tribes have been “chosen” to be part of the chosen species of our planet. We are all one family.

The second sticking point may be more difficult to deal with. Most religious traditions have produced some ancient sacred documents. In some religions, these documents are seen as the revealed word of God, not as their human authors’ understanding of God’s word. This belief in direct Divine revelation chains religions to the particular words chosen by particular writers at particular (and generally remote) times. Some religious groups have avoided the freezing of scriptures and made them open to reinterpretation based on newer, verifiable knowledge. As an example of this, I refer the interested reader to *The Science of God*, by Gerald Schroeder,<sup>xxvi</sup> which demonstrates how the story of creation in the book of Genesis can be reinterpreted as a symbolic story that is amazingly consistent with the understanding of the creation developed by contemporary science.

For another example that bears on the argument of this book, consider *Genesis 3:4-7*:

And the serpent said unto the woman, ye shall not surely die: For God doth know that in the day ye eat thereof, [the fruit from the forbidden tree] then your eyes shall be opened, and ye shall be as gods, knowing good and evil. And when the woman saw that the tree was good for food, and that it was pleasant to the eyes, and a tree to be desired to make one wise, she took of the fruit thereof, and did

eat, and gave also unto her husband with her: and he did eat. And the eyes of them both were opened, and they knew that they were naked.

My argument is that when hominids evolved dB and dC, they lost their innocence and were forced to make moral choices between good and evil—the hard choices, God-like choices. And it was Eve’s deliberate choice of her “husband,” Adam, to whom to give the forbidden fruit, that pulled the men into sharing this state of the knowledge of “good and evil.”

For an additional example of this openness to current scientific findings, I refer readers to *Destructive Emotions*. This book reports on a conference held between a group of distinguished mind/brain scholars and a group of equally distinguished Buddhist scholars led by the Dalai Lama; the account is narrated by Daniel Goleman. The following excerpt from the foreword written by the Dalai Lama displays the spirit of exchange that characterized the conference:

For instance, when it comes to the workings of the mind, Buddhism has a centuries-old science that has been of practical interest to researchers in the cognitive and neurosciences and in the study of emotions, offering significant contributions to their understanding... On the other hand, Buddhism can learn from science as well. I have often said that if science proves facts that conflict with Buddhist understanding, Buddhism must change accordingly. We should always adopt a view that accords with the facts.<sup>xxvii</sup>

Each major religion has sub-groups that cover the spectrum from openness to convergence with science, as expressed by the Dalai Lama, to insistence on the literal interpretation of ancient texts in the face of all contradictory scientific evidence. I urge tolerance and patience for all sides while keeping the dialogue going. As the dialogue proceeds, I would urge all religious leaders to bear in mind that, since it is highly likely that some religious leaders have been free-riders, it is highly likely that some aspects of religious texts have been shaped by free-rider thinking. Purging all religious doctrines of such benighted influences would, I believe, greatly contribute to convergence, even as inaccurate scientific ideas also need to be discarded. We should remember that Constantine, a fee-rider, played a major role in drafting the Nicene Creed.

A recent book that plunges headfirst into this science-religion issue is Dennett’s *Breaking the Spell: Religion as a Natural Phenomenon*.<sup>xxviii</sup> It opens up to scientific inquiry an entire range of religious issues that have previously been considered out of bounds. I found his analysis of

many issues insightful and penetrating, even though he seems biased toward seeing more of the toxic than the beneficial effects of religion. Dennett also seems to be unaware of Hawking's observations about the origin of the Big Bang.

Even more recently Richard Dawkins has entered this fray with his blockbuster, challengingly titled book, *The God Delusion*. No discussion of the current dialogue between religion and science can ignore Dawkins' new entry. I am sorry to say that I have to challenge the conclusion that he has built into his book title, not only because I, of course, hesitate to question such an eminent and brilliant scientist, but even more because I find myself in total agreement with almost all of the lesser conclusions he makes on the way to stating his final conclusion. I could demonstrate this point about agreements by reciting them one by one but this would be totally redundant and boring. So I must focus my disagreement on his final conclusion. To say this in another way, I, as a scientist, acknowledge and deeply appreciate that science has found a multitude of natural explanations of phenomenon, whose greater accuracy can rightly claim to supercede prior supernatural religious explanations. I also understand how this record can have lead many scientists, including Dawkins, to believe they can go all the way to the displacement of all supernatural explanations.

However, as a scientist, I have learned, principally from Hawking, that science has not, and in all probability never can find a natural explanation of the start of the universe. It is precisely on this point that I strongly disagree with Dawkins. What is puzzling to me is that Dawkins cites Hawking's book, *A Brief History of Time*, and then proceeds to declare Hawking an atheist. His only direct quote of Hawking is the last sentence in his book, "For then we should know the mind of God" and Dawkins explains it away as being for "dramatic (or was it for mischievous?) effect."<sup>xxix</sup> Yet Hawking's book focuses on the possible explanations of the Big Bang, and came to the conclusions that are cited above. So how did Dawkins manage to declare Hawking an atheist and manage to ignore totally the findings of his book? He also makes very favorable mention of Miller's contributions to refuting the arguments of creationists, but totally ignores Miller's arguments, following Hawking and Darwin, for a supernatural origin of the universe. He also ignores other statements of Darwin, himself, that I will quote below. Dawkins may have sound, unstated scientific ways to refute the arguments of these authorities, but, on the other hand, he may be so committed to the scientific code of *no-supernatural- explanations-*

*permitted* that he cannot perceive the evidence that argues forcefully for making a single, albeit important, exception in regard to the Big Bang.

Looking to the future, scientists and religionists can be expected to continue offering speculations about their preferred explanations of the Big Bang. However, proof of the origin would seem to be forever beyond the reach of both of them. As humans, we need to learn to accept this fact of ultimate mystery. As James Carroll has said:

Religion is to God what the clock is to time. Religion participates in the mystery of what it represents but does not embody that mystery... That truth applies to religion and science both. And it is why, also, the language of science always leaves room for what is not known... We humans naturally reach toward transcendence, seeking symbols with which to make it present. Religion and science are ways of doing this. So are poetry and music. So, for that matter, is clockmaking. Yet transcendence, by definition, transcends. We should be modest, therefore, in the claims we make on the absolute. And equally modest in the claims we make on one another in its name.<sup>xxx</sup>

We are living in a time of heightened tension between the institution of science and the institution of religion, particularly between the evolutionary biologists and the fundamentalist wings of the major religions. We are also witnessing a backlash from these religious groups against the growing dominance of the materialistic, secular, science-oriented aspects of Western culture. These groups see some scientists arrogantly ridiculing the beliefs that put meaning in their lives and, as cited above, some scientists are still doing just that. Meanwhile, some religious leaders are still trying to harness the power of government to force their particular religious beliefs on others, as Constantine did long ago.

Yet I think there is reason for hope. Moving away from the arrogant “scientific” statements of some scientists and also away from the arrogant “religious” beliefs of some fundamentalists—and toward consilience—would clearly be good for everybody’s health. Of course, when Darwin wrote his final sentence in *The Origin of the Species*, he had no knowledge of the Big Bang creation of the universe, so his scientific hypothesis about the role of the supernatural in creation focused on the start of organic life on this planet. Today, research is proceeding with the exploration of various plausible natural explanations about the huge step from inorganic matter to organic life on earth. There seems to be a reasonable chance that, in

time, scientists will succeed in finding a valid natural explanation. But no such *natural* explanation is conceivable for the Big Bang.

In his *Autobiography* of 1878, his last book, Darwin shared his lifetime of reflections on religion.. He said that the time of the *Beagle* trip he was an orthodox Christian, but with some significant reservations about the Old Testament. He describes how his thinking evolved, “The state of mind which grand scenes formerly excited in me, and which was intimately connected with a belief in God, did not essentially differ from that which is often called the sense of sublimity; and however difficult it may be to explain the genesis of this sense, it can hardly be advanced as an argument for the existence of God, any more than the powerful though vague and similar feelings excited by music... Another source of conviction in the existence of God, connected with the reason and not with the feelings, impresses me as having much more weight. This follows from the extreme difficulty or rather impossibility of conceiving this immense and wonderful universe, including man with his capacity of looking far backwards and far into futurity, as the result of blind chance or necessity. When thus reflecting I feel compelled to look to a First Cause having an intelligent mind in some degree analogous to that of man; and I deserve to be called as theist.” At this point Darwin is arguing more like a Deist than a Theist. Perhaps he was not aware of the distinction. He continues. “This conclusion was strong in my mind about the time, as far as I can remember, when I wrote the *Origin of the Species*; and it since that time that it has very gradually with many fluctuations become weaker. But then arises the doubt—can the mind of man, which has, as I fully believe, been developed from a mind as low as that possessed by the lowest animal, be trusted when it draws such grand conclusions? May not these be the result of the connection between cause and effect which strikes us as a necessary one, but probably depends merely on inherited experience? Nor must we overlook the probability of the constant inculcation in a belief in God on the minds of children producing so strong and perhaps an inherited effect on their brains not yet fully developed, that it would be as difficult for them to throw off their belief in God, as for a monkey to throw off its instinctive fear and hatred of a snake. I cannot pretend to throw the least light on such abstruse problems. The mystery of the beginning of all things is insoluble by us; and I for one must be content to remain an Agnostic”<sup>xxxii</sup>

So, without the benefit of Hawking's analysis, Darwin traced his thinking between all the classic positions on religion, except never that of an Atheist. He leaves the question about the origin of all things where it still rests today, as forever insoluble.

Now that we have the benefit of Hawking's scientific analysis, I believe we can credibly envision the following scenario going forward: As scientists reflect and ponder further on the meaning of human existence in the light of the Big Bang and of the millions times millions times millions of Big Bang explosions needed before a universe such as ours could have been created by chance, they might, after checking out the mathematics, hear an inner voice clearly say: "Be still, and *know* that I am the Creator." And perhaps, as the mainstream religious believers of different faiths reflect and ponder on Darwin's concept of evolved morality and on Darwin's Creator, they will see, one by one, that they must all be members of the Creator's hoped-for species on earth and must all be worshipping the one Creator of our one and only universe. Then the scientists and the believers might reflect together on their new insights and join together in worshipful recognition of the Creator's universe, of the Creator's hope for humanity, and of the surpassing "grandeur of this view of life."

We can all be grateful that scientists have so diligently pursued natural explanations of all phenomena, all the way to the Big Bang, and that religious leaders have so tenaciously argued for the existence of a supernatural Creator. Only because of the persistence of both groups is the convergence of two seemingly irreconcilable positions at least within sight. Moving toward such a reconciliation can be an essential part of the larger human mission of helping our species stay on-track.

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<sup>i</sup> Darwin, 1998 [1871] *Descent*, p. 97.

<sup>ii</sup> Pagels, E., 1989, *The Gnostic Gospels*, New York, Viking Press.

<sup>iii</sup> Pagels, 1989, p xviii-xix.

<sup>iv</sup> Pagels, 1989, p. xxxv.

<sup>v</sup> Pagels, 1989, p. 41.

<sup>vi</sup> Pagels, 1989, p. 128-129.

<sup>vii</sup> Pagels, 1989, p. 104-105.

<sup>viii</sup> Darwin, 1998 [1871], *Descent*, p. 97.

<sup>ix</sup> Darwin, C., *The Origin of Species*, 6<sup>th</sup> ed. London: Oxford University Press, 1872, reprinted 1956, p. 560. The first edition of *The Origin of Species* did not contain the words "by the Creator" in the quoted sentence. These words were first added in the 2<sup>nd</sup> edition. However, as

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many scholars have pointed out, these words were clearly implied by the common usage of the times, “breathed into”.

<sup>x</sup> Miller, K., 1999, *Finding Darwin’s God: A Scientist’s Search for Common Ground Between God and Evolution*, New York, Harper Collins.

<sup>xi</sup> The “intelligent design” argument has relied heavily on the work of Michael Behe (see 1996, *Darwin’s Black Box: The Biochemical Challenge to Evolution*, New York, Simon and Schuster, which argues that genetic mutation could not have generated enough Variety for The Selection process to create complex organisms such as humans. The most recent and convincing rebuttal of Behe’s claim is presented in Kirschner M., and J. Gerhart, 2005, *The Plausibility of Life: Resolving Darwin’s Dilemma*, New York, Yale University Press.

<sup>xii</sup> From the Preface of *Teaching About Evolution and the Nature of Science*, 1998, Washington, D. C.: National Academy Press, p. 16.

<sup>xiii</sup> As quoted in Eiseley, L, 1958, *Darwin’s Century*, Garden City, N. Y.: Doubleday, p. 346.

<sup>xiv</sup> Hull, D. “The God of the Galapagos,” *Nature* 352 1991: 485-86.

<sup>xv</sup> Dawkins, R., 1995, *Out of Eden*, New York, Harper Collins, p. 132-133.

<sup>xvi</sup> Quoted from “Truly a Wonderful Life” an Internet review by Kurt P. Wise of Stephen J. Gould’s *Wonderful Life*,” in the Origins Research Archive of the Access Research Network, vol. 13, no. 1.

<sup>xvii</sup> Miller, 1999, p. 227.

<sup>xviii</sup> Hawking, S., 1988, *A Brief History of Time*, New York, Bantam Books, p. 121.

<sup>xix</sup> Miller, 1999, p. 228.

<sup>xx</sup> Boslough, J., 1985, *Stephen Hawking’s Universe*, New York, William Morrow, p.121.

<sup>xxi</sup> Hawking, 1988, p. 127.

<sup>xxii</sup> While the Big Bang theory about the start of our universe is the currently well-established explanation supported by the evidence from numerous astronomical findings, there are still a few dissenting physicists. For example one alternative theory known as the Quasi Steady State Universe has been proposed that was summarized in, Hoyle, F., Burbidge, G. and Narlikar, J. V., 2000, *A Different Approach to Cosmology: From a Static Universe Through the Big Bang Towards Reality*, New York, Cambridge University Press.

<sup>xxiii</sup> Jastrow, R., 1978, *God and the Astronomers* New York, W.W. Norton, p. 116.

<sup>xxiv</sup> Barbour, 1997, *Religion and Science*, San Francisco, Harper Collins, p. 216.

<sup>xxv</sup> Miller, K., 1999, p. 238-239.

<sup>xxvi</sup> Schroeder, G., 1997, *The Science of God: The Convergence of Scientific and Biblical Wisdom*, New York, The Free Press.

<sup>xxvii</sup> Goleman D., 2003, *Destructive Emotions*, p. xiv.

<sup>xxviii</sup> Dennett, D., 2006, *Breaking the Spell: Religion as Natural Phenomenon*, New York, Viking.

<sup>xxix</sup> Dawkins, R., 2006, *The God Delusion*, New York, Houghton Mifflin, p. 13.

<sup>xxx</sup> Carroll, J. “God’s Clock” *Boston Globe*, Dec. 14, 2004.

<sup>xxxi</sup> Darwin, C., *The Autobiography of Charles Darwin*, Edited by Nora Barlow, WW Norton, New York, 1958, p. 91-94.