



CHRISTIANITY AND REASON: THE THEOLOGICAL ROOTS OF SCIENCE

"We shall first try to manifest the truth that faith professes and reason investigates, setting forth demonstrative and probable arguments, so that the truth may be confirmed and the adversary convinced."¹

—Thomas Aquinas, *Summa Contra Gentiles*

WE HAVE SEEN IN THE previous chapters how Christianity forms the heart of Western civilization, shaping ideas and institutions that have persisted for two millennia. In the next few chapters I will examine the relationship between Christianity and science. Specifically, I will consider whether there is an inherent antagonism between the two; atheist writers often portray an ongoing war between them. The conflict, Sam Harris writes, is "zero sum."² E. O. Wilson proclaims it an "insoluble" enmity,³ and the popular media breathlessly publicizes this theme of combat, as when *Time* magazine titled its cover story on November 13, 2006, "God vs. Science."⁴

Yet science as an organized, sustained enterprise arose only once in human history. And where did it arise? In Europe, in the civilization then called Christendom. Why did modern science develop here and nowhere else? In his September 12, 2006, speech in Regensburg, Germany, Pope Benedict XVI argued that it was due to Christianity's emphasis on the importance of reason. The pope argued that reason

is a central distinguishing feature of Christianity. While the Regensburg address became controversial because of the pope's remarks about Islam, on his point about Christianity and reason he was right. An unbiased look at the history of science shows that modern science is an invention of medieval Christianity, and that the greatest breakthroughs in scientific reason have largely been the work of Christians. Even atheist scientists work with Christian assumptions that, due to their ignorance of theology and history, are invisible to them.

Before religion as we understand the term, there was animism, which was based on the idea of an enchanted universe. Every river, every tree, and every stone was thought to be populated by spirits. The world was mysterious, capricious, unpredictable, and uncontrollable. Then came the various polytheistic religions, like those of the Babylonians, the Egyptians, and the Greeks. Each of these religions posited divine beings—sometimes immortal, sometimes not—who involved themselves in the daily workings of nature, creating storms and earthquakes, turning humans into stags, and so on. Then appeared the great religions of the East, Hinduism and Buddhism, followed by the three great monotheistic religions, Judaism, Christianity, and Islam.

Of these, only one—Christianity—was from the beginning based on reason. Judaism and Islam are primarily religions of law; there is a divine lawgiver who issues edicts that are authoritative both for nature and for human beings. In the case of Judaism these edicts apply mainly to God's chosen people, the Jews. In the case of Islam they apply to everyone. In both cases, however, the laws are divinely revealed and humans must follow them. Both Jews and Muslims may engage in extensive debates, but these are confined to the best way to interpret and apply the written codes. Christianity, by contrast, is not a religion of law but a religion of creed. Christianity has always been obsessed with doctrine, which is thought to be a set of true beliefs about man's relationship to God.

Philosopher Ernest Fortin writes that while the highest discipline in Judaism and Islam is jurisprudence, the highest discipline in Chris-

tianity is theology.⁵ The Christian theologian is charged with employing reason to understand the ways of God. There are no theologians in Hinduism and Buddhism because human beings are not called to investigate God's purposes in this manner.

But what is a theologian good for? We can answer this question by looking at the church father Augustine. Augustine was faced with a deep and serious theological problem: Before today, there was yesterday, and before yesterday, there was the day before yesterday, and so on. But how can this be? Does the series of yesterdays extend infinitely into the past? If so, then how could God have created a universe that has always existed? If not, there must have been a beginning, but what had been going on before that? If the universe was created by God, then what was God doing before He created the universe?

To these questions Augustine gave an astounding answer that does not seem to have occurred to anyone before him: God created time along with the universe. In other words, "before" the universe there was no time. The universe is like a series, which may or may not extend infinitely backward and forward in time. But God stands outside the series, and this is what we mean when we say God is "eternal." Eternal does not mean "goes on forever"; it means "stands outside of time." Notice that Augustine was not engaging in vague theological speculation. He was making a radically counterintuitive claim about the nature of physical reality. Today we know from modern physics and astronomy that Augustine was correct; time is a property of our universe, and time came into existence with the universe itself. Augustine's reflections on the nature of time, which were generated entirely through theological reasoning, are some of the most penetrating insights in the history of thought.

In order to get a sense of how Christians reasoned about God, I'd like to consider two famous arguments for the existence of God and match the wits of ancient Christian thinkers against those of their modern atheist detractors. The first is Aquinas's argument based on causation. Aquinas argues that every effect requires a cause, and that nothing in the world is the cause of its own existence. Whenever you

encounter A, it has to be caused by some other B. But then B has to be accounted for, so let us say it is caused by C. This tracing of causes, Aquinas says, cannot continue indefinitely, because if it did, then nothing would have come into existence. Therefore there must be an original cause responsible for the chain of causation in the first place. To this first cause we give the name God.

Leading atheists are unimpressed. "If God created the universe," Sam Harris writes, "what created God?"⁶ His sentiments are echoed by several atheist writers: Richard Dawkins, Christopher Hitchens, Carl Sagan, Steven Weinberg. They raise the problem of infinite regress. Yes, there has to be a chain of causation, but why does it have to stop with God? Why can't it go on forever? Dawkins makes the further point that only a complex God could have created such a complex universe, and we cannot account for one form of unexplained complexity (the universe) by pointing to an even greater form of unexplained complexity (God). Consequently Dawkins concludes that "the theist answer has utterly failed" and he sees "no alternative but to dismiss it."⁷

The real force of Aquinas's argument, however, is not that every series must have a beginning but that every series, in order to have being or existence, must depend on something outside the series. It is no rebuttal to say that as everything must have a cause, who caused God? Aquinas's argument does not use the premise that everything needs a cause, only that everything that exists in the universe needs a cause. The movement and contingency of the world cannot be without some ultimate explanation. Since God is by definition outside the universe, He is not part of the series. Therefore the rules of the series, including the rules of causation, would not logically apply to Him.

Think of God as the author of a novel. The events in the narrative have a certain coherence and logic. Something that occurs in the beginning of the story causes a crisis for one of the characters in the middle of the story. Raskolnikov's actions in *Crime and Punishment* cause the death of the old woman. But the author is the cause of the story on an entirely different level. The rules of causation that apply

within the novel do not apply to its creator. It makes sense to ask of a character that suddenly appears, "Where did he come from? How do you account for him?" It makes no sense in this context, however, to ask, "Where did this fellow Dostoevsky come from? How do you account for him?" The author is outside the narrative, and his act of creation cannot be understood as an episode within it.⁸ From this discussion it should be evident that Harris and Dawkins have not even come close to answering Aquinas's argument.

Next I turn to Anselm's ontological argument for the existence of God.⁹ Anselm begins whimsically with the passage from Psalm 14:1, "The fool has said in his heart, 'There is no God.'" Anselm intends to demonstrate that those who deny the existence of God are indeed fools. They are fools because once you understand the meaning of the term *God*, you are rationally compelled to assent to God's existence. Anselm is not joking about this.

Unlike the inductive argument of Aquinas, Anselm's argument is purely deductive and relies on no data from experience. Anselm defines God as "that than which no greater can be thought." Presumably, this is a reasonable and widely accepted definition. Even an atheist should have no problem with it. We all understand the idea of God to correspond to a supreme being that stretches—even transcends—the limits of our imagination. Anselm proceeds to say that as we acknowledge and understand the definition, we must have some idea of God in our mind. He doesn't mean a pictorial representation. He simply means that our minds comprehend as a logical possibility the idea of God as "that than which no greater can be thought."

But if this is true, Anselm says, then God exists. We have proved God's existence. Why? Because if "that than which no greater can be thought" exists in the mind, then it must also exist in reality. The reason is that to exist in reality is, according to Anselm, "greater" than to exist merely in the mind. What is possible and actual is obviously greater than what is merely possible. Anselm gives the example of a portrait painter whose portrait, actually painted, is the realization of an intuition or idea in his head; thus the actual painting is "greater"

than the mere intuition or idea of it. In the same way, in order for “that than which no greater can be thought” to satisfy its own definition, it must exist. Otherwise it would be “that than which a greater *can* be thought.” Anselm claims to have shown not only that God exists, but that He exists necessarily. If He existed only in fact and not by necessity, He would be a great being indeed, but He would not be “that than which no greater can be thought.”

I offer Anselm’s proof not because it is immediately convincing—we feel sure that Anselm has drawn a theological rabbit out of a rhetorical top hat—but because it is notoriously hard to refute. Descartes and Leibniz considered the argument to be a valid one, and produced their own versions of it. Yet in his book *God Is Not Great*, Christopher Hitchens seeks to expose Anselm’s shortcomings. He offers the example of a child in a novel who is asked why she believes in dragons. The child replies, “If there is a word dragon, then once there must have been dragons.” Clearly it is childish reasoning to infer the object from the mere idea of it. Hitchens triumphantly proclaims Anselm’s argument “overthrown.”¹⁰

Hitchens’s argument was first made by a contemporary of Anselm, a monk named Gaunilo, and Gaunilo’s version is much more effectively argued than Hitchens’s. Gaunilo accused Anselm of making an illicit transition from the conceptual to the existential. Gaunilo’s point was that just because we can imagine unreal things like unicorns, mermaids, and yellow flying dogs does not mean that any of these creatures exist. Anselm answered Gaunilo by pointing out his ontological argument does not say that everything we can imagine in our heads necessarily exists. The argument merely insists that “that than which no greater can be thought” exists and exists by necessity. In other words, Anselm is only making his claim in one particular case. It is precisely the character of “that than which no greater can be thought” to exist necessarily: there is nothing in the definition of unicorns and yellow flying dogs that confers existence on them, much less necessary existence.¹¹

There have been other objections to Anselm, and I don’t propose to

discuss them here. My point is that theology gives evidence of a high order of reason at work, and one cannot, as many atheists do, dismiss these arguments as unreasonable even if you don't agree with them. Consider many of the famous arguments in philosophy, say, Locke's argument about private property or Wittgenstein's argument about the possibility of a private language. Whether or not we think these arguments successful, it can hardly be said that they are irrational. Rather, they represent powerful rational claims about the nature of reality.

So it is with Aquinas and Anselm. In proving God's existence they at no point appeal to supernatural revelation. Theirs are arguments based on reason alone. They were, of course, devised in a very different historical and philosophical context than the one we now inhabit, so they need to be updated to be persuasive. And when they are reformulated in modern terms, they are persuasive. I intend, as you will see, to make an argument very similar to Aquinas's in a later chapter on the origin of the universe. My point is that the kind of reasoning about God that we see in Augustine, Aquinas, and Anselm is typical of Christianity. There is very little of this in any other religion. And out of such reasoning, remarkably enough, modern science was born.



FROM LOGOS TO COSMOS: CHRISTIANITY AND THE INVENTION OF INVENTION

"So vast, without any question, is the divine handiwork of the Almighty Creator!"¹

—Nicolaus Copernicus

LISTS OF THE GREAT IDEAS of modern science typically contain a major omission. On such lists we are sure to find Copernicus's heliocentric theory, Kepler's laws, Newton's laws, and Einstein's theory of relativity, yet the greatest idea of modern science is almost never included. It is such a big idea that it makes possible all the other ideas. And it is invisible to us because it is an assumption taken for granted rather than a theory that has been formulated. Oddly enough, the greatest idea of modern science is based not on reason but on faith.

Faith is not a highly acclaimed word in the scientific community. "I do not believe that the scientist can have that same certainty of faith that very deeply religious people have," writes physicist Richard Feynman in *The Meaning of It All*.² Astronomer Neil deGrasse Tyson complains that "the claims of religions rely on faith" and boasts that "the claims of science rely on experimental verification."³ Feynman and Tyson seem quite unaware that at the heart of their cherished

scientific enterprise is a faith-based proposition no less mysterious than any religious dogma. This is the presumption, quite impossible to prove, that the universe is rational.

Scientists today take for granted the idea that the universe operates according to laws, and that these laws are comprehensible to the human mind. Science is based on what author James Trefil calls the principle of universality: "It says that the laws of nature we discover here and now in our laboratories are true everywhere in the universe and have been in force for all time."⁴ Physicist Steven Weinberg writes, "All my experience as a physicist leads me to believe that there is order in the universe. . . . As we have been going to higher and higher energies and as we have studied structures that are smaller and smaller, we have found that the laws, the physical principles, that describe what we learn become simpler and simpler. . . . The rules we have discovered become increasingly coherent and universal. . . . There is a simplicity, a beauty, that we are finding in the rules that govern matter that mirrors something that is built into the logical structure of the universe at a very deep level."⁵

The laws that govern the universe seem to be written in the language of mathematics. The greatest scientists have been struck by how strange this is. In his essay "The Unreasonable Effectiveness of Mathematics in the Natural Sciences," physicist Eugene Wigner confesses that the mathematical underpinning of nature "is something bordering on the mysterious and there is no rational explanation for it."⁶ Feynman confesses, "Why nature is mathematical is a mystery. . . . The fact that there are rules at all is a kind of miracle."⁷

This astonishment springs from the recognition that the universe doesn't have to be this way. There is no special reason why the laws of nature we find on earth should also govern a star billions of light years away. It is easy to imagine a universe in which conditions change unpredictably from instant to instant, or even a universe in which things pop in and out of existence. There is no logical necessity for a universe that obeys rules, let alone one that abides by the rules of mathematics.

Yet the universe seems to be ordered. I say "seems" because there is no way to prove this is so. There are peculiar things going on in quantum physics that call into question the premise that the universe follows stable rules. Even so, scientists cling to their long-held faith in the fundamental rationality of the cosmos. Convinced in advance that rules exist, and that human reason is up to the task of uncovering those rules, scientists continue to try to find them. These articles of faith are essential for science to function. Without the "irrational" belief that we live in an ordered universe, modern science is impossible. Science also relies on the equally unsupported belief that the rationality of the universe is mirrored in the rationality of our human minds.

So where did Western man get this faith in a unified, ordered, and accessible universe? How did we go from chaos to cosmos? My answer, in a word, is Christianity.

Christianity did not invent the idea of a rational cosmos. That idea was invented by the pre-Socratics, such men as Thales, Parmenides, Heraclitus, and Pythagoras. These men had some very strange ideas, but their greatest contribution was to posit a universe that operates through discoverable rules of cause and effect. Before the pre-Socratics there were mythical cosmologies such as the Egyptian account of the sun god, Ra, who periodically traveled in his chariot across the heavens. Even the Greeks attributed storms and earthquakes to the wrath of Poseidon, god of the sea.

The pre-Socratics replaced the idea of an "enchanted universe" with that of a "disenchanted" cosmos accessible to unassisted human reason. They may not have known what caused eclipses and earthquakes, but they didn't look to Ra and Poseidon for explanations. This was a radical shift of consciousness. Unfortunately, their influence was short-lived. This is partly due to Socrates, who argued that philosophy should not bother with the regularities of nature but should instead focus on those of human nature. The pre-Socratics were also defeated by the deities of Greek paganism, who were believed to operate capriciously to fulfill their own inscrutable purposes.

Christianity reinvigorated the idea of an ordered cosmos by

envisioning the universe as following laws that embody the rationality of God the creator. "In the beginning was the Word, and the Word was with God, and the Word was God." The term used here for *word* is *logos*, a Greek term meaning "thought" or "rationality." God is sacred and made the universe, and the universe operates lawfully in accordance with divine reason. At the same time Christianity held that the universe itself is not sacred. The Bible says, "God made the two great lights, the greater light to rule the day and the smaller one to rule the night." For Christians the sun is not an object of worship; it is merely a great lamp. The Christian universe is ordered and yet disenchanted. Moreover, Christianity (adopting here the legacy of Judaism) teaches that man was made in the "image" and "likeness" of God. This means that there is a spark of the divine reason in man, setting him apart from other things and giving him the special power of apprehending them. According to Christianity, human reason is derived from the divine intelligence that created the universe.

True, Christians believe in miracles, which can be seen as departures from the orderliness of nature. But miracles are notable because they are exceptional. Miracles inspire wonder because they are believed to be the product of a natural order that is, in rare cases, suspended. By contrast, Islam doesn't emphasize miracles because everything in the universe is seen as miraculous. Medieval Muslim theologian Abu Hamed al-Ghazali claimed that God intervenes at every moment to make the events in the universe happen as they do. There is no question of laws; everything is the product of ceaseless divine intrusion.⁸ Historian Joseph Needham explains that despite the wealth and sophistication of China in ancient and medieval times, science never developed there because "there was no confidence that the code of nature's laws could ever be unveiled and read, because there was no assurance that a divine being, even more rational than ourselves, had ever formulated such a code capable of being read."⁹ In his classic book *Science and the Modern World*, Alfred North Whitehead concludes that "faith in the possibility of science . . . is an unconscious derivative from medieval theology."¹⁰

The medieval era in Europe saw the founding of the university, which would have a crucial role in the growth of modern science. At first monks labored in monasteries, working tirelessly to retrieve the classical knowledge destroyed when the barbarians overran the Roman Empire and spread chaos throughout the continent. For several centuries monasteries were the only institutions in Europe for the acquisition, preservation, and transmission of knowledge.

Then the churches began to build schools, first at the elementary and then at the secondary level. Eventually these became more advanced until, in the twelfth century, the first universities were founded in Bologna and Paris. Oxford and Cambridge were founded in the early thirteenth century, followed by universities in Rome, Naples, Salamanca, Seville, Prague, Vienna, Cologne, and Heidelberg. These institutions might be affiliated with the church, but they were independently governed and operated. The curriculum was both theological and secular, so that the new scientific knowledge of early modern times could be accommodated. As Alvin Schmidt points out, many of America's earliest colleges and universities—Harvard, the College of William and Mary, Yale, Northwestern, Princeton, Dartmouth, Brown—began as Christian institutions.¹¹

Robert Grosseteste, a Franciscan bishop who was the first chancellor of Oxford University, proposed that knowledge be accumulated through an inductive, experimental method. A couple of centuries later Francis Bacon—a devoutly religious man who wrote treatises on the Psalms and on prayer—used the inductive method to record experimental outcomes. Bacon argued that through the God-given power of discovery man could fulfill the divine mandate to establish dominion over creation and even restore a new kind of Eden.¹² Today Bacon is considered the founder of the scientific method, the “inventor of invention.” It was under the auspices of the church that the first medical research institutions and the first observatories were built and supported. From the Middle Ages to the Enlightenment, a period of several centuries, the church did more for Western science than any other institution.

We often hear that science was founded in the seventeenth century in revolt against religious dogma. In reality, science was founded between the thirteenth and fourteenth centuries through a dispute between two kinds of religious dogma. The first kind held that scholastic debate, operating according to the strict principles of deductive reason, was the best way to discover God's hand in the universe. The other held that inductive experience, including the use of experiments to "interrogate nature," was the preferred approach. Science benefited from both methods, using experiments to test propositions and then rigorous criticism and argumentation to establish their significance.

Historian Lynn White shows how the new scientific method launched an explosion of innovations and inventions starting in the thirteenth century. The fourteenth century was, according to Jean Gimpel, "one of the great inventive eras of mankind."¹³ The technological revolution described by White and Gimpel was unlike anything known in classical times. Between the trial-and-error agricultural techniques of the monasteries and the new theoretical and experimental study of the universities, Europe developed a new way of understanding nature and making it work to human purposes. A continent once desolate was soon dotted with schools, farms, and workshops, all taking learning and agricultural production and trade to a new level. Inventions of the period included the waterwheel, the windmill, the chimney, eyeglasses, and the mechanical clock. Humble these may seem, but they are responsible for launching a civilization that would soon, in learning, affluence, and power, dwarf the other cultures of the world.¹⁴

The first professional scientists can be traced to the late Middle Ages, and since this period the overwhelming majority of them have not only been Christians, but have also viewed their work as a fulfillment of Christian objectives. Morris Kline writes that "the Renaissance scientist was a theologian with nature instead of God as his subject."¹⁵ This does not mean the Renaissance scientist was on a secular path. On the contrary, he saw himself as achieving God's pur-

pose in a new and better way, by going beyond God's holy book and exploring His creation.

In the sixteenth century the Reformation introduced a new idea. This was the notion that knowledge is not simply the province of ecclesiastical institutions but that, especially when it comes to matters of conscience, each man should decide for himself. The "priesthood of the individual believer" was an immensely powerful notion because it rejected the papal hierarchy, and by implication all institutional hierarchy as well. Ultimately it was a charter of independent thought, carried out not by institutions but by individuals. The early Protestants didn't know it, but they were introducing new theological concepts that would give new vitality to the emerging scientific culture of Europe.

Here is a partial list of leading scientists who were Christian: Copernicus, Kepler, Galileo, Brahe, Descartes, Boyle, Newton, Leibniz, Gassendi, Pascal, Mersenne, Cuvier, Harvey, Dalton, Faraday, Herschel, Joule, Lyell, Lavoisier, Priestley, Kelvin, Ohm, Ampere, Steno, Pasteur, Maxwell, Planck, Mendel. A good number of these scientists were clergymen. Gassendi and Mersenne were priests. So was Georges Lemaitre, the Belgian astronomer who first proposed the "big bang" theory for the origin of the universe. Mendel, whose discovery of the principles of heredity would provide vital support for the theory of evolution, spent his entire adult life as a monk in an Augustinian monastery. Where would modern science be without these men? Some were Protestant and some were Catholic, but all saw their scientific vocation in distinctively Christian terms.

Copernicus, who was a canon in the cathedral of Krakow, celebrated astronomy as "a science more divine than human" and viewed his heliocentric theory as revealing God's grand scheme for the cosmos. Boyle was a pious Anglican who declared scientists to be on a divinely appointed mission to serve as "priests of the book of nature." Boyle's work includes both scientific studies and theological treatises. In his will he left money to fund a series of lectures combating atheism. Newton was virtually a Christian mystic who wrote long commentaries on

biblical prophecy from both the book of Daniel and the book of Revelation. Perhaps the greatest scientist of all time, Newton viewed his discoveries as showing the creative genius of God's handiwork in nature. "This most beautiful system of sun, planets, and comets," he wrote, "could only proceed from the counsel and dominion of an intelligent and powerful being."¹⁶ Newton's God was not a divine watchmaker who wound up the universe and then withdrew from it. Rather, God was an active agent sustaining the heavenly bodies in their positions and solicitous of His special creation, man.

The example of Kepler shows that the Christian convictions of these towering figures of science were not incidental to their work. Rather, these convictions were the scientists' guiding inspiration. "For a long time," Kepler wrote, "I wanted to become a theologian. Now, however, behold how through my effort God is being celebrated through astronomy." A strong advocate of Copernicus's heliocentrism, Kepler held that the sun-centered cosmos was an image of the Holy Trinity, with God represented by the sun, Christ by the stars and planets, and the Holy Spirit by the motions of the heavenly bodies.¹⁷ When Kepler discovered that planets do not move in circular but rather in elliptical orbits, he was criticized by some theologians as rejecting the beauty of God's creative plan. These theologians reasoned that surely God would have used perfect circles to choreograph the planetary motions!

Kepler, however, was certain, based on his deep Christian faith, that God had employed an even more beautiful pattern, and he labored hard to decipher it. When he discovered what it was—his three laws of planetary motion—he experienced something of a spiritual epiphany. Kepler announced that his laws showed that God had used a far simpler and more elegant scheme than the one previously delineated in the Ptolemaic system of cycles and epicycles. In a prayer concluding *The Harmony of the World*, Kepler implored God "graciously to cause that these demonstrations may lead to thy glory and to the salvation of souls."¹⁸

Kepler's laws posit uncanny relationships. For instance, Kepler's third law states that the square of the time of a planet's revolution

is proportional to the cube of its mean distance from the sun. How could anyone have figured that out? Kepler did in large part because he was convinced that there had to be a beautiful mathematical relationship there hidden and waiting for him. Part of his Christian vocation was to find it and promulgate it to the greater glory of God. Kepler's success leads to the surprising recognition that religious motivation can sometimes result in breakthrough discoveries that change the course of scientific history.

This may seem like an outdated view today, but it is not. Scientists commonly search for new patterns and order in nature, and they use what may appear to be peculiar criteria to determine if they are on the right path. They often ask whether a relationship is "simple" or whether it is "beautiful." Patterns that are overly cumbersome or "ugly" are often rejected on those grounds alone.

Why? Because even the most secular scientist presumes that nature embodies not only order but simplicity and beauty. This, I would argue, is the Christian residue of modern science. It is the little whisper, if we will hear it, that our science even today rests on religious foundations. Even secular scientists cannot get away from these Christian assumptions, and some of the most perceptive of them have recognized this. Einstein confessed that "in every true searcher of nature there is a kind of religious reverence."¹⁹ Biologist Joshua Lederberg recently told *Science* magazine, "What is incontrovertible is that a religious impulse guides our motive in sustaining scientific inquiry."²⁰ That impulse came originally from Christianity.