

## CHAPTER ELEVEN



# A UNIVERSE WITH A BEGINNING: GOD AND THE ASTRONOMERS

*"It would be very difficult to explain why the universe should have begun in just this way, except as the act of a God who intended to create beings like us."*<sup>1</sup>

—Stephen Hawking, *A Brief History of Time*

**I**N THE NEXT FEW CHAPTERS I explore whether the latest findings in modern science support or undermine the case for the existence of God. The argument will engage physics, astronomy, and biology, although no specialized knowledge of any of these is expected. Here I draw on the findings of classical physics to explore what we know about the origin of the universe and the implications of those discoveries. The question at issue is whether the design of nature points to a creator or whether that design can be given a purely naturalistic explanation.

Earlier we encountered astronomer Carl Sagan's assertion that "the cosmos is all there is, or was, or ever will be." Physicist Steven Weinberg argues that "as far as we have been able to discover the laws of nature, they are impersonal, with no hint of a divine plan or any special status for human beings."<sup>2</sup> I intend to show that these statements are factually wrong. Indeed, I wish to take up a challenge issued by biologist E. O. Wilson, who said, "If any positive evidence

could be found of a supernatural guiding force . . . it would be one of the greatest discoveries of all time.”<sup>3</sup> In recent decades, in one of the most spectacular developments in physics and astronomy, such evidence has indeed been found.

In a stunning confirmation of the book of Genesis, modern scientists have discovered that the universe was created in a primordial explosion of energy and light. Not only did the universe have a beginning *in* space and time, but the origin of the universe was also a beginning *for* space and time. Space and time did not exist prior to the universe. If you accept that everything that has a beginning has a cause, then the material universe had a nonmaterial or spiritual cause. This spiritual cause brought the universe into existence using none of the laws of physics. The creation of the universe was, in the quite literal meaning of the term, a miracle. Its creator is known to be a spiritual, eternal being of creativity and power beyond all conceivable limits. Mind, not matter, came at the beginning. With the help of science and logic, all this can be rationally demonstrated.

The story begins about a century ago, as scientists began to look for evidence that our universe—not just our planet or our galaxy but all the matter that exists—had a beginning. The reason for the search is that one of the most universal laws of physics, the second law of thermodynamics, predicts such a beginning. The law simply states that, left to themselves, things break down. We see this all around us: highways and buildings decay and collapse, people age and die, metals rust, fabrics become threadbare, rocks and coastlines suffer erosion. If you haven’t studied physics, you might think that the second law is refuted by the evidence of people who build new highways and buildings, but this is not the case. Materials and power are used up in the construction process. More resources and energy are required to maintain these highways and buildings. So even here things are running down and wearing out. Scientists use the term *entropy* as a measure of the level of disorder, and the second law shows that the total entropy in the universe is continually increasing.

The second law has a startling implication. Consider the example

of the sun. As time passes, its fuel reserves decline, so that eventually the sun will run out of heat and go cold. But this means the fires of the sun must have been ignited at some point. The sun has not been burning forever. And this is also true of other stars. They, too, are gradually burning out, suggesting that they, too, were set aflame some time ago. As the great English astronomer Arthur Eddington once put it, if the universe can be compared to a clock, the fact that the clock is continually running down leads to the conclusion that there was a time when the clock was fully wound up. The universe originated with its full supply of energy, and that is the fund that has been dissipating ever since. These facts were known as far back as the eighteenth century, but scientists didn't know what to make of them.

In the early twentieth century, Albert Einstein published his equations of general relativity and a Dutch astronomer, Willem de Sitter, found a solution to them that predicted an expanding universe. This, too, was a highly significant prediction because if the universe has been expanding and if galaxies are moving farther apart, this implies that in the past they once were closer together. If the universe has been "blowing up" for the duration of its existence, that means that it must have had an actual beginning.

Einstein, who didn't realize that his equations suggested an expanding universe, was distressed to hear about this implication of his famous theory. When Russian mathematician Alexander Friedmann tried to persuade him, Einstein sought to prove Friedmann wrong. Actually Einstein was wrong. The great physicist was, by his own account, "irritated" by the idea of an expanding universe. He went so far as to invent a new force, the "antigravity" force, as well as a number called the "cosmological constant," to try to disprove the notion of a beginning. Later Einstein admitted his errors and called his cosmological constant the biggest mistake of his life.<sup>4</sup>

In the late 1920s, astronomer Edwin Hubble, peering through the hundred-inch telescope at Mount Wilson Observatory in California, observed through the "red shift" of distant nebulae that galaxies were moving rapidly away from each other. The number of stars involved

in this galactic dispersal suggested an astoundingly vast universe, much bigger than anyone had thought. Some galaxies were millions of light years away. The impression that many people had long held of the stillness and changelessness of space was an illusion. Hubble noticed that planets and entire galaxies were hurtling away from one another at fantastic speeds. Moreover, space itself seemed to be getting bigger. The universe wasn't expanding into background space, because the universe already contains all the space there is. Incredibly, space itself was expanding along with the universe. Hubble's findings, subsequently confirmed by numerous others, generated great excitement in the scientific community.

Scientists realized right away that the galaxies were not flying apart because of some mysterious force thrusting them away from each other. Rather, they were moving apart because they were once flung apart by a primeval explosion. Extrapolating backward in time, all the galaxies seem to have had a common point of origin approximately fifteen billion years ago. Scientists projected a moment in which all the mass in the universe was compressed into a point of infinite density. The entire universe was smaller than a single atom.

Then in a single cosmic explosion—the Big Bang—the universe we now inhabit came into existence. “The universe was filled with light,” Steven Weinberg writes. In fact, “it was light that then formed the dominant constituent of the universe.” The temperature was about a hundred trillion degrees centigrade. Then, in a process vividly described by Weinberg in *The First Three Minutes*, the first protons and neutrons began to form into atoms. Once matter was formed, gravitational forces began to draw it into galaxies and then into stars. Eventually heavier elements like oxygen and iron were formed and, over billions of years, gave birth to our solar system and our planet. Crazy though it may seem, our terrestrial existence, indeed the very matter of which we are made, owes itself to a “creation event” that occurred around fifteen billion years ago.<sup>5</sup>

This theory of an expanding universe was consistent not only with the second law of thermodynamics but also with Einstein's theory of

relativity. Hubble found that the farther away a galaxy is from us, the faster it is receding from us. This is now called Hubble's Law, and it fulfills a prediction that was made on the basis of Einstein's theory. The expanding universe theory also solved an old conundrum that had been frustrating scientists for decades: why the galaxies continued to stay apart from each other. Why had the force of gravity not pulled them together? The reason was that they had been hurled apart in a primordial explosion whose force continued to thrust them farther and farther away from each other. Astronomer John Barrow calls Hubble's finding "the greatest discovery of twentieth-century science."<sup>6</sup>

Even so, many scientists were visibly upset by the concept of a Big Bang. Robert Jastrow cites a number of examples in his book *God and the Astronomers*.<sup>7</sup> Astronomer Arthur Eddington called the concept "preposterous . . . incredible . . . repugnant." Physicist Philip Morrison of MIT confessed, "I find it hard to accept the big bang theory. I would like to reject it." Allan Sandage of Carnegie Laboratories said the idea was "such a strange conclusion" that "it cannot really be true." Like Einstein, prominent scientists began to advance theories that would eliminate the need for a beginning. They worked very hard to find a scientifically credible way for the universe to have existed forever.

Jastrow argues that the reason several leading scientists were troubled by the notion of a big bang is because, if true, it would imply that there was a "moment of creation" in which everything—the universe and its laws—came into existence. It is very important to recognize that before the Big Bang, there were no laws of physics. In fact, the laws of physics cannot be used to explain the Big Bang because the Big Bang itself produced the laws of physics. The laws of science are a kind of grammar that explains the order and relationship of objects in the universe. Just as grammar has no existence outside the words and sentences whose operations it defines, so, too, the laws of science cannot exist outside the universe of objects whose relationships they describe.

Scientists call the starting moment of the universe a "singularity," an original point at which neither space nor time nor scientific laws

are in effect. Nothing can be known scientifically about what came before such a point. Indeed the term *before* has no meaning since time itself did not exist “prior to” the singularity. Once upon a time there was no time. Jastrow’s implication was that such concepts, which border on the metaphysical, give scientists a very queasy feeling. If the universe was produced outside the laws of physics, then its origin satisfies the basic definition of the term *miracle*. This term gives scientists the heebie-jeebies.

Imagine the relief of these scientists when astronomers Hermann Bondi, Thomas Gold, and Fred Hoyle advanced what became known as the “steady state” universe. Their theory was that the universe was infinite in age. Basically Bondi, Gold, and Hoyle hypothesized that as energy burns up over time, new energy and new matter are somehow created in intergalactic space. So despite entropy and the second law of thermodynamics, everything remains in balance and on an even keel, and thus it is possible that the universe has always existed. Space and time are also eternal. The steady state theory quickly gained popularity and became the most favored explanation for the universe among scientists in Europe and America. As late as 1959, it commanded the support of two-thirds of astronomers and physicists.<sup>8</sup>

In a way, the steady state theory built on a very old foundation. The notion of an eternal universe has been around since the ancient Greeks. Greek philosophers and natural scientists had a wide range of views on the origin of the world, but they all generally agreed on the principle that something cannot be produced out of nothing: *ex nihilo, nihil*: “out of nothing there is nothing.” It takes matter to give shape to matter. Therefore, as the material universe could not possibly have arisen out of “thin air,” it has always been there. Matter is forever. Newton’s discoveries in the eighteenth century generally supported the idea of an eternal universe. For Newton, space was a three-dimensional volume stretching without limit in every direction, and time was a single dimension extending indefinitely into the past and into the future. It was this concept of the eternal universe that the steady state theory sought to confirm, as an alternative to the Big Bang theory.

The implications of the steady state theory, its advocates freely conceded, were largely atheistic. If the universe has always existed, then no one created it. It has simply been there all along. Newton himself sought to avoid this implication. While the universe may operate according to mechanical laws, perhaps even laws that have always existed, Newton argued that there was an external creator of those laws and he “certainly is not mechanical” but rather “incorporeal, living, intelligent, omnipresent.”<sup>9</sup> But by the early twentieth century most scientists viewed Newton’s argument as the special pleading of a religious man who simply could not abide the full significance of his own laws. The scientific consensus seemed to incline toward the view of Pierre-Simon Laplace, who was asked by Napoleon what place his nebular theories had for God and reportedly replied, “I have no need of that hypothesis.” The steady state theory had the virtue for many scientists of dispensing with the God hypothesis.

In the 1960s, however, the steady state theory suffered a devastating blow when two radio engineers working at Bell Labs, Arno Penzias and Robert Wilson, discovered some mysterious radiation coming from space. This radiation was not coming from a particular direction; rather, it was coming equally from all directions. In fact, it appeared to be coming from the universe itself. Penzias and Wilson soon learned that scientists had been predicting that, if the universe began in a single explosion around fifteen billion years ago, then some of the radiation from that fiery blast would still be around. This radiation was expected to have a temperature of around five degrees above absolute zero. Penzias and Wilson’s radiation measured slightly less than this number, and they realized to their astonishment that they had encountered a ghostly whisper from the original moment of creation.

Numerous other findings—including data from NASA’s Cosmic Background Explorer (COBE) satellite—have now confirmed the existence of this primordial background radiation. Based on the Big Bang theory, scientists are able to predict how much hydrogen, lithium, deuterium, and helium should exist in the universe. These predictions are in remarkable congruence with the actual amounts of those elements

that we find today. In 1970 physicist Stephen Hawking and mathematician Roger Penrose wrote a famous paper that proved that, given general relativity and the amount of matter in the universe, the universe must have had a beginning. As Hawking states in *A Brief History of Time*, “There must have been a Big Bang singularity.”<sup>10</sup> Astronomer Martin Rees notes that numerous lines of evidence have now converged that have discredited the steady state theory and confirmed the Big Bang theory.<sup>11</sup>

“In the beginning,” the Bible says in the book of Genesis, “God created the heavens and the earth.” The Bible is unique among the documents of ancient history in positing an absolute beginning. In Buddhism, we learn from the Dalai Lama that “there are multiple world systems . . . in constant state of coming into being and passing away.”<sup>12</sup> The Bible also asserts clearly that time is finite. By contrast, Hinduism and Buddhism posit endless cycles of time stretching into the indefinite past. The Greeks and Romans, like other cultures of antiquity, believed in the eternity of history. As Leon Kass notes in his study of Genesis, the biblical writers didn’t need to venture into this territory. They could have started with the Garden of Eden and left out the account of creation.<sup>13</sup> Instead the biblical narrative brazenly insists that the universe came into existence at a particular instant in time as an act of voluntary creation by an already existing supernatural being.

It is important here to clear up a common misunderstanding. Many secular writers seem to think that the orthodox Christian position is that the universe and the earth were literally made in six calendar days. But the Bible uses a Hebrew term that could mean a day or a season or an era. We also read in 2 Peter 3:8 that “with the Lord a day is like a thousand years, and a thousand years are like a day.” From earliest Christian times, the leading church authorities from Irenaeus to Origen to Augustine gave a figurative interpretation to the “days” in the book of Genesis. Most traditional Christians have no problem with a creation account that extends over millions, even billions, of years.



Remarkably, Jews and Christians have always believed not only that God made the universe, but also that He made it out of nothing: “in the beginning was the Word.” With this the Bible implies that the universe was literally spoken into existence.<sup>14</sup> For nearly two thousand years this made no rational sense. We experience time and space in such a way that we cannot imagine them having a beginning or an end. Nature suggests no beginning or end in itself. In the creation myths of most other religions, gods typically fashion the world out of some preexisting stuff. Logic would seem to be on the side of the ancient Greeks: *ex nihilo, nihil*. But now modern science tells us that the Bible is right. The universe was indeed formed out of nothing. And how was it formed? We do not know and may never know, because the creator used processes that are not now operating anywhere in the natural universe.

Even more strange is that Jews and Christians have long held that God made space and time along with the universe. We have seen how the church father Augustine, when confronted with the question of why God sat around for such a long time before deciding to create the universe, answered that the question was meaningless. There was no time before the creation, Augustine wrote, because the creation of the universe involved the creation of time itself. Modern physics has confirmed Augustine and the ancient understanding of the Jews and Christians.

The Big Bang resolves one of the apparent contradictions in the book of Genesis. For more than two centuries, critics of the Bible have pointed out that in the beginning—on the first day—God created light. Then on the fourth day God separated the night from the day. The problem is pointed out by philosopher Leo Strauss: “Light is presented as preceding the sun.”<sup>15</sup> Christians have long struggled to explain this anomaly but without much success. The writer of Genesis seemed to have made an obvious mistake.

But it turns out that there is no mistake. The universe was created in a burst of light fifteen billion years ago. Our sun and our planet came into existence billions of years later. So light did indeed precede

the sun. The first reference to light in Genesis 1:3 can be seen to refer to the Big Bang itself. The separation of the day and the night described in Genesis 1:4 clearly refers to the formation of the sun and the earth. Day and night—which we experience as a result of the earth's rotation—were indeed created much later than the universe itself. The Genesis enigma is solved, and its account of the creation is vindicated not as some vague parable but as a strikingly accurate account of how the universe came to be.

Let's remember that the Old Testament was written more than 2,500 years ago by people who essentially contended that God told them what He did. Gerald Schroeder notes, "These commentaries were not composed in response to cosmological discoveries as an attempt to force an agreement between theology and cosmology. . . . Theology presents a fixed view of the universe. Science, through its progressively improved understanding of the world, has come to agree with theology."<sup>16</sup>

Leading scientists have, sometimes reluctantly, endorsed this conclusion. Arthur Eddington, who finally conceded the veracity of the Big Bang, acknowledged that "the beginning seems to present insuperable difficulties unless we agree to look at it as frankly supernatural."<sup>17</sup> Arno Penzias, who won the Nobel prize for his discovery of the cosmic background radiation that corroborated the Big Bang, said, "The best data we have are exactly what I would have predicted had I nothing to go on but the five books of Moses, the Psalms, and the Bible as a whole."<sup>18</sup>

Astronomer Robert Jastrow puts it even more vividly. "For the scientist who has lived by his faith in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak. As he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries."<sup>19</sup>

I am not citing the Bible to prove that God created the universe. I am citing it to show that the biblical account of how the universe was created is substantially correct. The Bible is not a science textbook. It

does not attempt, as science does, to give a detailed account of how the universe and the earth were formed into their current shapes. But what it does say about creation—about the fact of creation and about the order of creation—turns out to be accurate. In a manner that once would have seemed impossible, the Bible has been vindicated by the findings of modern science.

Now it is time to supply the “missing link” and show that the universe did have a creator. The proof is extremely simple. Everything that begins to exist has a cause. The universe began to exist. Therefore the universe has a cause. That cause we call God. For a long time the denial of a creator was based on denying the second proposition. No, the atheists insisted, pointing to Newtonian science as their evidence, the universe does not have a beginning. It’s a kind of perpetual motion machine. It has always been there. Science has now removed that argument.

So atheists—including atheist scientists—are reduced to denying the first proposition. Everything that has a beginning doesn’t necessarily have a cause. The universe simply is and there’s nothing more we can say about it. Philosopher Bertrand Russell adopted this position in a debate on the existence of God. He said, “The universe is just there, and that’s all.”<sup>20</sup> Physicist Victor Stenger says the universe may be “uncaused” and may have “emerged from nothing.”<sup>21</sup> Even David Hume, one of the most skeptical of all philosophers, regarded this position as ridiculous. For all his skepticism, Hume never denied causation. Hume wrote in 1754, “I have never asserted so absurd a proposition as that anything might arise without cause.”<sup>22</sup>

If every effect in nature has a cause, what is the cause of nature itself? Who or what put the matter and energy into the universe? Is it even remotely reasonable to suggest that nature created itself? If for even a single instant there was nothing in existence—no matter, no universe, no God—then how could there be anything at all? When events occur—we see a huge crater where level ground used to be, a famous movie star is found with his head cut off—we immediately ask what caused these things to happen. It would hardly be

considered a reasonable or scientific explanation to say, "Well, they just happened. There is no cause." We know that something caused the crater to show up. We know that someone cut off the movie star's head. We may not know the identity of the person who committed the act, but we know that someone did it.

Similarly we may not know what kind of creator made the universe, but we do know that it was made, and that someone made it. Our world looks so physical, and yet we know with scientific certainty that it was the result of a force beyond physics. This is the literal meaning of the term *metaphysics*—that which is after or beyond physics. Science has discovered a reality that it had previously consigned to the domain of faith. But today it takes no faith to recognize that the origin of the universe is metaphysical. The universe that came into being in a primeval explosion fifteen billion years ago did not cause itself. It was caused or created, which means there had to be a creator. To that creator we give the name God.

It seems at this point that we have established the existence of a creator, but nothing can be known about the nature of that creator. I submit that this is not so. Many attributes of the creator remain unknown or hidden, but there are some conclusions that we can reasonably draw from what we know. As the universe was produced by a creative act, it is reasonable to infer that it was produced by some sort of mind. Mind is the origin of matter, and it is mind that produced matter, rather than the other way around. As the universe comprises the totality of nature, containing everything that is natural, its creator must necessarily be outside nature. As the creator used no natural laws or forces to create the universe, the creator is clearly supernatural. As space and time are within the universe, the creator is also outside space and time, which is to say, eternal. As the universe is material, the creator is immaterial, which is to say, spiritual. As the universe was created from nothing, the creator is incomprehensibly powerful or, as best as we can tell, omnipotent.

Is the cosmos all there is, or was, or ever will be? Of course not. That idea is complete nonsense, and from a man who should have

known better. The laws of nature give “no hint” of a divine plan or creator? How could Steven Weinberg have made an assertion as foolish as that? To the dogmatic atheist, it seems like science fiction, or a recurrent nightmare. But there’s no getting around the scientific fact. The finding of modern physics that the universe has a beginning in space and in time meets E. O. Wilson’s litmus test for one of the most important scientific discoveries ever made. It provides, for all who take the trouble to understand and reflect upon it, powerful and convincing evidence of the existence of an eternal, supernatural being that created our world and everything in it.