

Evolution vs. Creationism

An Introduction

Second Edition

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FOREWORD BY NILES ELDREDGE

FOREWORD TO SECOND EDITION BY JUDGE JOHN E. JONES III



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CHAPTER 3



Beliefs: Religion, Creationism, and Naturalism

Because the methodology of science works so well, you will find people from every nation, religion, and culture using it. Science is recognized internationally as the best way to find out about the natural world. But the natural world is not the only thing that human beings ask questions about, are concerned about, or think about. In fact, in every known human society, from the most complex urban civilization to the simplest community of hunter-gatherers, most people believe that there is a universe or world or something beyond or other than this material one. Gods, spirits, ancestors, or other nonmaterial beings populate this something. Science doesn't tell us anything about this world; this transcendent world—if it exists—is the province of religion.

RELIGION

Americans are most familiar with the Middle Eastern monotheistic traditions of the Jews, Christians, and Muslims. These are known as Abrahamic religions because all three revere the patriarch Abraham, and their practitioners worship a single God who reveals himself through sacred writings (the Torah, the Bible, and the Koran). All human societies have religious beliefs, however, and it is important not to let our understanding of a human universal such as religion be limited only to that which is familiar to us. To understand religion, one must look beyond, as well as at, the great Abrahamic religions.

All human societies have some belief system that can be called religion. Some of these are believed in by hundreds of millions of people, such as Christianity, Islam, Confucianism, and Hinduism, whereas others are believed in by tribal groups whose numbers are reckoned in thousands or even fewer. With such a disparity of beliefs, can we find any commonalities?

One thing all religions appear to have in common is a belief in something beyond the material world, an ultimate or absolute or transcendent reality beyond the earthly. A sense of sacredness, awe, or mystery about this beyond is common to religious beliefs

and practices, and almost universal is the notion of spiritual (rather than mortal) beings that inhabit this realm and have special powers. These include gods, witches, powerful spirits, and the like. Most religions, though not all, include the concept of life after death, and most include a component of worship—ritual behavior associated with spiritual beliefs.

Intermediaries (such as priests and shamans) between people and the spiritual world are often very powerful and authoritative. Commonly there are special places for worship (such as temples, churches, holy sites) that are set apart from other sites (Stevens 1996). In virtually all religions, knowledge (about the supernatural; about where people, animals, and other natural objects came from; and about moral and ritual conduct) is obtained partly by revelation from supernatural sources. The gods of the Greeks revealed information through oracles, and the god of the Hebrews gave the Ten Commandments to Moses. Sometimes this revealed truth is recorded in texts that believers consider holy, such as the Koran of the Muslims, the Hindu Vedas, the Book of Mormon, or the New Testament of the Christians. Believers may dispute among themselves as to the proper interpretation of these holy texts.

How believers in a particular religion conceive of the ultimate varies enormously, from views similar to the Christian personal God to the considerably more diffuse Hindu conception of Brahma, a generalized “spirit behind, beneath, and beyond the world of matter and energy” (Raman 1998–1999: 6). Even within Christianity, the concept of God varies widely from an anthropomorphic creator God, such as that portrayed by Michelangelo on the ceiling of the Sistine Chapel, to a generalized force undergirding the universe that, although a source of awe, some Christians neither regard as a person nor pray to.

Human societies could not function without ethical systems—rules for behavior toward other people—and usually, though not universally, religion determines or at least strongly influences these systems. In many human societies, it is believed that rules for behavior are divinely revealed, such as the Ten Commandments, which Christians, Jews, and Muslims believe that God gave to Moses. Others may ascribe the rules for proper behavior to directives from ancestors, and still others have no supernatural source for their rules but attribute the origin of such rules to custom and tradition.

RELIGION AND EXPLANATION

Although the primary function of religion is to mediate between people and the gods or forces beyond everyday existence, it may additionally provide explanations of the natural world. In many human societies, natural phenomena are frequently explained by reference to supernatural causation. The sun shines or rain falls, but some sort of personal causation is involved in producing this effect. For example, the Brazilian Kuikuru people “know it was the wind that blew the roof off a house, but they carry the search for explanation one step further and ask, ‘Who sent the wind?’” A human or spirit personality “had to direct the natural force of the wind to produce its effect” (Carneiro 1983). Sickness; death; meteorological phenomena such as rain or tornadoes; the existence and location of mountains and other landforms; earthquakes; volcanoes; the passage of seasons; and the positions of the sun, stars, and planets also

frequently have religiously based explanations. In fact, for most people living in tribal, nonindustrial settings, the natural world and the spiritual world are not divided but are blended, in contrast to the modern Western cultural view.

In earlier times in Western society, it was common for biblical statements about the natural world to be accepted as authoritative and for God to be viewed as the direct cause of natural events. If plague struck a community or if a comet blazed across the sky, the event was attributed to the direct action of God, specially intervening in God's created world. Gradually, though, some of these statements in the Bible were discarded as they were found to be inaccurate—for example, that Earth is a circle (reflecting early civilization's belief that the world was disk shaped rather than spherical). Livestock breeders found that coat color in cattle was not affected by watering them at troughs in which peeled sticks had been placed (as claimed in Genesis 30:35–39), and thus the Bible came to be taken less as a source of information about the natural world and more as a guide to understanding the relationship of man to God. St. Augustine, among other early church leaders, argued in the fourth and fifth centuries that it was bad theology to accept biblical statements about the natural world uncritically if such statements contradicted experience. He felt that too-strict adherence to biblical literalism regarding statements about the natural world would diminish the credibility of proselytizers:

Usually, even a non-Christian knows something about the earth, the heavens, and the other elements of this world, about the motion and orbit of the stars and even their size and relative positions, about the predictable eclipses of the sun and moon, the cycles of the years and the seasons, about the kinds of animals, shrubs, stones and so forth, and this knowledge he holds to as being certain from reason and experience.

Now, it is a disgraceful and dangerous thing for an infidel to hear a Christian, while presumably giving the meaning of Holy Scripture, talking nonsense on these topics. . . . If they find a Christian mistaken in a field which they themselves know well, and hear him maintaining his foolish opinions about the Scriptures, how then are they going to believe those Scriptures in matters concerning the resurrection of the dead, the hope of eternal life, and the kingdom of heaven? How indeed, when they think that their pages are full of falsehoods on facts which they themselves have learnt from experience and the light of reason? (Augustine 1982: 42–43)

During the seventeenth and eighteenth centuries, science was developing as a methodology of knowing about the natural world. Natural philosophy, the study of nature, was regarded equally as a means to understand the mind of God and a means to understand the natural world. A considerable increase in knowledge about the natural world was obtained through the systematic methodology of science, in which natural phenomena were explained as instances of natural laws or theories. God was by no means ignored, but the focus was on discovering the laws that God had created. Isaac Newton, for example, was a highly religious man who sought to discover the natural laws by which God governed the universe. He felt that a God who worked through his created natural laws was a God more worthy of awe and worship than one who constantly intervened to maintain the universe. To Newton, God was more awesome if God caused planets to orbit about the sun using gravity than if God directly

suspended them. Of course, as an omnipotent being, God could intervene at any time in the operation of the universe—miracles were possible—but it was not considered blasphemous to conclude that God acted through secondary causes (interpreted to be God's laws).

By the mid-nineteenth century, the success of science as a way of understanding the natural world was clear. It was possible to explain geological strata, for example, by reference to observable forces of deposition, erosion, volcanism, and other processes rather than by reliance on the direct hand of God to have formed the layers. By the late nineteenth century, science was well on its way to avoiding even the occasional reliance on God as immediate cause and to invoking only natural causes in explaining natural phenomena. This change in emphasis occurred not because of any animosity toward religion; rather, limiting science only to natural causes came about because it worked: a great deal was learned about the natural world by applying materialist (matter, energy, and their interactions) explanations.

Twentieth- and twenty-first-century scientists limit themselves to explaining natural phenomena using only natural causes for another practical reason: if a scientist is "allowed" to refer to God as a direct causal force, then there is no reason to continue looking for a natural explanation. Scientific explanation screeches to a halt. If there were a natural explanation, perhaps unknown or not yet able to be studied given technological limits or inadequate theory, then it would never be discovered if scientists, giving up in despair, invoked the supernatural. Scientists are quite used to saying, "I don't know yet."

But perhaps the most important reason scientists restrict themselves to natural explanations is that the methods of science are inadequate to test explanations involving supernatural forces. Recall that one of the hallmarks of science is the ability to hold constant some variables to be able to test the role of others. If indeed there is an omnipotent force that intervenes in the material world, by definition it is not possible to control for—to hold constant—its actions. As one wag put it, "You can't put God in a test tube"; and, one must add, you can't keep God out of one, either. Such is the nature of omnipotence—by definition. So, because God is unconstrained, any test of an explanation that involves God would be impossible to set up: all results or outcomes of the test are compatible with God's acts.

As a result, scientists do not consider supernatural explanations scientific. We will encounter a contrary opinion when we discuss intelligent design. Of course, limiting scientific explanation to natural causes has been extraordinarily fruitful. In the spirit of the adage "if it ain't broke, don't fix it," scientists continue to seek explanations in natural processes when doing science, whether they are believers or nonbelievers in an omnipotent power.

A topic to which we will return at the end of the chapter concerns a difference between a rule of science and a philosophical view—between methodological naturalism and philosophical naturalism. We have been discussing a rule of science that requires that scientific explanations use only material (matter, energy, and their interaction) cause; this is known as methodological naturalism. To go beyond methodological naturalism to claim that the universe consists only of matter and energy—that is, that there is no God or, more generally, no supernatural entities—is philosophical naturalism. The two views are logically decoupled because one can be a methodological

naturalist but not accept naturalism as a philosophy. Scientists who are theists are examples: in their scientific work they explain natural phenomena in terms of natural causes, even if in their personal lives they believe in God, and even that God may intervene in nature.

Christianity and many other religions rely at least in part on truth revealed from God. When a revelation-based claim about the natural world is made, it may come into conflict with knowledge gained from experience—as St. Augustine described in the quote earlier in this chapter. A classic example of revealed truth conflicting with scientific interpretation is the seventeenth-century debate regarding the relationship of Earth to the other planets and the sun. Traditionally, the Bible was interpreted as reflecting a geocentric, or Earth centered, model of the universe. The sun and the other planets revolved around Earth. Early astronomers such as Copernicus and Galileo challenged the geocentric view, based on their empirical observations, inferences, and mathematical calculations, holding instead the heliocentric view that Earth and other planets revolved around the sun. The Catholic Church rejected these conclusions partly on scientific grounds, but primarily because heliocentrism contradicted the accepted interpretation of the Bible that Earth had to be the center of the universe. God had created humankind to worship him, and, in turn, had made the whole universe for us. Because Earth was the place where human beings lived, logically it would be the center of the universe. Bible passages such as Joshua 10:12–13 reinforced this view. In this passage, Joshua requests God to lengthen the day so his soldiers might win on the battlefield; God lengthens the day by stopping the sun, reflecting the geocentric model of the universe extant when the book of Joshua was set down. Although at one time, heliocentrism was considered blasphemous, today only a tiny fraction of Christians interpret the Bible as a geocentric document; for the vast majority of Christians, it is no longer necessary to interpret the Bible as presenting a geocentric cosmology.

CREATIONISM

Just as with *evolution*, the word *creationism* has a broad and a narrow definition. Broadly, *creationism* refers to the idea of creation by a supernatural force. To Christians, Jews, and Muslims, this supernatural force is God; to people of other religions, it is other deities. The creative power may be unlimited, like that of the Christian God, or it may be restricted to the ability to affect certain parts of nature, such as heavenly bodies or certain kinds of living things.

The term *creationism* to many people connotes the theological doctrine of special creationism: that God created the universe essentially as we see it today, and that this universe has not changed appreciably since that creation event. Special creationism includes the idea that God created living things in their present forms, and it reflects a literalist view of the Bible. It is most closely associated with the endeavor of “creation science,” which includes the view that the universe is only 10,000 years old. But the most important aspect of special creation is the idea that things are created in their present forms. In intelligent design creationism, for example, God is required to specially create complex structures such as the bacterial flagellum or the body plans of animals of the Cambrian period, even though many if not most intelligent design proponents accept an ancient Earth.

It is important to define terms and use them consistently. In this book, the usual connotation of *creationism* will be the Christian view that God created directly. Special creationism is the most familiar form of direct creationism, but some Christians view God as creating sequentially rather than all at once. Later in this chapter, readers will be introduced to a range of religious views about creationism and evolution that will help clarify these relationships.

ORIGIN MYTHS

All people try to make sense of the world around them, and that includes speculating about the course of events that brought the world and its inhabitants to their present state. Stories of how things came to be are known as origin myths. They are tied to the broad definition of creationism.

Now, just as the word *theory* is used differently in science than in casual conversation (see chapter 1), so the word *myth* is a term of art in the anthropological study of cultures. The common connotation of *myth* is something that is untrue, primitive, or superstitious—something that should be discounted. Yet when anthropologists talk of myths, it is to describe stories within a culture that symbolize what members of the culture hold to be most important. A culture's myths are unquestionably important, and *myth* is not a term of denigration.

Rather than being dismissible untruths, myths express some of the most powerful and important ideas in a society. In societies dependent on oral tradition rather than writing, myths reinforce values and ideals and help to transmit them from generation to generation. Myths in this sense are true even if they are fantastic and deal with impossible events or have actors who could not have existed—like talking steam engines. Because myths encapsulate important cultural truths, anthropologists recognize that they are vitally important to a society and deserve respect. In the anthropological study of cultures, the term *myth* is not pejorative. Myths are of great importance.

Although myths tend to be more common in nonliterate societies, they occur even in developed countries like our own. The children's story of *The Little Engine That Could*, for example, is a classic myth that expresses an important value in American culture: persevering in the face of adversity. The Horatio Alger myth of the poor but plucky youth who achieves success through hard work, pulling himself up by his bootstraps, is classically American. Both of these secular myths also express the American value of individualism—something quite characteristic of our culture. Mythical elements arise around historical and popular heroes as well: there are many myths associated with Abraham Lincoln and George Washington, for example.

Some myths are secular and others are religious, but all involve a symbolic representation of some societal or human truth. In the mythology of the ancient Greeks, the goddess Persephone joins her husband Hades below the surface of Earth for part of the year. When she is gone, her mother, Demeter, the goddess of growing things, laments her absence, and winter comes. In the spring, when Persephone rejoins her mother, the world becomes green and fertile again. The story of Persephone and Hades not only symbolizes the passage of seasons but also is a metaphor of the human realities of death and birth. Chinese culture reflects a strong sense of the importance of balancing

opposites: yin and yang, light and dark, hot and cold, good and evil, wet and dry, earth and sky, female and male—there are many examples of this duality. A Chinese origin myth reflects this important cultural concern of balance: the creator god Pan Gu separates chaos into these opposites and establishes a series of dualities, including the separation of earth from sky, and other elements of the physical universe.

Some cultures have myths about creator figures or heroes who establish legitimacy for tribes or kin groups within a tribe by giving certain people particular lands, objects, or rituals that only they can use (Leeming and Leeming 1994). The telling of these myths may be incorporated in rituals that remind people of the relationships among people in society, as well as relationships between groups. They can also be art forms: myths are often a form of literature as well as a means to promote the continuity of a culture. And in truth, stories are more meaningful and much easier to remember than lectures—a principle doubtlessly recognizable to anyone who has been a student!

Just as do tools and language, myths spread from people to people in a process anthropologists call diffusion. Humans necessarily must live near water, and after agriculture was invented, human settlements tended to congregate in river valleys, where control of water for agriculture often was the basis for political and religious power. Floods are not uncommon in such environments, and overflowing rivers may be a source of the fertility that attracts people to such settings. So, it is not surprising to find that the early agricultural societies of the Middle East all possessed versions of a flood myth and a hero who survived it on a raft or boat: the Babylonians (Utnapishtim), Sumerians (Ziusudra), Indians (Manu), Greeks (Deucalion and Pyrrha), and Hebrews (Noah). Similarities in the flood myths of all of these groups suggest considerable diffusion—but there are differences as well, which presumably reflect individual cultural elements. After all, myths are symbolic of what is important to a people—and what was important to the Babylonians differed from what was important to the Hebrews, to take just one pair.

Sometimes as cultures come in contact with one another, new ideas and practices replace old ones, but more frequently cultural elements are borrowed and recombined. When the African Efe people encountered Christian versions of creation from Genesis, what eventually emerged was a combination origin myth incorporating a traditional female moon figure who helps the high god create human beings. He commands the people not to eat the fruit of the tahu tree, but one of the women disobeys. The moon sees her and reports her to the high god, who punishes human beings with death. If you are familiar with the biblical Adam and Eve story, you can see how the Efe adapted components of this creation myth.

Types of Origin Myths

Although origin myths are quite varied, they can be grouped into types. The origin myth of the Cubeo people of Colombia presents the world as always having existed, without a specific origin event, but most myths include a beginning time or event. Several cultures believe that in the beginning was a “cosmic egg,” which either breaks like a familiar bird’s egg to let forth a creator god (the Chinese Pan Gu, the Polynesian Ta’aroa, or the Hindu Prajapati) or is itself laid by a deity and hatches into elements of the universe. The myth of the Pelasgians of ancient Greece, for example, featured

a cosmic egg laid by the goddess Eurynome, which hatched into the sun, moon, and stars as well as plants and animals (Leeming and Leeming 1994).

The beginning period might be a time of chaos, usually watery and dark, with supernatural beings emerging from a void. Perhaps reflecting a normal human preference for order and predictability over disorder and chaos, many origin myths attempt to explain how an orderly, understandable world emerged from frightening, formless disorder. Many traditions, such as that of the Native American Hopi people, speak of a time when human beings lived underground and emerged to the upper world when led there by a spirit figure or god. Many origin myths describe the creation of Earth as resulting from the dismembering of a god or previous spirit: the Norse god Odin creates the mountains, seas, and other geographical features from the body of the slain giant Ymir; the Babylonian god Marduk creates the world from the body of the slain mother figure Tiamat.

The origin myths of North American Indian groups frequently include the earth-diver motif, in which a god or messenger is commanded to dive into the formless waters and bring up mud or silt, which is made into dry land. Earth-diver myths are common, ranging from Eastern Europe throughout Asia and into North America. The motif is even found in some Melanesian tribes of the Pacific.

Genesis Symbolism

The story of Creation in the biblical book of Genesis symbolizes many things to people of Abrahamic faiths. Because they were migratory, and because they were located at a geographical crossroads, ancient Hebrews encountered many other Middle Eastern groups; as is typical in culture contact, they borrowed from neighbors and shared their own heritage. Origin myths of most of the Middle Eastern cultures, for example, included the motifs of the creation of humans from clay, as well as a primordial, chaotic state composed of water. The Genesis creation story derives in part from earlier Middle Eastern traditions from Babylonia and Persia, but with important differences.

According to the theologian Conrad Hyers, the ancient Hebrews found themselves surrounded by other tribes that worshipped multiple gods, a practice called polytheism. Of central importance to the Hebrews, and their major distinction among their neighbors, was their belief in one god (monotheism), and maintaining this belief (especially in the face of conquest) was difficult. The Hebrews were variously conquered by Egyptians, Assyrians, Babylonians, and Persians, which meant that remaining true to their traditions and avoiding absorption was a constant challenge. There was much pressure on the Hebrews to adopt the gods and idols of their neighbors. According to Hyers, the religious meaning of Genesis is largely to make a statement to both Hebrews and surrounding tribes that the one god of Abraham was superior to the false gods of their neighbors: sky gods (the sun, the moon, and stars), earth gods, nature gods, light and darkness, rivers, and animals (Hyers 1983). As Hyers (1983: 101) puts it, "Each day of creation takes on two principal categories of divinity in the pantheons of the day, and declares that these are not gods at all, but . . . creations of the one true God who is the only one. . . . Each day dismisses an additional cluster of deities, arranged in a cosmological and symmetrical order."

So on day 1 (“Let there be light”), God vanquishes the pagan gods of light and darkness. Similarly, gods of the sky and seas are displaced on day 2, while Earth gods and gods of vegetation are done away with on the third day. On the fourth day God creates the sun, moon, and stars, thereby establishing his superiority to them, and the fifth day removes divinity from the animal kingdom. Finally, on the sixth day God specially creates human beings, which takes away from the divinity of kings and pharaohs—but because God creates humans as his own special part of creation (in God’s image), all human beings are in some degree divine.

Genesis also described the nature of the Hebrew God. Unlike the gods of other Middle Eastern groups, the Hebrew God was ever present. Unlike the high god Marduk of the Mesopotamians, the Hebrew God did not originate from the actions of some other god or preexisting force. Genesis also suggests that God is omnipotent; unlike the Mesopotamian or Sumerian gods, the Hebrew God does not require preexisting materials from which to assemble creation but speaks (wills) the universe into being. God is also moral, being concerned with good and evil, which contrasts strongly with the gods of the Hebrews’ neighbors, who seem to govern in a universe that has little meaning or purpose. The Bible’s God also is not part of nature, as some of the gods of others, but stands outside of nature as its creator (Sarna 1983).

Genesis also tells of the nature of humankind, “a God-like creature, uniquely endowed with dignity, honor, and infinite worth, into whose hands God has entrusted mastery over His creation” (Sarna 1983: 137). God forms the universe, making Earth the most important component and humans its most important creature, having been given dominion over all other creatures and Earth itself. Humanity’s responsibility is to husband the Earth but also to worship and obey God. Much of Genesis, especially the stories of Adam and Eve and of Noah and the Flood, reflect these themes; Adam and Eve are cast out of Paradise for disobeying God, and Noah is rewarded for his obedience and faith by being chosen to survive the Flood.

Thus, Genesis reflects the character of a classic origin myth: it presents in symbolic form the values ancient Hebrews felt were most important: the nature of God, the nature of human beings, and the relationship of God to humankind. Hebrews distinguished their God from those of their neighbors and presented God’s deeds in their oral traditions and, eventually, in written form. Some of these writings were selected over time to become the Old Testament of the Bible.

Modern Jews, Christians, and Muslims all revere the Bible as a sacred book, but each of the Abrahamic faiths has different interpretations of many of the events depicted—and differences of interpretation occur within the three faiths as well. For example, in contrast to the early Hebrew view, some modern Christians and Jews do not necessarily see God as separate from God’s creation. There are also differences in beliefs among sects as to the amount that God intervenes in the world, and the nature and even the existence of miracles. Yet as did the ancient Hebrews, the Abrahamic faiths generally agree that God is omnipotent and good and that human beings are responsible to God. As will be discussed later, there are vast differences among believers as to specifics of faith, such as how literally the Bible should be read. Christians, Jews, and Muslims all have constituent sects that demand that the holy texts (Bible, Koran, or Torah) be read literally, and all have sects that feel many or most passages should be read symbolically.

AMERICAN RELIGIONS

Americans practice a large number of religions, but the religion with the most adherents by far is Christianity. According to several polls, upward of 85 percent of Americans describe themselves as Christian. Scholars at the City University of New York (CUNY) conducted the largest survey of American religious views in 1990. In the National Survey of Religious Identification (NSRI), researchers conducted a telephone survey of 113,723 adults, randomly chosen, with results statistically weighted to reflect American demographic characteristics (Kosmin and Lachman 1993). The percentage of error in a survey of this size is less than 0.5 percent.

Respondents were asked a simple question—"What is your religion?"—and answers, as well as information on geographic location, age, sex, income, and so on, were tabulated. The results of the survey are presented in Table 3.1.

The religious profile of Americans in the 1990 NSRI study is echoed in other surveys conducted during that decade. In a 1996 poll conducted by the humanist publication *Free Inquiry*, 90.7 percent of Americans stated that they have a religion, with 83.8 percent identifying as either Catholic or Protestant (*Free Inquiry*, 1996). A Gallup poll conducted in December 1999 similarly found that 94 percent of Americans identified themselves as believing in God on a higher power, and only 5 percent stated that they did not (New Port 1999).

However, a 2001 follow-up survey by the NSRI investigators showed some changes in this religious profile. Using a smaller but still very large sample of 50,281 individuals, investigators found that the percentage of Americans professing belief in God had declined from 89.5 percent to 80.2 percent, as had the percentage of Christians (from 86.2 percent to 76.5 percent) (Kosmin, Mayer, and Keysar 2002). The largest increase was in the percentage of nonbelievers, which increased from 8.2 percent in 1990 to 14.1 percent in 2001. The American population might be becoming more secular, although another possible explanation for the different results might be a change in how the question about religious adherence was asked. In 1990, the question asked was "What is your religion?" In 2001, the question was, "What is your religion, if any?" Perhaps being reminded of the option of not being religious might have increased the number of people who thus classified themselves (see Table 3.1 for these more recent data).

Similar results were found in a survey conducted in 2007 by the Pew Research Foundation (Pew Forum on Religion and Public Life 2008); they are presented in Table 3.1. The Pew U.S. Religious Landscape Survey was another large telephone survey involving about thirty-six thousand adults. Interviewers asked respondents, "What is your present religion, if any?" and then prompted the respondent with a list of denominations. All three surveys found high percentages of Americans professing religion, and high percentages identifying themselves specifically as Christian. The two most recent surveys suggest that secularism may be increasing; the percentage claiming no religion, although relatively small, is greater than it was in 1990. With samples as large as these, the margin of error is less than 1 percent, which makes the results quite reliable.

But whether the percentage of Christians is near 80 percent or 70 percent, it is nonetheless true that Christians are the largest religious group in the United States. It

Table 3.1
American Religious Profiles

	1990 (%)	2001 (%)	2007 (%)
Religious	89.5	80.2	82.1
Christian	86.2	76.5	78.4
Non-Christian	3.3	3.7	4.7
Jewish	1.8	1.3	1.7
Muslim	0.5	0.5	0.6
Other non-Christian	1.0	1.9	2.4
No religion	8.2	14.1	16.1
Refused to state	2.3	5.4	0.8

Source: 1990: Kosmin and Lachman, 1993; 2001: Kosmin et al., 2001; 2007: Pew Forum on Religion and Public Life, 2008.

is also true that in international comparisons, Americans rank highly in the percentage of adults who believe in God.

Christians can be further broken down into conservative or born-again Christians on the one hand and mainstream Christians on the other. Conservative Christians are those who believe that they have a personal relationship with Jesus and who tie salvation to this belief. A greater percentage of conservative Christians than mainstream Christians regard the Bible as being literally true, according to a poll conducted by the Barna organization (Barna 2007). Most conservative Christians are Protestants, but some Catholics hold the same beliefs, especially those who embrace charismatic Catholicism.

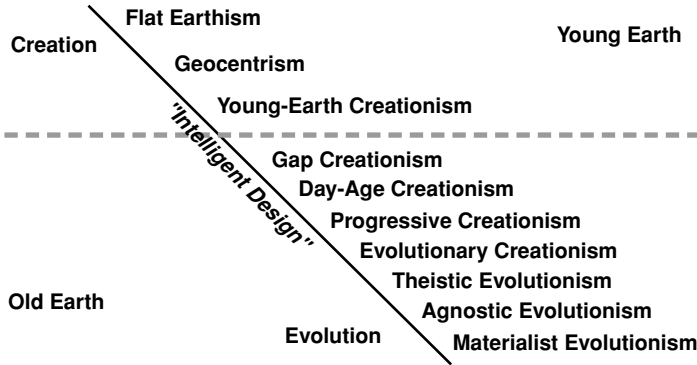
Antievolutionism in North America is rooted in religiously conservative Christianity; there are few if any activist Jews or Muslims who oppose evolution in North America, and only small antievolution movements in Islamic countries such as Turkey and in the Jewish state of Israel. Although minority religions are growing in the United States, it is clear that Christianity is now, and for the near and intermediate future will be, the predominant American religious tradition. Because of their numbers and their prominence in the antievolution movement, the rest of this chapter will concentrate on Christians.

Many people are under the impression that there is a dichotomy between evolution and Christianity, a line in the sand between two incompatible belief systems. These people believe that a person must choose one side of the line or the other. In reality, Christians hold many views about evolution, and Christian views actually range along a continuum rather than being separated into a dichotomy.

THE CREATION/EVOLUTION CONTINUUM

Figure 3.1 presents a continuum of religious views with creationism at one end and evolution at the other. The most extreme views are, of course, at the ends of the continuum. The creation/evolution continuum reflects the degree to which the Bible is interpreted as literally true, with the greatest degree of literalism at the top.

Figure 3.1
The relationship between evolution and creationism in Christianity is a continuum, not a dichotomy between two choices. Courtesy of Alan Gishlick.



Although it is a continuum of religious and philosophical beliefs, the creation/evolution continuum inversely reflects how much of modern science holders of these different views accept. I will begin with the strictest biblical literalists, the flat earthers. (For readers not familiar with the Bible, references take the form of book, chapter: verse; thus, Genesis 1:4 refers to the book of Genesis, chapter 1, verse 4.)

Flat Earthism

Until his death in March 2001, Charles K. Johnson of Lancaster, California, was the head of the International Flat Earth Research Society, an organization with a claimed membership of 3,500 (Martin 2001) that may not long outlive its leader's demise. Johnson—and we assume the members of his society—were very serious about their contention that the shape of Earth is flat rather than spherical, because they are the most strict of biblical literalists. Few other biblical literalists hold to such stringent interpretations of the Bible. To flat earthers, many passages in the Bible imply that God created an Earth that is shaped like a coin, not a ball: flat and round at the edges. Earth's disklike (not spherical) shape reflects biblical passages referring to the "circle" of the Earth (Isaiah 40:22) and permits one to sail around the planet and return to one's starting point: one merely has to sail to the edge of Earth and make the circuit.

Because their theology requires the Bible to be read as literally true, flat earthers believe Earth must be flat (Schadewald 1991). The Englishman responsible for the nineteenth-century revival of flat earthism, Samuel Birley Rowbotham, "cited 76 scriptures in the last chapter of his monumental second edition of *Earth Not a Globe*" (Schadewald 1987: 27). Many of these refer to "ends of the Earth" (Deuteronomy 28:64, 33:17; Psalms 98:3, 135:7; Jeremiah 25:31) or "quadrants" (Revelation 20:8). For flat earthers—and other literalists—the Bible takes primacy over the information provided by science; thus, because modern geology, physics, biology, and astronomy contradict a strict biblical interpretation, these sciences are held to be in error.

Geocentrism

Geocentrists accept that Earth is a sphere but deny that the sun is the center of the solar system. Like flat earthers, they reject virtually all of modern physics and astronomy as well as biology. Geocentrism is a somewhat larger, though still insignificant, component of modern antievolutionism. At the Bible-Science Association creationism conference in 1985, the plenary session debate was between two geocentrists and two heliocentrists (Bible-Science Association 1985). Similarly, as recently as 1985, the secretary of the still-influential Creation Research Society was a published geocentrist (Kaufmann 1985).

Both flat earthers and geocentrists reflect to a greater or lesser degree the perception of Earth held by the ancient Hebrews, which was that it was a disk-shaped structure (Figure 3.2). They believed that the heavens were held up by a dome (*raqiya* or firmament) that arched over the land and that water surrounded the land. The firmament was perceived as a solid, metal-like structure that could be hammered and shaped (as in Job 37:18: “Can you, like him, spread out the skies, hard as a molten mirror?” [All biblical quotes are from the Revised Standard Bible, Zondervan, 1981]). The surface of the firmament is solid enough that God can walk on it (as in Job 22:14: “Thick clouds enwrap him, so that he does not see, he walks on the vault of heaven”). The sun, moon, and stars were attached to the firmament, which means that these heavenly bodies circled Earth beneath the firmament and, hence, were part of a geocentric universe. Further support for the idea of a solid sky and a geocentric solar system is found in Revelation 6:13–16: “and the stars of the sky fell to the earth as the fig tree sheds its winter fruit when shaken by a gale; the sky vanished like a scroll that is rolled up.” Stars were regarded as small, bright objects rather than massive suns hugely larger than Earth. They could fall on Earth because they were below the firmament, a solid object that, if rolled aside, would reveal the throne of God (Schadewald 1987, 1981–1982).

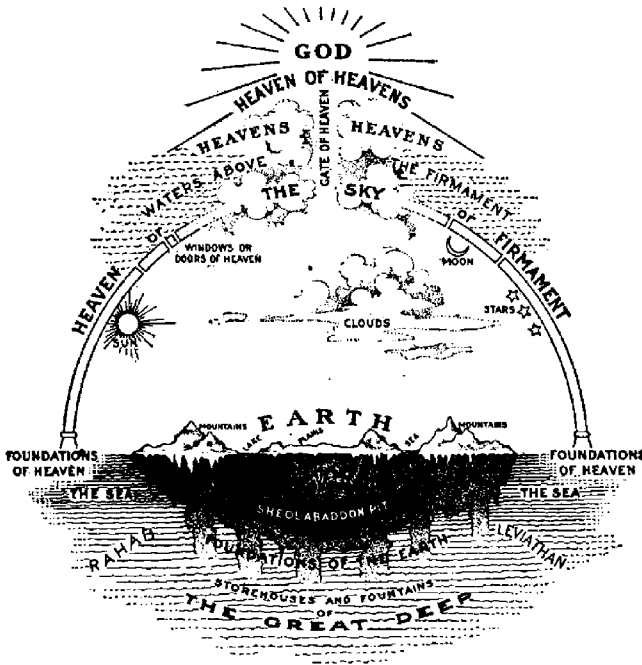
The Bible also speaks of the waters above the firmament; ancient Hebrews conceived of the firmament supporting a body of water that came to Earth as rain through the “windows of heaven” and was the source of the forty days and nights of rain that began Noah’s Flood.

Ancient and modern geocentricity reflects the idea that because the Earth and its creatures—especially humans—are central to God. To symbolize this importance, God would have made Earth the center of the universe. Taking Earth out of this central position reduces its importance, which reduces (according to their interpretation) man’s place as the most important element in creation. Although not actively supporting geocentrism, young-Earth creationist astronomer D. Russell Humphreys has promoted the idea of the centrality of Earth and humans by claiming that Earth is at the center of the universe (Humphreys 2002). His conception of cosmology has the central Earth surrounded by galaxies and ultimately a sphere of water that is light-years in diameter (the “waters which were above the firmament” of Genesis 1:7) (Humphreys 2007; see Figure 3.3).

The next group of creationists on the continuum are less biblically literalist than the previous two, but all three endorse the theological doctrine of special creationism, which stresses the view that God created the universe, Earth, plants, and animals,

Figure 3.2

An early twentieth-century conceptualization of ancient cosmology. Early Hebrews conceived of the universe as consisting of a disk-shaped Earth that was the center of the cosmos, in which a domelike sky was supported by pillars of heaven. From Robinson (1913), frontispiece.



THE ANCIENT HEBREW CONCEPTION OF THE UNIVERSE

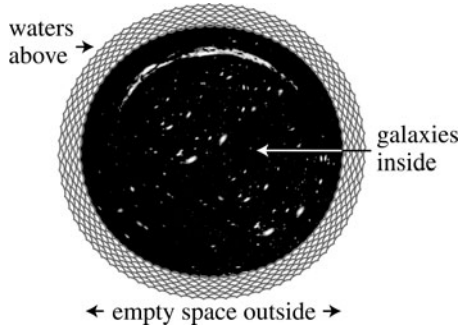
TO ILLUSTRATE THE ACCOUNT OF CREATION AND THE FLOOD

and humans in essentially their present form. The most common form of special creationism holds that the creation event took place relatively recently, and is thus called young-Earth creationism.

Young-Earth Creationism

Few proponents of young-Earth creationism interpret the flat Earth and geocentric passages of the Bible literally. They accept heliocentrism but reject the conclusions of modern physics, astronomy, chemistry, and geology concerning the age of Earth, and they deny biological descent with modification. Earth, in their view, is between 6,000 and 10,000 years old. They reject the Big Bang theory and postulate catastrophic mechanisms as the cause of most of the world's geological features. The Flood of Noah, for example, is allegedly responsible for carving the Grand Canyon and other geological features.

Figure 3.3
Humphreys's model of the universe.
 The young-Earth creationist Russell Humphreys envisions the cosmos as spherical, with galaxies and all other phenomena surrounded by a layer of water. This view is derived from the biblical reference to "waters above the firmament." Courtesy Sarina Bronson.



Young-Earth creationists (YECs) reject the inference that earlier forms of life are ancestral to later ones. Instead, they embrace the special creation of separate "kinds" of plants and animals, as stated in Genesis. The definition of kinds is inconsistent among YECs but usually refers to a higher taxonomic level than species. Most YECs accept that God created creatures possessing at least as much genetic variation as occurs within a biological family (for example, the cat family Felidae, the cattle family Bovidae) and then considerable evolution within a kind occurred. The created cat kind thus would have possessed sufficient genetic variability to differentiate into lions, tigers, leopards, pumas, bobcats, and house cats, through the normal microevolutionary processes of mutation and recombination, natural selection, genetic drift, and speciation. Most YECs view the basic body plans of major phyla that appear in the Cambrian explosion as evidence of special creation.

The term *young-Earth creationist* is often associated with the followers of Henry Morris, founder of the Institute for Creation Research (ICR) and arguably the most influential creationist of the second half of the twentieth century. He and John C. Whitcomb Jr. published *The Genesis Flood*, a seminal work that claimed to provide a scientific rationale for young-Earth creationism (Whitcomb and Morris 1961). As the title suggests, the authors read Genesis literally, including not just the special, separate creation of humans and all other kinds of plants and animals but also the historicity of Noah's Flood. Whitcomb and Morris proposed that there is scientific evidence to demonstrate the truth of special creationism: Earth is young, the universe appeared in essentially its present form about 10,000 years ago, and plants and animals appeared in their present forms as created kinds rather than having evolved over millions of years through common ancestors. Although efforts were made during the eighteenth and nineteenth centuries to claim that a literal interpretation of the Bible is compatible

with science, *The Genesis Flood* was the first twentieth-century effort to attract a large following. Religious antievolutionists were greatly encouraged by the thought that there might be evidence that evolution was not only religiously objectionable but also scientifically flawed. Creation science has been augmented by hundreds of books and pamphlets written by Morris and those inspired by him (McIver 1988). More on Morris and young-Earth creationism can be found in Chapter 5.

Old-Earth Creationism

As mentioned, the idea that Earth is ancient was well established in science by the mid-1800s and was not considered a radical idea in either the Church of England or the Catholic Church (Eiseley 1961). From the mid-1700s on, the theology of special creationism has been partly harmonized with scientific data and theory showing that Earth is ancient. To many Christians, the most critical element of special creation is God's personal involvement in Creation; precise details of how God created are considered secondary. The present may indeed be different from the past, but old-Earth creationists (OECs) see God as a direct causal agent of the observed changes.

The creation/evolution continuum, like most continua, has few sharp boundaries. Although there is a sharp division between YECs and OECs, the separation among the various OEC persuasions is less clear cut. Even though OECs accept most of modern physics, chemistry, and geology, they are not very dissimilar to YECs in their rejection of biological evolution. There are several religious views that can be classed as OEC.

Gap Creationism. One of the better-known nineteenth-century accommodations allowing Christianity to accept the science of its time was gap or restitution creationism, which claimed that there was a large temporal gap between verses 1 and 2 of chapter 1 of Genesis (Young 1982). Articulated from approximately the late eighteenth century on, gap creationism assumes a pre-Adamic creation that was destroyed before Genesis 1:2, when God re-created the world in six days and created Adam and Eve. A time gap between two separate creations allows for an accommodation of special creationism with the evidence for an ancient age of Earth. In gap creationism, the six days of Genesis 1:2 and following are considered twenty-four-hour days.

Day-Age Creationism. Another attempt to accommodate science to a literal, or mostly literal, reading of the Bible is the day-age theory, which was more popular than gap creationism in the nineteenth century and the earlier part of the twentieth (Young 1982). Here religion is accommodated to science by having each of the six days of creation be not twenty-four hours but long periods of time—even thousands or millions of years. This allows for recognition of an ancient age of Earth but still retains a quite literal interpretation of Genesis. Many literalists have found comfort in what they interpret as a rough parallel between organic evolution and Genesis, in which plants appear before animals, and human beings appear afterward. Anomalies such as flowering plants being created before animals and birds occurring before land animals—incidents unsupported by the fossil record—are usually ignored.

Progressive Creationism. Although some modern activist antievolutionists may still hold to day-age and gap views, the view held by the majority of today's OECs is some form of progressive creationism (PC). The PC view accepts more of modern science than do day-age and gap creationism: progressive creationists do not dispute scientific data concerning the Big Bang, the age of Earth, or the long period of time it has taken for Earth to come to its current form. Indeed, some cite the Big Bang as confirmation of Genesis, in that the Big Bang is viewed as the origin of matter, energy, and time, which in the PC view is equivalent to creation ex nihilo, the doctrine of creation out of nothing. As in other forms of old-Earth creationism, although theories of modern physical science are accepted, PC incorporates only parts of modern biological science.

For example, the fossil record shows a consistent distribution of plants and animals through time: mammals are never found in the Cambrian, for example, and flowering plants are never found in the Devonian. However, YECs believe that flowering plants, dinosaurs, humans, and trilobites were all created at the same time and therefore all lived at the same time. They regard the orderly distribution of fossils in strata around the world to be an artifact of Noah's Flood, which is thought to have differentially sorted organisms into groups, even if they all died at the same time. In contrast, PCs generally accept the fossil distribution of organisms as "real" because they believe that God created kinds of animals sequentially. To PCs, the geological column reflects history: God first created simple, single-celled organisms, then more complex single-celled life, then simple multicellular organisms, then more complex ones, and so on up until the present time. With PC, there is no difficulty that seed-bearing plants appear after ferns and cycads: God created the more "advanced" plants at a later time. However, progressive creationists do not accept that the kinds evolved from one another, though they are no more specific than YECs about what constitutes a kind. As in young-Earth creationism, though, a kind is viewed as genetically limited: as a result, one kind cannot change into another.

Evolutionary Creationism. Despite its name, evolutionary creationism (EC) is actually a type of evolution. Here, God the Creator uses evolution to bring about the universe according to God's plan. From a scientific point of view, evolutionary creationism is hardly distinguishable from theistic evolution, which follows it on the continuum. The differences between EC and theistic evolution lie not in science but in theology, with EC being held by more conservative (Evangelical) Christians, who view God as being more actively involved in evolution than do most theistic evolutionists (Lamoureux 2008).

Intelligent design creationism has been positioned on the continuum as overlapping YEC and OEC because some of its proponents can be found in each camp; old-Earthers among the intelligent design creationists have not categorically denied the scientific validity of YEC.

Intelligent Design Creationism

Intelligent design creationism (IDC) is the newest manifestation of American creationism, and yet it resembles a much earlier idea. In most ways, IDC is a descendant

of William Paley's argument from design (Paley 1802), which argued that God's existence could be proved by examining God's works. Paley used a metaphor: if one found a watch, it was obvious that such a complex object could not have come together by chance; the existence of a watch implied a watchmaker who had designed the watch with a purpose in mind. By analogy, the finding of order, purpose, and design in the world was proof of an omniscient designer.

The vertebrate eye was Paley's classic example of design in nature, well known to educated people in the nineteenth century. Because of its familiarity, Darwin deliberately used the vertebrate eye in *On the Origin of Species* to demonstrate how complexity and intricate design could indeed come about through a natural process; complexity in nature did not require divine intervention.

Structures and organs that accomplish a purpose for the organism—allowing capture of prey, escape from predators, or attracting a mate—could be designed directly by an omniscient designer, or they could be “designed” by a natural process that produces the same effect. As will be discussed in more detail elsewhere in this book, Darwin's argument that a natural process such as natural selection could explain apparent design was theologically offensive to those who believed that God created directly.

In IDC one is less likely to find references to the vertebrate eye and more likely to find molecular phenomena such as DNA structure or complex cellular mechanisms held up as too complex to have evolved “by chance.” The IDC high school biology supplemental textbooks *Of Pandas and People* (Davis and Kenyon 1993) and *Explore Evolution* (Meyer, Minnich, Money maker, Nelson, and Seelke 2007) both attempt to prove that DNA is too complex to explain through natural causes by weaving allusions to information theory into an exposition of the “linguistics” of the DNA code.

Following creationist tradition, IDC proponents accept natural selection but deny that mutation and natural selection are adequate to explain the evolution of one kind to another, such as chordates from echinoderms or humans and chimps from a common ancestor. The emergence of major anatomical body types and the origin of life, to choose just two examples popular among IDC followers, are phenomena supposedly too complex to be explained naturally; thus, IDC demands that a role be left for the intelligent designer—God. Chapter 7 discusses IDC in more detail.

Theistic Evolution

Theistic evolution is a theological view in which God creates through the laws of nature. Theistic evolutionists (TEs) accept all the results of modern science, in anthropology and biology as well as in astronomy, physics, and geology. In particular, it is acceptable to TEs that one species give rise to another; they accept descent with modification. However, TEs vary in whether and how much God is allowed to intervene—some believe that God created the laws of nature and allows events to occur with no further intervention. Other TEs believe that God intervenes at critical intervals during the history of life (especially in the origin of humans). A 2003 book presents an entire continuum of TEs; clearly, there is much variation among Christians regarding this theological view (Peters and Hewlett 2003). In one form or another, TE is the view of creation taught at the majority of mainline Protestant seminaries, and it is the position of the Catholic Church. In 1996, Pope John Paul II (1996) reiterated

the Catholic version of theistic evolution, in which God created, evolution happened, humans may indeed be descended from more primitive forms, but the hand of God was required for the production of the human soul. The current pope, Benedict XVI, has reiterated the evolution-friendly Catholic view, stressing the importance of rejecting philosophical naturalism (Lawton 2007).

Agnostic Evolutionism

Although poll data indicate that most Americans have a belief in God or some higher power, a (perhaps growing) minority do not (Pew Forum on Religion and Public Life 2008). The term *agnostic* was coined by “Darwin’s bulldog,” the nineteenth-century scientist Thomas Henry Huxley, to refer to someone who suspended judgment about the existence of God. Huxley felt that human beings, part of the material universe, would be unable to grasp ultimate reality; therefore, neither belief in nor rejection of the existence of God is warranted. To Huxley, the thoughtful person should suspend judgment. Huxley was a strong supporter of science and believed that knowledge and beliefs should be based on empirical knowledge—and that science would eventually supplant supernaturalism. But he felt it was more honest not to categorically reject an ultimate force or power beyond the material world:

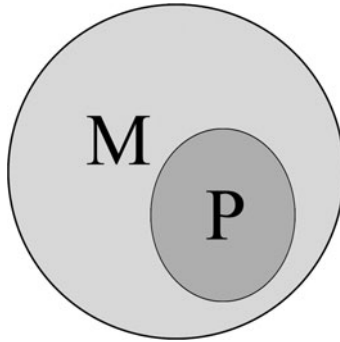
I have no doubt that scientific criticism will prove destructive to the forms of supernaturalism which enter into the constitution of existing religions. On trial of any so-called miracle the verdict of science is “Not proven.” But true Agnosticism will not forget that existence, motion, and law-abiding operation in nature are more stupendous miracles than any recounted by the mythologies, and that there may be things, not only in the heavens and earth, but beyond the intelligible universe, which “are not dreamt of in our philosophy.” The theological “gnosis” would have us believe that the world is a conjuror’s house; the anti-theological “gnosis” talks as if it were a “dirt-pie” made by the two blind children, Law and Force. Agnosticism simply says that we know nothing of what may be beyond phenomena. (Huxley 1884)

Agnostics believe that, in this life, it is impossible to know truly whether there is a God, and although they believe that it is not probable that God exists, they tend not to be dogmatic about this conclusion. One can find individuals who accept the scientific evidence that evolution occurred but do not consider important the question of whether God is or was or will be involved. We can call this belief agnostic evolutionism. Holders of this view differ from the next position on the continuum by not categorically ruling out the involvement of God, although they tend to side with those who doubt the existence of God and whether God acts in the world.

Materialist Evolutionism

Before discussing materialist evolutionism, I need to distinguish between two uses of the term *materialism* (or *naturalism*). As I mentioned in chapter 1, modern science operates under a rule of methodological naturalism that limits it to attempting to explain natural phenomena using natural causes. Philosophical materialists (sometimes

Figure 3.4
The Relationship between Methodological and Philosophical Naturalism. All philosophical naturalists are methodological naturalists, but it is not accurate to say that all methodological naturalists are philosophical naturalists. One can thus be a scientist practicing methodological naturalism but still be a theist.



referred to as philosophical naturalists) go beyond the methodological naturalism of science to propose not only that material (matter and energy) causes are sufficient to explain natural phenomena but also that the supernatural does not exist. To a philosophical naturalist, there is no God. The philosophy of humanism is a materialistic philosophy, as is atheism. As discussed earlier in this chapter, philosophical naturalism is distinct from the practical rules of how to do science.

This is an important distinction to the subject of this book because some antievolutionists accuse evolution and science in general of being not only methodologically naturalistic but also philosophically naturalistic. This is a logical error, as Figure 3.4 shows. It is very likely the case that all philosophical naturalists are simultaneously methodological naturalists (all *Ps* are *Ms*). It does not follow that all methodological naturalists are philosophical naturalists (not all *Ms* are *Ps*). It might be the case—if both circles were the same size and right on top of one another—but this would have to be determined empirically, not logically. In fact, such a claim is empirically falsified, for there are many scientists who accept methodological naturalism in their work but who are theists and therefore not philosophical naturalists. Gregor Mendel—the monk whose research became the foundation of genetics—is a classic case of a scientist who was a methodological naturalist but not a philosophical one, and there are many scientists today who, like him, are methodological but not philosophical naturalists.

As mentioned, there are varieties of belief within the various theistic positions on the continuum, and this is true for materialists as well. For example, although materialists share a high opinion of science and accept evolution, they do not all share the same attitudes toward religion. Agnostics are materialists who do not consider that

the question of whether God created can be answered. Humanists have a philosophy of life and an ethical code that holds, “Humanism is a progressive life stance that, without supernaturalism, affirms our ability and responsibility to lead meaningful, ethical lives capable of adding to the greater good of humanity” (American Humanist Association 2002). The two major humanist organizations are the American Humanist Association, with approximately 5,000 members at the time of this writing, and the Council for Secular Humanism, with approximately 4,000 members.

Atheists, the third major group within materialists, reject the existence of God but tend to be more actively antireligious than the other two. There are about 2,200 members of the best-known atheist group, the American Atheists. Clearly, any single theist organization has far more members than all the materialist organizations combined. If nonbelievers make up between 10 percent and 14 percent of the population, as some polls suggest, the vast majority of them do not join groups of like-minded individuals. Someone holding to materialist evolutionism, then, believes that evolution occurred but that there was absolutely no supernatural entities or forces affecting it, because such forces do not exist. As we will see later in this book, creationists consider materialist evolutionism the true enemy of religion; actually, although all material evolutionists reject the involvement of God in evolution, not all material evolutionists are antireligious.

This presentation of Christian and materialist views regarding creation and evolution is simplified—as was the earlier presentation of the nature of science in chapter 1 and the presentation of the science of evolution in chapter 2. It is possible to go into far more detail on any of these beliefs, but a shorthand version will have to suffice to introduce the topic.

RELIGION, SCIENCE, AND PHILOSOPHICAL NATURALISM

What are the relationships among religion, science, and philosophical naturalism? Everyone recognizes that there are differences, but there are similarities as well. All three of these terms refer to ways of knowing: a field of study that philosophers call epistemology. The epistemology we call science is primarily a methodology that attempts to explain the natural world using natural causes. Although individual scientists may be concerned with moral and ethical issues or rules of conduct, science as a way of knowing is not concerned with these things. The methodology of testing natural explanations against the natural world will not tell us whether it is immoral for coyotes to kill rabbits or whether members of one sex or another should keep their heads covered in public, or whether marrying your father’s brother’s child is immoral but marrying your father’s sister’s child is not. Science is a limited way of knowing, with limited goals and a limited set of tools to use to accomplish those goals.

Philosophical naturalism relies on science and is inspired by science, but it differs from science in being concerned with rules of conduct, ethics, and morals. When a scientist makes a statement like, “Man is the result of a purposeless and natural process that did not have him in mind” (Simpson 1967: 344), it is clear that he or she is speaking from the perspective of philosophical naturalism rather than from the methodology of science itself. As anthropologist Matt Cartmill (1998: 83) has observed, “Many scientists are atheists or agnostics who want to believe that the

natural world they study is all there is, and being only human, they try to persuade themselves that science gives them grounds for that belief. It's an honorable belief, but it isn't a research finding." Only a minority of Americans embrace philosophical naturalism—perhaps as few as 10 to 16 percent or so—but it has had a long history in Western culture, going back to some of the pre-Socratic philosophers of ancient Greece.

Religion concerns the relationship of people with the divine, but it also may include explanations of the natural world and the origin of natural phenomena. Religious views almost universally derive from revelation, but this does not rule out the use of empirical and logical approaches to theology. In fact, many Christian denominations pride themselves on their reliance on logic and reason as a means both to understand the natural world and to evaluate theological positions. But an ultimate reliance on revelation can place religion into conflict with science, as discussed earlier in this chapter. When revealed truth conflicts with empirical knowledge, how does one choose?

Different religious traditions provide different interpretations of revealed truth—all held with equal fervor—and within the same religious tradition the documents that are considered authoritative can be, and usually are, interpreted differently by different adherents. Reform and Hasidic Jews interpret the Torah differently, Muslims of the Shiite and Sunni traditions have some different interpretations of the Koran, and Catholics and Protestants use Bibles with different books. Which tradition is more faithful to the sacred documents is ascertained differently by different factions, and unless agreement can be reached on criteria of judgment, different factions will be unable to determine whose interpretation is correct.

For example, some Christians interpret the Bible as indicating that the Flood of Noah was an actual historical event that covered the entire Earth, and they believe that the receding floodwaters cut the Grand Canyon. Other Christians interpret the Bible differently and argue that the Flood was not a universal historical event and could not have carved the Grand Canyon. Proponents of different biblical interpretations tend not to persuade one another because their religious assumptions are different; to some it is not a matter of logic or empirical evidence (as will be illustrated in the readings in part 3).

In science, on the other hand, there is no revealed truth. Although some explanations are believed to be very solidly grounded, it is understood that even well-supported theories can be modified and, in rare circumstances, even replaced by other explanations. For the limited purpose of explaining the natural world, science has a major advantage over religion in that individuals of different philosophical, religious, cultural, and/or ideological orientations, using the methodology of science, can debate their differences on the basis of repeatable—and repeated—empirical investigations. Different scientists, using different techniques, technologies, and observational approaches, provide validation not possible through revelation.

Scientists looking at geological and biological data can piece together a natural history of the Grand Canyon and test one another's explanations against the lay of the land itself. The ability to go back to nature—again and again—to test explanations, rework them, and retest them is one of the strengths of science and a major contributor to the amount of empirical knowledge exponentially amassed over the past three

hundred years. To some, though, the open-endedness of science is a weakness: they seek definite answers that will never change. For them, Ashley Montagu's (1984: 9) definition of science as "truth without certainty" is insufficient; for others, it is science's greatest strength.

Just as attempts to explain the natural world through revelation cause friction with scientists, so materialist scientists cause friction with religious people when they make statements about the ultimate nature of reality—when they speak as if they speak for science itself. On reflection it should be recognizable that if science has the limited goal of explaining the natural world using natural causes, it lacks the tools to make justifiable statements about whether there is or is not a reality beyond the familiar one of matter and energy. As will be clear in some of the readings to follow, both supporters and deniers of evolution argue erroneously that because science uses methodological naturalism (and quite successfully), science therefore also incorporates philosophical naturalism. Unfortunately, such confusion makes communication about science and religion, or creationism and evolution, more difficult.

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