

INTRODUCTION

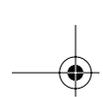
Stories & Myths

ALL SOCIETIES HAVE THEIR STORIES, AND EVERYONE HAS HEARD OF THE myths of ancient civilizations, with their gods and heroes. The animated Disney film about Hercules upset some modern-day Greek people because the legendary figure remains an important part of their national heritage. They perceived his Disneyfication as a slight. But in ancient Greece, Hercules was much more than national heritage. Heroes demonstrated to people how humans fit into the world and how to live a noble life. If Disney had made its film in classical times, it would have been in deep trouble.

Of course, the stories of ancient Greece were myths or legends and were not intended to be taken literally as history. They paint a picture of sharply etched contrasts, of heroes and villains, of the battle between good and evil, and of creation and destruction, and have the feel of a bygone age.¹

Some theologians, especially in the nineteenth century, tried to read the Bible as if it were a myth. This failed because the Bible values historical narrative in a way that myth does not. Although the popular belief that the Bible is mythical still survives, few contemporary scholars would regard such a reading as plausible nowadays, preferring to use myth in more precise and limited ways.² In fact, we now know that the biblical narrative is quite unlike the structure of myths. Indeed, the Jews were probably the first to write historical narrative in the sense of a story moving steadily forward, with a beginning and an end. Certainly some of the Bible predates the histories of Herodotus, "the father of history." The Christian gospel, rooted in Judaism, is also a historical message. It is concerned with actual people and places. Jesus was a carpenter from Nazareth and Paul a tentmaker from Tarsus. New Testament authors emphasize the historical nature of the Gospel accounts, disparagingly contrasting them





with “cleverly devised myths” (2 Pet 1:16).³ In the words of theologian and historian Stephen Neill, “He who says ‘Jesus’ says also ‘history.’ ”⁴

We sometimes suppose that it was our Enlightenment forebears who fought to free us from myth and superstition, and we forget that Western culture has been deeply influenced by this biblical vision. Our contemporary idea of history owes much to it. Indeed, we have become so accustomed to the idea of historical narrative that myth seems a thing of the past. Myths are seen as untrue, relics of premodern anxieties that science and progress have assuaged. The ancients may have relied on them, but we know better. However, some myths are still with us.

Just as the Bible cannot be regarded as mythical simply because it is an ancient text, so some modern stories of our place in the universe cannot be regarded as history simply because they are recent texts. Indeed, such stories may sometimes have more in common with ancient myths than with history. Of course, modern-day stories of who we are and how we fit into the universe are no longer told in the same way as the Greeks told theirs, but that does not mean that we have no such stories. The modern mind, no less than the ancient one, uses stories to reinforce its belief that we are more advanced and more “scientific” than other civilizations. But unlike the ancient Greeks, we clothe our modern myths in the garb of history or science.

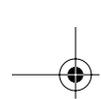


Newton’s Apple

At first sight this may seem a strange idea. Surely “science” is concerned with facts and logic, and can have nothing to do with stories and myths. So let me illustrate what I mean with an example that will be familiar to everyone.

As we know, Isaac Newton revolutionized science by his discovery of gravity. But if we were asked to explain this, most of us might be hard pressed to state Newton’s law of universal gravitation even though we know that there is one. We rely on scientists whose training fits them to understand these things. We are not entirely ignorant of Newton’s discovery, however, for everybody has heard the story of the great physicist sitting beneath his apple tree at Woolsthorpe Manor in Lincolnshire, England. It is said that while he was puzzling over the mystery of the moon’s orbit an apple fell from a tree, some say on to his head, and Newton “discovered” gravity. If we visit Woolsthorpe today, we can picture the place where it all happened. Our “knowledge” is encapsulated in this story, and we trust in what the story signifies, even though we might not be familiar with the





INTRODUCTION

9

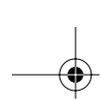
mathematics. The fact that the story was probably made up by Newton to satisfy someone's idle curiosity does not invalidate the truths of his *Principia Mathematica*, even though that book is mercifully free of falling fruit.

It is widely assumed that reason, science and history have replaced stories as the basis for our understanding of the world. But if we look at the way that our everyday knowledge of science circulates and is passed on from one generation to the next, we find stories, not mathematics. Most of us have met Newton as the man who had an apple fall on his head, but few go on to read the *Principia Mathematica* with its notable lack of vegetable references. If we have heard of black holes, those mysterious denizens of space, it is more likely that we learned about them by watching *Star Trek* than by reading the British physicist Stephen Hawking. We know that the earth revolves around the sun because we have heard the story of Galileo's clash with the Inquisition, not because we know Kepler's laws of planetary motion or understand the dynamics of Foucault's pendulum. Of course, if we study science at a university, we will learn the beautiful mathematical descriptions of gravitational theory and gain a deeper insight into it. Yet the lack of a physics degree does not prevent scientific discoveries from being part of everyone's picture of the modern world.

The story of Newton's apple encapsulates a difficult physical theory and helps us to pass on his great discovery in an easily understood way. Although this particular story is especially apt, any number of others could do the same. For example, it is said that late one morning Newton's housekeeper arrived to find him still in his nightclothes, sitting on the edge of his bed. The great man had been so deep in thought about the motion of the moon that he had forgotten to get dressed or have breakfast! Stories are part of our modern knowledge of the world, even of science. But they are not like ancient myths. If they were, no one would bother with them. They are told as if they were history, even if this turns out to be untrue.

Of course, the story of Newton and his apple is a harmless legend that is unlikely to cause much damage, even if it is apocryphal. However, it is more than just a convenient way to pass on difficult ideas about gravity. It also carries something more fundamental: a *myth* which, under cover of the story, perpetuates a romantic picture of the "scientific genius" as someone whose theories come in a flash of inspiration. A variation on the same theme lies behind the story of Newton lost in thought on the edge of his bed: the myth of the "absent-minded professor" who is so caught up in his



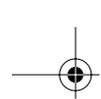


theories (and it always seems to be “his” theories) that he has no time for the more mundane affairs of life. These myths are more significant than the stories that carry them, for they form our view of scientific discovery as a rather eccentric activity leading the lone genius away from everyday human interaction and life. They present science as a solitary activity, usually of rather emotionally uninvolved men, and downplay the cooperative effort of people working together to understand God’s world. At best they give us a romantic picture of the lone pioneer, heroically blazing his own trail; at worst they present the image of the “geek” or the “nerd,” alone in his laboratory or in front of his computer screen and isolated from human companionship and real life. “Nerds,” incidentally, are almost always men.

Such myths are carried by the story, driving it forward and making use of the historical facts and the scientific evidence for their own purposes. Sometimes the myth distorts both the science and the history in order to make its point. For example, few historians suppose that Newton’s idea came to him in a flash of inspiration when an apple hit him on the head. Indeed, Newton’s own remark about having seen further than others because he stood on the “shoulders of giants” hints at the communal aspect of scientific activity. But the “flash of inspiration” picture is better suited to the romantic myth of the scientific genius, so it is this that the myth uses to construct its story. Such a myth of science may have very concrete consequences in either inspiring or discouraging budding young scientists. To some, the idea of science as indifferent to ordinary human life and human relationships may not seem so attractive and may help perpetuate the stereotype of science as a male preserve.

Science, then, is sustained and transmitted by stories as well as mathematics, and not all of them are as innocuous as they first appear. The same applies to history. Indeed, in recent years we have become accustomed to the idea that history is told by the victors and reflects the interests of the rich and powerful. Thus at school we learn about kings and queens, prime ministers and presidents. Recent scholars have shown that this traditional idea of history has neglected the concerns of ordinary people, while some feminist historians consider that women’s lives have been so far excluded that a new discipline of “her-story” (rather than “his-story”) is needed. These insights can easily become a suspicion that there is no *objective* history, just biased accounts reflecting sectional interests. We then ask not “Is it true?” but “What advantage do you gain from the way that you tell your





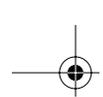
version of history?" This suspicion about historical neutrality has found its way into popular consciousness, including films such as Oliver Stone's *JFK*, which brought conspiracy theories about the Kennedy assassination to a whole new audience. The adult cartoon show *The Simpsons* humorously exploited this trend in the episode dealing with "Whacking Day."

The Simpson family lives in the town of Springfield. Every year the good townsfolk celebrate Whacking Day, when the men hunt down the local snakes and beat them to death with large sticks. It is said that the history of Whacking Day goes back to the late eighteenth century when Jedediah Springfield, the town's founding father, hit a snake with his gun to drive it away. Lisa Simpson, the young daughter of the family, is a lively critic of cruelty and injustice of all kinds. She is suspicious of the "received version" of the Whacking Day story and discovers from her brother that, in reality, Whacking Day was invented in 1924 as an excuse to beat up the Irish. The story wore the garb of history, but behind it lay an attempt to justify ethnic violence; in more recent, tolerant times, its purpose shifts to the simple, homely pursuit of killing snakes.

The recognition that history may serve vested interests has led some to suspect that all narratives have a hidden agenda. Some historians argue that the increasing prevalence of such views makes relativism inescapable and "destroys the difference between fact and fiction."⁵ But if Springfield's Whacking Day myth allowed the local community to express prejudice against an ethnic group, Lisa's discovery of this relied on an appeal to a history independent of sectional interests. The claim that we should treat all truth claims as relative is itself a (relative) truth claim and therefore contradicts itself. As the philosopher Roger Scruton wryly observes, "A writer who says that there are no truths, or that all truth is 'merely relative', is asking you not to believe him. So don't."⁶

Nowadays, then, a story has to be presented as history or as science in order to be taken seriously. This has not always been the case. Among the ancients, history was commonly regarded as inherently uncertain, involving local and particular events, the accidents and coincidences of everyday life. It was therefore unsuited to express eternal truths that are true everywhere and for all time. To express a truth in the language of history would have reduced its status, not increased it. Thus when Greek thought moved away from the mythic representation of universal values, it turned not to the uncertain tide of history but to an idea of reason as the bearer of truth. It





is sometimes argued that the Bible is myth dressed up as history, but this naively assumes that just because the clothes of history automatically increase the status of a narrative in our modern world, the same was true of the ancient world. It need not have been so. The insistence that stories have to be *historical* in order to be taken seriously, while now a universal belief, has probably been a minority view throughout the ages. Where Bible texts claim to be history, it is because that is what they are, not because their authors had an eye to the beliefs of future ages. Without good evidence it would be extravagant to assume otherwise.

Stories, then, can form part of our account of modern scientific or historical knowledge (as with Newton and his apple), and they may serve sectional interests (as with Whacking Day). In doing so, they may distort and impoverish the history or science they use.

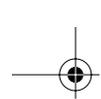
So far, we have looked at small-scale stories, little local affairs, misleading certainly but of little consequence. It is not always so. More widespread stories also exist that can influence the perception of a whole culture. For these big myths we have to look at what Douglas Adams calls “life, the universe and everything.”

The Whole Story

In his book *The Pilgrim's Regress* C. S. Lewis has his Pilgrim meet nineteenth-century rationalism in the person of Mr. Enlightenment, who makes appeal to just such stories of science and history. Mr. Enlightenment offers his assistance to Pilgrim and advises him that God (in the person of the Landlord) does not exist. Those who believe that he does exist “have no knowledge of modern science and would believe anything they were told.” “But how do you *know* there is no Landlord?” asks Pilgrim. “Christopher Columbus, Galileo, the earth is round, invention of printing, gunpowder,” exclaims Mr. Enlightenment, adding that those who disbelieve “have not had the benefit of a scientific training. For example, now, I dare say it would be news to you that the earth was round.”⁷

Mr. Enlightenment appeals to stories of science and history, clinching his argument with tales that we all learned at school: Christopher Columbus, who shows us the ignorance of the medieval church and who pioneered man's⁸ voyages of discovery; Galileo, who epitomizes the human spirit's pursuit of truth in the face of the church's continuing bigotry and persecution; and discoveries such as printing and gunpowder, which illustrate the





achievements of science and technology that make the modern world what it is. We might add Darwin, who showed us man's place in nature, or the Spanish Inquisition, which serves as a byword for the terror and oppression exercised by religion if it gets half a chance.

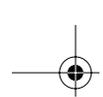
There are many such stories, and a selection of the most common ones forms the core of this book. The myths they carry are the modern mind's way of communicating its beliefs about the fundamental problems of origins and meaning that have puzzled philosophers and theologians for millennia. A myth, in my sense of the word, presents values and beliefs to us as though they were facts or history, and it uses stories to do so. Stories, then, are shaped by the myths that drive them, by the underlying worldview that organizes and justifies a multitude of particular narratives. A myth provides the framework into which other things are fitted and the light by which we see them. The story may be the medium, but the myth is the message. Once upon a time, it was heroes like Hercules who formed the raw material for myths. But nowadays no one would believe such a story, so science and history have replaced the Herculean tasks. Modern myths are characteristic of their time (today) and place (Western societies). We should not expect them to look like the myths of yesteryear.

A myth needs history and science in order to propagate itself. Newton's apple appeared as a historical fact but carried the romantic image of scientific discovery. History and science do not disappear, but they are distorted by the myth they serve. Modern myths are, as it were, messages woven out of history and science. But once historical events or scientific theories are incorporated into a myth, once the myth makes use of them, it feeds off them, and they become deformed and impoverished. Thus the story of Whacking Day distorted our understanding of the ethnic conflicts during the foundation of the community of Springfield. The legend of Newton's apple oversimplified the history of scientific discovery. To recover the historical richness, we must uncover the myth.⁹

The Big Stories of the Modern World

The stories we will be discussing concern the nature and meaning of life, the origins of humanity, and the nature of good and evil. These are subjects that were once the province of religion and philosophy but are now that of science and history. So it is no surprise that these stories often refer both to the religious explanations from the past and to the more recent scientific





accounts, contrasting their respective claims to truth. Before looking in more detail at how such stories work, it might be helpful to have a couple of examples. We start with one mentioned by C. S. Lewis's *Mr. Enlightenment*: "the earth is round."

The flat earth. A common *grand story* contrasts the modern world with the superstition and bigotry that preceded it. The role of the bygone time is often played by the Dark Ages, with the church as the bastion of ignorance. The well-known medieval belief in a flat earth is one such story.

We all know the tale. In the Dark Ages people believed that the earth was flat and that sailors venturing too near the edge would fall off.¹⁰ This belief was the official teaching of the church, and it put a brake on the voyages of discovery. The very term "Dark Ages" portrays a period of ignorance and decline. For Carl Sagan, "classical learning dwindled" with the birth of the church, and the "triumph of superstition" dominated the Middle Ages until the recovery of reason during the Renaissance.¹¹

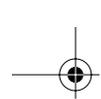
The story has a clear and simple plot line, which quickly found its way into the received wisdom. The villains are obvious: superstitious, ignorant and credulous priests—"flat-earthers" to a man. But like all good stories this one also needs a hero. Columbus is a popular choice, and he is presented as courageous, rational and moderate, standing alone against the might of the church and the Inquisition. For the purposes of the story Columbus has become an honorary member of the modern world, while all the ills of superstition and ignorance are concentrated in the church. The following version of the story comes from the 1887 book *Ten Great Events in History*:

"But if the world is round," said Columbus, "it is not hell that lies beyond that stormy sea. Over there *must* lie the eastern strand of Asia." . . . In the hall of the convent there was assembled the imposing company—shaved monks in gowns . . . cardinals in scarlet robes. . . . "You think the earth is round. . . . Are you not aware that the holy fathers of the church have condemned this belief. . . . The Holy Scriptures too. . . . This theory of yours looks heretical." Columbus might well quake in his boots at the mention of heresy; for there was that new Inquisition just in fine running order, with its elaborate bone-breaking, flesh-pinching, thumb-screwing, hanging, burning, mangling system for heretics.¹²

Nearly a hundred years later student textbooks still tell the same story: "The Middle Ages were a dark period . . . [when ancient insights] were reshaped to conform to the teaching of the Church. The Earth became a flat disc with Jerusalem at its centre."¹³

It has been known for many years that this story is not true. All educated





people of the time knew that the earth was round, and the confrontation between the church and Columbus reported above is fiction. The historian Jeffrey Russell has documented the story's growth in the nineteenth century and its popularization by John Draper and Andrew White, two authors we shall repeatedly meet.

Draper, in his book *History of the Conflict Between Religion and Science*, argues that the Roman Catholic Church of the Middle Ages was inherently opposed to scientific progress. "Intelligent sailors," astronomers and philosophers realized that the earth is round, but "as might be expected, [this] was received with disfavour by theologians." "Traditions and policy forbade [the Papal Government] to admit any other than the flat figure of the earth, as revealed in the Scriptures."¹⁴ We see here that more characters have been added to the story. The church remains on the side of the "flat-earth-ers," but "intelligent sailors," astronomers and philosophers join Columbus on the side of reason and good sense.

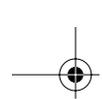
Andrew White's book *A History of the Warfare of Science with Theology in Christendom* puts the more general case that theology, if it trespasses upon science, distorts it. Thus he asserted that the church fathers attempted to "crush" Aristotle's "ancient germ of scientific truth" of the round earth and claims that everyone is familiar with "the warfare of Columbus" with the church, which science ultimately won.¹⁵

Despite historians like Jeffrey Russell, the story persists, proving from "history" that religion is bigoted and opposed the truth of a round earth. In doing so it distorts both the history and the science of the period. The myth that drives this story is apparent from the titles of Draper's and White's books: the "warfare between religion and science."

The tale of the comet. The myth of the "warfare between religion and science" appears in many guises. A curious example concerns the "excommunication" of Halley's comet by Pope Callixtus III in 1456, a tale of the superstitions of a prescientific age that, as Carl Sagan tells us, "most astronomical writers relate."¹⁶ He means, I think, most *older* astronomical authors. The majority of scholars today are aware of the tale's apocryphal nature, although it does persist in some popular science books. Thus Patrick Moore informs us that Callixtus III "excommunicated [Halley's comet] as an agent of the Devil."¹⁷

The story tells us that when Halley's comet appeared in 1456, Pope Callixtus III was alarmed at this portent in the skies. At a time of continuing





conflict between Rome and the Turks, Callixtus naturally thought it “an evil omen somehow allied with the Turkish cause.” Fortunately a remedy was at hand which was no less superstitious than his view of comets—its excommunication. And so, we are told, Pope Callixtus III is remembered by history for the insane act of excommunicating Halley’s comet. Draper gives us a characteristically colorful rendition in which the unhappy comet is “exorcised” rather than the more customary excommunication:

When Halley’s comet came, in 1456, so tremendous was its apparition that it was necessary for the pope himself to interfere. He exorcised and expelled it from the skies. It slunk away into the abysses of space, terror-stricken by the maledictions of Callixtus III, and did not venture back for 75 years.¹⁸

We should remind ourselves that although Draper was a physiologist rather than a historian, his book was intended to be a serious work of scholarship; it enjoyed enormous influence at the time, was translated into eight languages and is still often cited.

The story of Callixtus III appears to have originated in an unreliable fifteenth-century *Lives of the Popes* by Platina. It was revived by the Enlightenment mathematician, the Marquis Pierre-Simon de Laplace, and has been uncritically repeated by astronomers until very recently. But the story does not end with mere ridicule of Callixtus III. It also has a hero: the same Enlightenment to which Laplace was committed turns out to be the New Dawn.

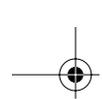
The medieval treatises [on comets] are full of divination and portent, omen and blood, mysticism and superstition. . . . So, when the Renaissance and the Enlightenment finally came, a new breed of scholars arose who were predisposed to hold the Church responsible for superstition and ignorance—about comets and many other matters.¹⁹

We have passed from a local story about Halley’s comet in 1456 to the open-mindedness of Enlightenment science and the ignorance of the church. Moreover, lest readers should think that this was a peculiarity of an especially superstitious period of Catholicism, the story is at pains to point out that it is equally true of all religions:

[As for the] Protestant Reformation . . . The contending sects, divided on many theological issues, were in perfect harmony on the matter of comets [namely, that they are supernatural events given as signs].²⁰

The received story envisages a simple correlation between the church and





error, and between “scientists” and truth. The facts are rather different and much more complex.²¹

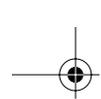
It is certainly true that many medieval authors regarded comets as an evil omen. For example, the Venerable Bede, writing in the eighth-century A.D., tells us that two comets appeared in A.D. 729, “striking terror into all who saw them . . . [and] seeming to portend awful calamity to east and west alike.”²² The source of this terror is, however, more uncertain. Beliefs about comets are probably linked to pagan astrological belief, generally with roots in the ancient Near East. They may also be connected to ancient Greek beliefs in the perfection and immutability of the heavens. Comets come and go; they indicate change in the changeless heavenly sphere, and if the heavens can change, what convulsions must be awaiting the earth. Whatever their origin, it does not seem to be either *religious* or specifically Christian. Astrology is not encouraged in the Bible, and those heavenly signs that do occur in Scripture, from a rainbow to the star of Bethlehem, do not usually portend evil. Rather the reverse.

Moreover, the emergence of a modern understanding of comets in the seventeenth century was not resisted by religious opinion. It was the Jesuit Horatio Grassi who advocated correctly that comets lie beyond the moon’s orbit, while no less a person than Galileo rejected this in favor of the traditional Aristotelian account that comets are caused by an exhalation from the earth to the upper air. In 1692 Isaac Newton wrote to his friend Bentley, expressing his pleasure that his scientific discoveries would help intelligent laymen to understand more of the glory of God. Among other things, he refers to comets in the context of divine providence, with no mention of them as messengers of doom and no apparent sense of conflict between his discoveries and his belief in the deity. The fact is that the pioneers of seventeenth-century science simply did not think in terms of the modern division between science and religion. The modern myth of the “warfare between religion and science” has again tailored history to fit its needs.

The Warfare Between Religion and Science

The stories of the flat earth and of the excommunication of Halley’s comet are presented as innocent historical accounts of the victory of science over superstition. In fact, they carry values and beliefs about the world and ourselves. They sustain myths, including those of a “warfare between religion





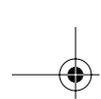
and science,” the myth of “progress” and that of “humanism.”

The myth of a “warfare between religion and science” contrasts an earlier era of ignorance and intolerant superstition with today’s world of science and enlightened toleration. It had its origin in Enlightenment anticlericalism, but it was systematically developed in the nineteenth century. The rationalist historian William Lecky pictured the rise of rationalism from the late eighteenth century as the triumph of civilization over barbarism. Dogma declined in direct proportion to the growth of science.²³ John Draper argued that religion, especially Roman Catholicism, destroyed ancient science, replacing it with superstition and precipitating the Dark Ages until reason broke free in the seventeenth century. However, it was historian and president of Cornell University Andrew White who put it most sharply. He believed that mutual damage was inevitable when religion dictates to science and gave many misleading examples that are still widely cited today. His book has been extremely influential; “the idea that science is a rational, truth-seeking discipline and theology is not” has become “a widespread cultural myth.”²⁴

It is important to realize that myths are not necessarily deliberately invented in the face of the known facts, nor need they arise from conspiracies designed to promote a particular point of view. Rather, myths find expression in the taken-for-granted vocabulary of a culture. They are cultural resources and carriers of meaning. On occasion, however, myths are deliberately fostered by groups of like-minded people to serve their own ends. The historian Colin Russell has argued that this is the case with the myth of a “warfare between science and religion.” Russell believes that T. H. Huxley and his associates not only drew on this myth to increase their own status as scientists but were involved in something approaching a conspiracy to reinforce the myth in the public mind.²⁵ The role of individual ambition and of the prestige of social groups such as scientists is an important aspect of myth-making, and I will occasionally refer to it, but the focus of this book is more on the cultural aspects of myth and avoids notions of “conspiracy.”

The myths of progress and humanism have their roots in the Renaissance and Enlightenment. They drive the familiar story that ignorance and fear dominated people’s lives in the Dark Ages. Since the Enlightenment, it is said, we have broken the chains of superstition and religion and are now free to work together for the common good, to lift the burden of human misery through education and medical science. Man has come of age. Of





course, religion continues to oppose this, as it is the business of the churches “to expound an unchanging truth, revealed once for all in utter perfection . . . [so] they become necessarily opponents of all intellectual and moral progress. [Thus] the church opposed Galileo and Darwin.”²⁶ Authors such as Bob Goudswaard²⁷ have argued that this myth amounts to a faith with religious roots.

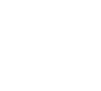
These myths establish a language that later storytellers can build on. For example, they define the connotations of key words, fixing them into new associations that perpetuate the myth. Thus in the above quotations about the flat earth and comets, we find *religion* associated with belief, omens, ignorance, superstition, heresy, excommunication, torture and blood. *Science*, on the other hand, is associated with enlightenment, scholarship, astronomy, intelligence, open-mindedness and observation. These very associations reinforce the myth that religion is credulous, ignorant and oppressive, while modern science seeks the truth by impartially weighing the evidence, promoting freedom and truth. Thus the word *Puritan* serves as a handy label for anything repressive, while the term *Enlightenment* unambiguously tells us how to regard the anticlericalism of the late eighteenth century. Once such a language is in use, there can be only one relationship between science and religion: warfare.

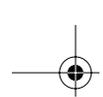
The historian Owen Chadwick calls the resultant images of science and religion “balloon duellists” in the “legend” of the warfare between them:

Science and Religion were blown up into balloon duellists, science containing all knowledge, Religion containing no knowledge, and the two set side by side. . . . [It then] became possible to read back the antipathy [between science and religion] throughout history and see the ding-dong of duel through the centuries . . . [with] the Church putting the earth at the centre of the universe and Galileo proving it was not.²⁸

Key words are also integrated into everyday language, squeezing out the language of religion. In 1977 a Church of England survey showed that young people have adopted the language of “science” without necessarily understanding what it refers to:

In general . . . we find . . . an uncritical acceptance of a vocabulary of natural science which is . . . out of date . . . and is *capable of enshrining new myths within itself*. . . . Instead of religion our young people have a mild form of science fiction.²⁹





The Persistence of Myth

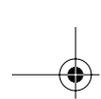
All versions of the story of the “warfare between science and religion” agree that science has won the day, and human progress is the badge of its victory. Things are different, it is said, in those countries still dominated by fundamentalist religious beliefs, but in the modern world the “steeple’s shadow,” which once stretched over much of social life, has shrunk dramatically.³⁰ Society is now less religious, the church less influential and everyday life less dominated by belief and superstition. We no longer rely on religion but have other sources of reassurance and hope. Nowadays we do not turn to the gods to guarantee a good harvest but to the meteorological office, not to prayer for the success of an enterprise but to the stock market index. It is Galileo’s discoveries that tell us our place in the heavens, not Zeus or Jehovah, and it is Darwin’s theory of evolution, not Aphrodite, who explains to us our amorous nature. Thus the recognition that the earth is round, Columbus’s voyages of discovery, the end of witch-hunting, Darwin’s discovery of evolution—all these become metaphors for progress generally. The church may wage a rear-guard action against progress, but it has had its day.



In view of this we would expect the role of religion in modern stories to fade over time. It is understandable that some eighteenth-century Enlightenment philosophers would be anticlerical and reject church doctrine; after all, the church wielded great power and actively opposed the Enlightenment program. Similarly, when the nineteenth-century biologist T. H. Huxley, known as “Darwin’s Bulldog” for his aggressive support of evolution, founded the Sunday Lecture Society as an alternative to church worship, he was, among other things, attempting to poach the prestige of a church that still controlled entry to most universities and enjoyed great social status. In such circumstances opposition to religion is understandable. But by the early twentieth century the situation was different. Religion no longer had so privileged a status. Science had won its “war.” And yet contemporary authors continue to contrast religion and science as if nothing had changed. Carl Sagan pictures science as a candle in the darkness of religious superstition, while Andrew Brown observes that for Richard Dawkins, “the world appears as bright islands of scientific enlightenment surrounded by a ravaging darkness of ignorance and religion.”³¹

Of course, stories have a certain momentum and continue even after they have been proved untrue. But there are deeper reasons for modern myths to persist that are related to their claims to truth.



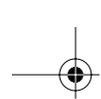


Rational Foundations?

Many existing myths reflect a problem at the very heart of the modern worldview. The Enlightenment championed a particular kind of reason derived from Newton's insights into the physical world, and we are told, "The Enlightenment swept away the prejudice of the past and tried to establish, on a rational foundation, the study of humanity, society and nature."³² However, this "rational foundation" has always been rather shaky; even in the eighteenth century there were doubts whether this kind of reason is adequate to the rich and complex nature of human life, and the Romantic movement rejected its cold heartlessness. Newtonian reason is quantitative and thrives on calculation; it cannot of its own motion enter the continuous calculus of qualities, feelings, values or experience. Thus at the very center of the Enlightenment worldview, a rift opened between blind mechanism and human freedom. But it is not just that logic is depersonalizing. Human reason itself turns out to be "merely an organ that has been developed by man's efforts to adapt himself to his environment."³³ And if reason has evolved in this blind displacement of one species by another, why should we place any trust in it? Darwin confessed "the horrid doubt . . . whether the convictions of man's mind, which has been developed from the mind of the lower animals, are of any value or at all trustworthy. Would any one trust in the convictions of a monkey's mind, if there are any convictions in such a mind?"³⁴ Presumably one such conviction is that of evolution, and so we come full circle. Newtonian reason is indeed a highway for our understanding of the physical aspect of creation. Yet, as modernity's Royal Road to all wisdom, it turns out to be a dead end. Rationalism, the very foundation of the Enlightenment, deconstructs itself.

As a result of its unstable foundations, modernity, the supposedly rational study of "humanity, society and nature," has found it easier to say what it *is not* than what it *is*. Specifically, it *is not* religion. But then the modern mind is involved in a dual task: it must wage war against religion, but it dare not defeat it. In fact, it needs actively to sustain and nurture an image of religion as a superstitious, prejudiced and ignorant opponent. For if science and reason were to defeat and banish religion, the modern mind would be forced to say what it *is*. As the philosopher Roger Scruton has observed, "A modernist needs to define himself *against* something, so that the very success of his enterprise threatens to undermine it."³⁵ The modern project needs religion, the old antagonist, as the image of what it *is not*, in





order to put off the day when it has to say what it *is*. The stories of the “warfare between science and religion” admirably satisfy this dual task.

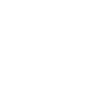
However, there is another, social, reason for the persistence of modern myths. Even as science triumphed, the hope that it would inevitably bring progress faded. An age that has seen more than eighty million people killed in wars, that has polluted its environment, that starves two thirds of its population in order to make the remainder obese and that is daily destroying numerous species of plants and animals seems less the embodiment of progress than it once did. But myths can bring reassurance in the face of such adversity, and the myth of the “warfare between science and religion” diverts attention from these failures of the modern hope, comforting us that it was even worse when the church burned witches and persecuted Galileo. Moreover, while the influence of institutional forms of religion may have waned, more informal varieties have prospered, so that religion’s demise no longer seems as certain as twenty years ago. Add to this the resurgence of fundamentalisms worldwide, and we can see why the warfare myth is needed now more than ever to sustain modernity’s rather embattled self-image.

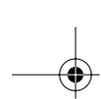


Stories and Faith

Myths determine what is included and excluded from stories. They silence competing narratives and repress alternative worldviews. Indeed, the coherence of a story may be maintained as much by what is excluded as by what is told. The flat-earth story would lose its force if we were told that all educated people of the medieval period knew that the earth is round. The “warfare of science and religion” would seem less plausible if we knew that religious belief was intimately linked with the origins of modern science in the seventeenth century (see chapter one).

A good read: plot, characters, settings and props. Modern stories have some similarities with ancient myths. They both shun half tones and are repeated and transmitted from one generation to another. But there are also important differences. Ancient myths are not presented as history and are complex and varied. By comparison, modern stories tend to be much simpler and reduce the richness of history and science to a few general and repetitive plots with stereotyped characters. For example, a powerful church cruelly oppresses an intrepid hero, whether Columbus, Galileo or Darwin. The history is marshaled and organized to suit the underlying myth.





The stories that carry modern myths have, like all stories, a plot, some central characters, a setting to provide the context for the characters to interact, and some props to help the action along. The setting may vary: the Dark Ages, Galileo's Leaning Tower of Pisa, Darwin's Galapagos Islands. The props also change: a flat earth, Halley's comet, Darwin's finches, Galileo's telescope. But the plot and characters have an identifiable consistency.

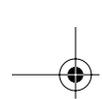
The plot is intended to draw a sharp contrast between the Dark Ages and ourselves, between science and the church, between reason and superstition. It highlights practices and beliefs that seem alien and primitive to the modern mind: witches, earth-centered cosmology or the creation of the world in seven days. The plot must clearly identify the contending characters, the oppression and injustice they suffer, and point the finger at the guilty party. Naturalism, the belief that the supernatural is either nonexistent or powerless, is a plot feature common to all modern stories.

All good stories need a hero, whether it be Columbus, Galileo or Darwin, and with a hero comes a villain, whether the Inquisition, Pope Callixtus III, ignorant priests and bishops or just religion in general. As the villain, "Religion" appears not as the "power of God" but must play the role allotted to it by the myth.

Once drawn, the characters are set against one another: Columbus and the papal court, Galileo and the Inquisition, or Darwin and Bishop "Soapy Sam" Wilberforce. In order to maintain this opposition, the characters must be portrayed as one-dimensional, shorn of any compromising complexity. Thus, if it were known that the papal court was fully aware that the earth is round or that Galileo regarded himself as loyal to his church, the plot would become obscured beneath detail. Above all, the contending characters must be kept sharply separate. There must be no hint of Galileo's belief in God, of Newton's delight that his discoveries supported belief in "a deity," or that many of Darwin's most distinguished colleagues were Christians. The desire for simple, straightforward contrasts merges into stereotyping and misrepresentation. Such sharp contrasts ought to alert us to be cautious.

Stories as carriers of belief. Perhaps because its stories pose as history or science, the modern mind is blind to the extent to which its viewpoint is one of faith. Modern stories, driven by their underlying myths, are carriers of values and beliefs. Their commitment is to what is left of the Enlightenment project, with its trust in progress and the universal human spirit. They sup-





press, marginalize or disqualify Christian narratives in order to keep human beings at the center of things (the doctrine commonly called “humanism”) and in order to present reality as malleable to our will.

I have already noted the roots of modern stories in the Enlightenment with its elevation of reason and man and its high ideals of equality, brotherhood and freedom. But the Enlightenment hope always rested more on faith than fact. The Reign of Terror put a brake on optimism, producing a conservative reaction against change in France and fear of radicalism in England. The modern hope revived in the mid-nineteenth century when many people again became optimistic about scientific progress leading to social reform. Writing at the turn of the twentieth century, H. G. Wells was fully aware that the industrial revolution, with its squalor and slums, had not fulfilled the hope of the eighteenth-century Enlightenment. Yet his faith was undaunted that science and the human spirit would prevail. In his novel *Men Like Gods*, he recapitulates and reinterprets the Enlightenment mind as he seeks a solution to the miseries and injustices of the nineteenth century in a utopian future.

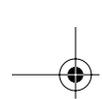
Utopia . . . a world fairly and righteously at peace, its resources husbanded and exploited for the common good, its every citizen freed not only from servitude but from ignorance, and its surplus energies directed steadfastly to the increase of knowledge and beauty. The attainment of that vision by more and more minds was a thing no longer to be prevented. Earth would tread the path Utopia had trod. She too would weave law, duty, and education into a larger sanity than man had ever known. Men also would presently laugh at the things they had feared, and brush aside the impostures [of religion] that had overawed them and [its] absurdities that had tormented and crippled their lives. And as this great revolution was achieved and earth wheeled into daylight, the burden of human miseries would lift, and courage oust sorrow from the hearts of men. . . . The sons of earth . . . purified from disease, sweet-minded and strong and beautiful, would go proudly about their conquered planet and lift their daring to the stars.³⁶

Brian J. Walsh and J. Richard Middleton describe a faith commitment as the way we answer the four fundamental worldview questions: *Who am I? Where am I? What's wrong? and What is the remedy?*³⁷ Well's answers to these questions are clear.

Who are we? Children of the earth, sweet-minded, strong and beautiful.

Where are we? On an earth that is ours to conquer and whose resources are ours to exploit.





What's wrong? We are chained by ignorance and the impostures of religion that torment us and cripple our lives.

What is the remedy? Education to banish ignorance and superstition, and to free the human spirit to lift its daring to the stars.

The centrality of man is apparent, and Wells's agenda is comprehensive. The themes of harmony, progress and knowledge are united in the "daylight" of a new dawn, a modern Utopia. It is the irrational "absurdities" and "impostures" of religion and tradition that emerge as the villain of the piece. This was a common theme among humanists of the period. For example, Bertrand Russell regarded religion "as belonging to the infancy of human reason, and to a stage of development which we are now outgrowing."³⁸ The solution is reason and education, so that we may proudly occupy our "conquered planet" for the common good of all.

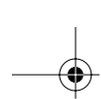
Affirming the Faith

The modern world's self-image is sustained by secular social institutions³⁹ that marginalize religion, but also by modern culture. We have seen that the modern mind, no less than the ancient one, uses stories to reinforce its belief that we are more advanced than other civilizations. The myths they carry communicate beliefs about the fundamental questions of existence. These stories have taken root because they reassure the modern mind about its own rationality and tolerance, qualities that the events of the last hundred years have cast into doubt. The myth of a "warfare between science and religion" persists long after it has been shown to be untrue because modernity needs an antagonist to divert attention from its internal contradictions and its external failures. An image of "religion" is constructed as the shadow of Enlightenment reason so that its supposed irrationality and intolerance reinforces the modern mind's trust in its own rationality and toleration. The stories of modernity constantly reinvent the image of the church, and of religion, in order to brush it aside.

Six Stories

This book takes a close look at six modern stories and investigates the tales they tell. As stories have their own color and rhythm, which are lost in paraphrases, I have tried to preserve their specific flavor by quoting the storytellers themselves whenever possible. The chapters form a sequence, with developing themes. But each is more or less self-contained and can



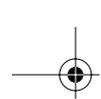


be taken separately if the reader wishes.

We will see that these stories, despite their claim to be based in fact, are closer to myths than to history. My purpose is solely to show that modern stories, which have become modern-day “orthodoxies,” are not transparent windows to history but richly textured accounts that support modern myths. The chapters are therefore not intended to be introductions to the subjects covered. The themes highlighted are dictated by the stories themselves, and these are often highly selective versions of history. To present a full review of the events behind each story would be beyond the scope of this book, although the endnotes and bibliography will generally point the interested reader toward the relevant literature.

The modern world has two stories that have become widely influential in explaining to us our place in the physical and natural world. The story of Galileo tells us that God did not put us at the center of the universe, while that of Darwin puts us in our place in the animal world. Together they are often cited as ushering in the modern world and dispelling the myths of religion. It is with these two modern myths that we begin.





1

GALILEO *A Story of a Hero of Science*

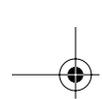
THE FIRST OF THE TWO STORIES THAT TELL US WHO WE ARE AND HOW we fit into the modern world is that of Galileo. This story explains to us our place in the physical universe—that we occupy a small planet circling an average sun of one galaxy among many.

As any encyclopedia will tell us, Nicolaus Copernicus founded modern astronomy when he showed that the earth revolves around the sun. Columbus's voyage to the New World was hardly more epoch-making than this "revolution" in the heavens. But whereas the church sponsored the conquest of the New World in order to "search for gold and . . . convert the local people to Christianity,"¹ it tried to frustrate the advance of science. Let Bertrand Russell take up the story.

The modern period began, claims Russell, with the Renaissance, which started to free men's minds from superstition and religion, and established reason as the foundation for science. This new freedom, however, was opposed root and branch by the church, culminating in the clash between religion and science symbolized by Galileo.

Galileo, as everyone knows, was condemned by the Inquisition. . . . He recanted, and promised never again to maintain that the earth rotates or revolves. The Inquisition was successful at putting an end to science in Italy, which did not revive there for centuries, but it failed to prevent men of science from adopting the heliocentric theory, and did considerable damage to the Church by its stupidity. Fortunately there were Protestant countries, where the clergy, however anxious to do harm to science, were unable to gain control of the State.²





This is presented as a transparent window on to history, but it is actually a richly textured narrative that puts character and plot into the foreground and pushes into the background features such as the role of the Puritans in the development of seventeenth-century science.

Writing in a similar vein, George Bernard Shaw remarked that scientific education teaches us that “Galileo was a martyr, and his persecutors incorrigible ignoramuses.”³ Ultimately reason prevailed over religion and reached its fulfillment in the eighteenth-century Enlightenment. The story, we are told, has a happy ending.

This familiar tale seems to have first gained widespread currency through the influential mid-eighteenth-century *Encyclopédie* of the French Enlightenment. Many contributors to *L'Encyclopédie* took a rationalist approach to religion, which they considered to be the invention of crafty priests who exploited the ignorant and superstitious masses. For them, Galileo's was the fate of anyone who opposes religious bigotry. In the nineteenth century the rationalist historian William Lecky developed this story further:

It is, indeed, marvellous that science should ever have revived amid the fearful obstacles theologians cast in her way. . . . The constant exaltation of blind faith, the countless miracles, the childish legends, all produced a condition of besotted ignorance, of grovelling and trembling credulity that can scarcely be paralleled except among the most degraded barbarians.⁴

If the story predates Russell, it does not stop with his generation. The popular science writer Patrick Moore tells us:

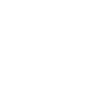
The Roman Catholic Church attacked Galileo because the [heliocentric] theory was not reconcilable with certain passages of the Bible. As a consequence, poor Galileo spent most of his life in open conflict with the Church.⁵

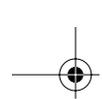
“Religion as the entrenched political power” is often contrasted with the liberating force of science:

Science and religion have clashed frequently throughout history, most often with religion as the entrenched political power and with decidedly detrimental effects on the health of the scientist—as Galileo could confirm.⁶

As the eminent scientist Carl Sagan writes:

Many felt that Copernicus and Galileo were up to no good and erosive of the social order. Indeed, any challenge, from any source, to the literal truth of the Bible might have such consequences. We can readily see how science began to





make people nervous. Instead of criticising those who perpetuated the myths, public rancour was directed at those who discredited them.⁷

Biblical Christian belief is here identified with both myth and the conservation of an oppressive social order. Sagan believes that science unsettles prejudice and exposes myth, leading to true humanism and social progress. This is a common aspect of the Galileo story. In his play about the life of Galileo, the twentieth-century author Bertolt Brecht presented him as a martyr to humanism and reason. Brecht has Galileo say: "I believe in Humanity, which means to say I believe in human reason." Galileo's disciple in the drama anticipates the progress that the new science will bring, and enthuses to Galileo: "To me you're the man who's battling for freedom to teach what's new."⁸

The Galileo story is driven by the myth that there is an enduring opposition between religion and science. It tells of a modern world based on science and technological progress. By contrast, religion is based on faith rather than reason and leads to superstition rather than science, to authoritarian oppression rather than to democracy.

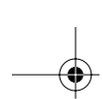
Galileo: The Received Version

Like any story, that of Galileo has a plot, characters, a setting and props. The plot is the war between religion and science, and it is presented to us not with facts but through the adventures of a charismatic individual. Armed only with a telescope and reason, plucky Galileo stood against the might of the church. He was tortured by the Inquisition, condemned as a heretic, and wasted away in a prison cell; Italian science floundered. The main drawback to this plot is that most of it is untrue.

As the philosopher Aristotle sagely observed, a drama must concern but one action of one man, entire and complete. We know the action. The man is, of course, Galileo. As Bertrand Russell says, "everyone knows" about Galileo. Scientist and hero, he invented the telescope, discovered how the earth moves around the sun, conducted his famous experiment on the (even then) Leaning Tower of Pisa and courageously added to his recantation of the earth's motion: "*Eppure si muove*" ("yet it does move"). As it happens, little of this is true either. However, where decisive scientific discoveries are lacking, the myth supplies them: the Leaning Tower and the telescope build up Galileo's character nicely.

To become a martyr to knowledge, our hero needs an antagonist, and





this is provided by the church, sometimes appearing in the form of Pope Urban VIII, sometimes as Robert Cardinal Bellarmine, but most commonly as the Inquisition. It is powerful, bigoted and ignorant.

The story has two settings, corresponding to the two *dramatis personae*. Galileo occupies the wide, sunlit high ground of reason and observation, free from obscurantist dogma and superstition: the realm of knowledge and facts. The church, on the other hand, prefers to live in the cramped monastic cell of religious dogma and faith.

The props are simple. Galileo has his telescope; the church has its Bible. And so the stage is set.

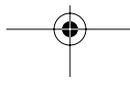
The Wrong Man

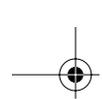
There is a puzzle here, however. Why Galileo? At first blush, the prime candidate for the hero of the Copernican Revolution must surely be Nicolaus Copernicus. Yet most versions of the story turn not on the retiring Canon Copernicus but on the name of Galileo Galilei, a man born some twenty years after Copernicus died. For Copernicus could not carry the plot forward. He was, after all, a canon of the Church and enjoyed the support of the cardinal of Capua and Pope Paul III. His book *On the Revolutions of the Heavenly Spheres*, published in 1543, circulated at little or no cost for some seventy years. Galileo is therefore much more congenial to the storytellers, for even though he received Church pensions, he was at least condemned by the Holy Office in 1633 for teaching that the sun is the center of the universe and that the earth moves around it.

Every schoolchild learns that “the Bible said that everything moves around the earth but Galileo’s observations showed that the earth moves around the sun.”⁹ This puts the issue very clearly, so let us look at what Galileo observed, how this “showed that the earth moves around the sun” and whether it did indeed conflict with what the Bible says. First, though, we need to know a little about the astronomy of the early seventeenth century, which relied heavily on the work of Aristotle, the Greek philosopher of the fourth century B.C.

Scholarly Circles

From the late Middle Ages the dominant model of the universe in western Europe was derived from Aristotle, who reasoned that the heavens, the per-





fect and immutable realm, would also be unchangeable in its physical qualities and motions.

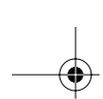
Aristotle's physics is complex and differs greatly from what is now taught as science in our schools, but it would be a great mistake to suppose that it was therefore foolish or self-evidently wrong. I can give only the briefest outline here, but the reader must remember that the majority of early-seventeenth-century astronomers were Aristotelians for reasons defended in logic and observation.

Aristotle pictured the earth at the center of a universe of concentric spheres. The nearest sphere carries the moon; the furthest carries the stars; the planets circle around, each on its intermediate sphere. In this scheme the heavens above the sphere of the moon are sharply distinguished from the earth below. Above the moon, all is perfect and immutable; all movement there is circular, as this is the only motion that eternally returns unchanging to its beginning. Heavenly bodies are perfectly spherical, without spot or blemish. The earth, however, is made of mutable matter, and motion on earth is linear, lacking unchanging perfection.¹⁰ Moreover, all matter falls downward, toward the center of the earth, which is also the center of the universe.

Ptolemy's universe. In the second century A.D., Ptolemy constructed an astronomical system based on Aristotle's ideas. He found that Aristotle's picture of the sun and stars revolving around the earth on their crystal spheres could be made to fit the known facts quite well, but there were serious problems with the planets, which appeared to wander about in the heavens rather than move in simple circles. In order to explain this, he proposed that the planets themselves moved in smaller circles, each attached to their respective sphere. This resulted in an inconveniently complex model, and from early times, astronomers debated whether these smaller circles were real or just included to "save the appearances"—that is, to fit in with observation. Ptolemy also considered alternative models, including the Pythagorean view that the earth rotates. However, he rejected this for a number of empirical reasons, including that there is no steady wind as one might expect if the earth turned nor do objects dropped from the top of a tower fall at a distance from its base.

By the early seventeenth century, numerous problems had accumulated with Ptolemy's Aristotelian cosmology. Not only was Aristotelian physics increasingly criticized, but improved observations led to greater and





greater complexity in the model. To try to resolve these difficulties Copernicus adopted the ancient Pythagorean hypothesis that the sun, not the earth, is at the center of the universe. This was not altogether successful, and Copernicus's final model of the heavens was ultimately more complex than Ptolemy's. It did, however, allow Copernicus to fix the order of the planets, perhaps his greatest achievement. In other respects Copernicus remained faithful to Aristotle, retaining the circular orbits as well as most of the Ptolemaic devices.

Galileo was a firm disciple of Copernicus, both in placing the sun at the center of the universe and in his otherwise conservative picture of the universe.

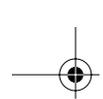
The "center of the universe" or "third rock from the sun"? Before looking at "what Galileo observed," it is worth spending a little time on the misunderstandings that surround Aristotle's belief that the earth is at the center of the universe, a theme I will explore further in chapter three. Bertrand Russell tells us:

In the medieval world, the earth was the centre of the heavens, and everything had a purpose concerned with man. [After Copernicus, man lived on] a minor planet of a not specially distinguished star; astronomical distances were so vast that the earth, in comparison, was a mere pin-point.¹¹

This connection between the Copernican Revolution and man's significance in the universe in a broader sense is very common. It blithely identifies Copernicus's "discovery that our world is not the centre and axis of the material universe"¹² with man's subordination in the scheme of things. Many authors assume that pre-Copernican men, living in an earth-centered cosmos, tiny in comparison with the vastness revealed by modern science, had an exaggerated and arrogant sense of human importance. God, it is said, created the universe for man's use, and man is therefore at the center of creation. The Copernican Revolution, and subsequently the Enlightenment, is supposed to have disabused mankind of its arrogant beliefs, instilling an appropriate humility about our place in the world and undermining belief in God. The science writer James Newman tells this story especially clearly:

It will never be known when man first became convinced that he was of cosmic importance, but the date this pretension was disposed of is pretty clear. The *De Revolutionibus Orbium Coelestium* of Nicolaus Copernicus was published in 1543. . . . Nestled in the mathematics . . . was a concept that put man in his place in the cosmos, as Darwin's concept was to put him in his place on





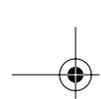
earth. . . . Looking backward in history, it is easy for us to see that a moving earth and sun-centred universe gravely subverted Christian theology. If man's abode was not at the centre of things, how could he be king?¹³

Although this is a common subplot of the Galileo story, it is mistaken. There is indeed a connection between the earth's physical "position" in the universe and its status, but not the one often assumed.

Aristotle emphasized the corruption of the earth in comparison with everything above the lunar sphere (remember the moon is the first of many spheres revolving around the earth). Indeed, in Aristotelian thought the earth was so far inferior to the heavens that the latter were believed to consist of a higher, finer substance—the fifth element, the quintessence. The earth was at the center not because of its significance but because it is everywhere below the heavens. Thus the pre-Copernican cosmology that the earth lies at the center of the universe is no compliment to earth's occupants. The center is the lowest place in the universe, not the most important. The hierarchy of perfection stretches up beyond us in concentric circles, rank upon rank. Thus the fourteenth-century Florentine poet Dante Alighieri, in *The Divine Comedy*, locates the pit of hell centrally in the "great fundamentals of the universe, on which all weights downweigh."¹⁴ The heavens, by contrast, were everywhere lifted up above the earth, incorruptible and divine.

The Copernican system, far from demoting man, destroyed Aristotle's vision of the earth as a kind of cosmic sink, and if it did anything, it elevated humanity. In making the earth a planet, a heavenly body, Copernicus infinitely ennobled its status. Galileo exploited this changed status of the earth when he had his mouthpiece, Salviati, say: "We seek to ennoble and perfect [the earth] when we strive to make it like the celestial bodies, and, as it were, place it in heaven, from which your philosophers [namely, Aristotle] have banished it."¹⁵ As for size, it matters, but not as is often supposed. Ptolemy knew that the earth was a mere pinpoint in comparison with the heavens. Moreover, the pre-Copernican cosmos, while physically smaller than ours, was of far greater range, for it included a hierarchy of changeless celestial beings, each the superior of man in the scale of being. "Man, his pleasures or his pains," did not, as Draper supposes, become of little consequence because the universe appeared larger than it had before.¹⁶ Size is not so easy to measure as many imagine. In fact, there is little evidence that any of this was an issue for Galileo's contemporaries.¹⁷ All educated people knew that creation





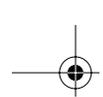
was made for God, not man. Merely changing the cosmological model didn't affect this. As we shall see in chapter three, the doctrine that the earth exists for man's use derives from Greek philosophy, not the Bible.

A modest humanism? The use of the "Copernican Revolution" as a metaphor for a modest and realistic humanism seems to have first gained ground during the Enlightenment of the eighteenth century. As James Newman suggested in the quotation above, the nineteenth century joined it to Darwin's evolutionary metaphor and "put man in his place on earth," just as astronomy had put him in his place in the heavens. Human beings share a common evolutionary tree with all other animals and have not been specially created in the image of God. While this "modest humanism" is the official line, another, different, story lies concealed within it. As we have seen, if overturning Aristotle's vision of the place of the earth is to have any metaphorical meaning at all, it elevates humanity to the status of heavenly creatures. In this sense the Enlightenment was indeed a Copernican Revolution. For it made man the source and origin, as well as the measure, of all things. It placed him at the center of creation in a far more radical sense than that wrongly ascribed to pre-Copernican astronomy and the church. Man became his own god, or at least his reason did. As Charles Darwin put it, man's "god-like intellect . . . has penetrated into the movements and constitution of the solar system."¹⁸ Indeed, as the astronomer Sir Fred Hoyle has pointed out, Darwinism similarly elevates mankind, for the neo-Darwinist picture of evolution relies on the predilection, fueled by "anti-religion," to see everything as centered on the earth.¹⁹ Darwin's theory of evolution placed man at the very apex of nature, where a less geocentric point of view would take into account the constant interaction between the earth and the universe as a whole.

We find this same elevated vision of "Man" and his intellect in Bertrand Russell in the early twentieth century. After observing the meaninglessness and purposelessness of a materialist vision, he surveys the heroic image of "Man" as he appears in humanism:

Undismayed by the empire of chance, [Man determines] to preserve a mind free from the wanton tyranny that rules his outward life; proudly defiant of the irresistible forces that tolerate, for a moment, his knowledge and his condemnation, [he determines] to sustain alone, a weary but unyielding Atlas, the world that his own ideals have fashioned despite the trampling march of unconscious power.²⁰





Under cover of the claim to dispose of man's pretensions, Russell smuggles in "Man," the new Atlas, no longer just the center of the world but now the very creator and sustainer of the cosmos. In Russell's purple passage it is not hard to identify this new Atlas as Russell himself, the philosopher preserving his free mind and his proud ideals.

The official story that the Copernican Revolution demoted man from the center of things and undermined Christian theology conceals a story of man elevated to be the very creator and sustainer of the world.

With this brief summary of Aristotelian physics and its implications in mind, let us return to "Galileo's observations."

A Victim of Spin?

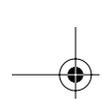
The Galileo story tells us that he invented the telescope and was the first to turn it on the heavens. In fact, it was invented by the Dutch lens maker Johann Lippersheim in 1605. Nor was Galileo the first to look at the sky. That honor probably goes to Thomas Harriot in England, who observed the moon through a telescope in 1609. Other achievements sometimes attributed to Galileo are equally apocryphal. He is unlikely to have dropped different-sized cannon balls from the Leaning Tower of Pisa in order to compare their rate of descent. Nor did he discover the dynamics of the pendulum or invent the pendulum clock, as is often asserted.

It has been said of Galileo that his fame rests on discoveries he never made and feats he never performed. This is a pity, as his real achievements need no supplementing by what he did not do. They are, however, more technical and lack the immediate appeal of a telescope or the Leaning Tower. Galileo's discoveries resulted from long, laborious hours of studying the heavens and from simple, though ingenious, experiments.

Galileo's major contributions to astronomy were the observations made before 1613, namely, the existence of sunspots, the irregularity of the moon's surface, the phases of Venus and the moons of Jupiter. It is not obvious how this proves "that the earth moves around the sun," and for a very good reason: it doesn't. Nor could it. Neither Galileo nor anybody else in the seventeenth century supposed otherwise.

Galileo's observations were important for another related reason: they conflicted with Aristotelian reason, for they indicated a lack of perfection in the heavens—the sun had "spots" and the moon blemishes. Moreover, his observations of Venus and Jupiter implied that the earth is not the center of





all astronomical motion (although they do not imply that the sun is). Both of these conclusions are fatal to Aristotelian reasoning and therefore to Ptolemy's cosmology.

Before publishing his conclusions in *Letters on Sunspots* in 1613, Galileo took the precaution of checking that the incorruptibility of the heavens was an Aristotelian belief and not a Church doctrine. Indeed, the Church largely accepted his conclusions, although the die-hard Aristotelians in the universities did not.

These findings were revolutionary enough, but they did not prove that the earth orbits the sun. The fact is that during Galileo's lifetime there was insufficient evidence to show that the earth revolves. This is now widely accepted by scholars, some even suggesting that the then-known facts weighed heavily against the Copernican theory.

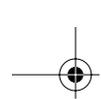
[In the sixteenth century] sensible men all over Europe, especially the most empirically minded, would have pronounced [Copernicus's theory] . . . the premature fruits of an uncontrolled imagination. . . . Contemporary empiricists, had they lived in the sixteenth century, would have been the first to scoff out of court the new [Copernican] philosophy of the universe.²¹

As the historian of science Thomas Kuhn puts it: "Available observational tests . . . provided no basis for a choice" between the Copernican and Ptolemaic theories.²² So if Galileo's observations did not bear directly on whether the earth orbits the sun, why was he condemned in 1633?

Galileo and the Church

Galileo delayed publishing his Copernican opinions for many years. He was nearly fifty when he first did so and approaching seventy at the time of his trial. Copernicus, also, had been reticent to publish. This hesitation is often attributed to fear of "the punishments of the Church." We are told that when Copernicus did finally publish in 1543, his fears were realized as "the Inquisition condemned it as heretical."²³ The truth is more prosaic. Copernicus feared ridicule by his fellow astronomers. In the dedication of his book to Pope Paul III he wrote of his fear that he would be "hoted off the stage" and admitted that "the scorn which I had to fear on account of the newness and absurdity of my opinion almost drove me to abandon a work already undertaken."²⁴ His views were, indeed, rejected by the Aristotelian astronomers, but his book circulated for seventy years without condemnation by the Church. Galileo feared the same fate and was afraid of looking stupid.





As he wrote in a letter to his fellow astronomer Johannes Kepler on August 4, 1597, he was “frightened by the fate of Copernicus himself . . . who . . . is . . . to an infinite multitude . . . (for such is the number of fools) an object of ridicule and derision.” The “fools” in question were not Inquisitors but his fellow astronomers, especially the Aristotelians in the universities.

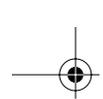
From 1613, however, Galileo unambiguously asserted that the earth literally moves around the sun and popularized his views in snappy Italian rather than the arcane Latin of the universities. This put his work at the top of the seventeenth-century bestsellers list, but it did not endear him to his academic colleagues. Galileo was first and foremost opposing Aristotle, not the Bible, and for the majority of early-seventeenth-century astronomers, this put him on the fringes of “science”; his was not a cutting-edge theory but an ancient Pythagorean view that had been discredited by Aristotle.

On the other hand, Galileo’s relations with the Church were cordial. The orthodox story tells us that his telescopic discoveries “gave unbounded alarm to the Church. By the low and ignorant ecclesiastics they were denounced as deceptions or frauds.”²⁵ But this is not so. Far from being constantly harried by obscurantist priests, he was feted by cardinals, received by Pope Paul V and befriended by the future Pope Urban VIII who, in 1620, wrote an ode in his honor. The historian Georgio de Santillana observed in 1958 that “it has been known for a long time that a major part of the Church intellectuals were on the side of Galileo, while the clearest opposition to him came from secular circles.”²⁶ Although scholars may long have known this, the orthodox story assumes the opposite. When it is said that Galileo became “too advanced for the church,” the case is rather overstated.²⁷

Robert Cardinal Bellarmine was appointed to examine Galileo’s teaching. A distinguished scholar, he was far from ill-informed and was told that Galileo needed to produce more evidence to establish his case; this, as we have seen, was precisely what he could not do because at the time it did not exist. Galileo was not condemned, but the Church did take a harder look at Copernicus’s book. It was suspended for four years in 1616 “pending correction” and reissued with several changes, largely to make it clear that the heliocentric model is only a hypothesis. Galileo was not mentioned. How, then, did things go so wrong for him?

Freedom of speech. The Church’s response to Galileo is often put down to “a fear of discussion and debate,”²⁸ but that is not so. Alternative astronomical hypotheses were freely discussed, including Copernicus’s astronomy,





which, as Bellarmine remarked (in a letter to Paolo Foscarini, April 12, 1615), made “excellent good sense” as a hypothesis.

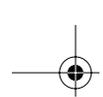
Galileo was not content with this. In order to show that the earth truly revolves, he advanced an ingenious but erroneous theory of the tides, and in order to defend the Copernican picture of heavenly spheres, he argued that comets were a form of optical illusion. These views put Galileo out on a limb.

He went further than this, however. He sought to reinterpret certain disputed biblical passages in the light of Copernican reasoning and in contradiction of earlier authorities. This was contrary to the Council of Trent’s admonition (which had been intended for the Reformers) forbidding the interpretation of Scripture against the authority of tradition. But perhaps just as significantly, Galileo alienated his friend Pope Urban VIII.

The book that led to Galileo’s trial was his 1632 treatise *Dialogue Concerning the Chief World Systems*. This took the form of a debate between protagonists, each representing a different view. The Aristotelian opponent of heliocentrism was called Simplicio, a name that is a play both on that of an early commentator on Aristotle and on the word meaning “simpleton.” Simplicio’s role in the dialogue is to be a kind of Aunt Sally to be knocked down by Galileo. At the very end of his book, Galileo puts into Simplicio’s mouth a favorite argument of his friend Pope Urban VIII and then mocks it. In other words, he concluded his treatise by effectively calling the very Pope who had befriended him a simpleton for not agreeing with Galileo. This was not a wise move, and the rest is history. Galileo himself was convinced that the “major cause” of his troubles was the charge that he had made “fun of his Holiness” rather than the matter of the earth moving.²⁹

The *Dialogue* was confiscated a few months after it was printed; Galileo, elderly and probably ill, was summoned to Rome. But the stories of dank prison cells and torture are modern embellishments for the sake of the plot. It is even misleading to say that he was “imprisoned for some months” and “treated with remorseless severity.”³⁰ He was certainly detained and was forced to abjure heliocentrism, but, as befitted his status, he was given his own rooms and servants. Moreover, he did not die a broken, lonely man in exile. He returned to his own home with his pensions from the Church intact. He could not travel freely, but he continued to write and receive visitors. As the philosopher A. N. Whitehead put it: “Galileo suffered an honourable detention and a mild reproof, before dying peacefully in his bed.”³¹





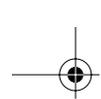
There is no doubt that the judgment against Galileo resulted in greater caution in the debate over Copernicus. However, it is a gross overstatement to say, as does Bertrand Russell, that it “was successful at putting an end to science in Italy, which did not revive there for centuries.”³² Italy continued, as it still does, to produce many eminent scholars. As we shall see, Russell’s belief that science developed in Protestant countries only because the church there lacked the power to suppress it is equally erroneous.

Galileo was interrogated by the Holy Office in April 1633. Modern scholarship has long rejected the simplistic myth, which has grown since the Enlightenment, of “a clash between enlightened reason in the form of Galileo and oppressive reaction in the form of the Church.”³³ Galileo scholar Maurice Finocchiaro takes it for granted that the events of 1633 involve complex intrigues of politics and patronage rather than “dogmatic reservations of the Church” about biblical teaching.³⁴ As the historian William Shea puts it: “Galileo’s condemnation was the result of the complex interplay of untoward political circumstances, political ambitions, and wounded prides.”³⁵ Indeed, Galileo’s rhetoric, his position as a court favorite and even contemporary eucharistic disputes have all been considered factors in his downfall.³⁶ But the received version of the Galileo story focuses exclusively on the supposed conflict between Galileo’s science and the teaching of the Bible, so we will turn to that next.

A question of authority. Aristotle—not the Bible—taught explicitly that “everything moves around the earth.” The question, therefore, was whether a passage such as Psalm 19:4-5, “The sun . . . like a strong man runs its course with joy,” was to be interpreted according to traditional Aristotelian reasoning (the sun moves) or Galileo’s Copernican reasoning (the light of the sun “runs its course” from sun to earth but the sun itself is stationary). In either case the question concerned which authority to use in discerning the “underlying” meaning of the Bible. The Roman Catholic Church’s position, stated by Bellarmine in 1615, followed the Council of Trent in upholding interpretation according to traditional (Aristotelian) authority until observational evidence was available requiring its revision. Galileo was condemned, not because the Bible conflicted with observation but because he differed with the church over what authority should be used to interpret it.³⁷

This debate, based on authorities, differs from the Reformers’ approach, which held that Scripture does not require the Church to interpret it. Inter-





estingly, Galileo himself came close to this view in 1615 when he said in his letter to the Grand Duchess Christina that the Bible is written “in order to [accommodate itself] to the capacities of the common people, who are rude and unlearned.”³⁸ He seems to mean that phrases such as “the sun rises” are commonly used, in Scripture as in contemporary speech, without implying a cosmological theory. In this he was perilously close to John Calvin, writing seventy-five years earlier, who believed that the Bible is accessible to all without need of arcane interpretation. Whether or not Galileo was aware of this, the point was not lost on the Roman Catholic Church.

Of course, Bertrand Russell would have rejected this comparison between Galileo and John Calvin. In his eyes the Reformed churches opposed Copernicus and Galileo even before the Roman Catholic Church did. This is in fact crucial to his argument, for, if Galileo’s science contradicted the Bible, a renewed emphasis on Scripture should arouse even more dogmatic opposition. Thus he claims that

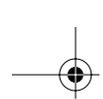
Calvin . . . demolished Copernicus with the text: “the world also is stablished, that it cannot be moved” (Ps 93:1), and exclaimed: “Who will venture to place the authority of Copernicus above that of the Holy Spirit?” Protestant clergy were at least as bigoted as Catholic ecclesiastics . . . [but] had less power.³⁹

Russell gives no reference for this well-known “quotation,” but scholars such as the historian of science Thomas Kuhn do; they tell us that Calvin wrote it in his commentary on Genesis.⁴⁰ But this is not true. Calvin does not mention Copernicus at all in that book. Indeed, Edward Rosen⁴¹ argues that Calvin had never even heard of Copernicus. The quotation appears to have been invented in the late nineteenth century in order to substantiate the myth of an enduring “warfare of science with theology,” exemplified by Galileo.⁴²

Faithful investigation. If, then, Galileo’s condemnation concerned competing forms of reason together with their founding worldviews rather than any simple warfare between science and religion, what effect did it have when the Reformers placed the authority of the Bible above that of Aristotelian tradition?

In his discussion of the Genesis creation account, Calvin argues that “Moses . . . addresses himself to our senses” and accommodates to our everyday understanding of the world rather than giving an exact scientific description: “As it became a theologian, [Moses] had respect to us rather than to the stars.” Echoing Galileo’s remark that the Bible is written for the



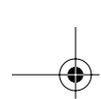


“rude and unlearned,” Calvin remarks of the “waters above the heavens” (in Gen 1) that they are “such as rude and unlearned may perceive” so that we may all appreciate the “wonderful providence of God.”⁴³ Some 150 years later Isaac Newton echoed this view when he wrote that Moses had “described realities in a language artificially adapted to ye sense of ye vulgar.”⁴⁴

Andrew White, a keen advocate of the received story of Galileo and the probable source of the misquotation of Calvin, claimed that this “accommodation theory” of Scripture is a late invention aimed at rationalizing a nonliteral reading of the Bible in the light of scientific discoveries. But this is not so. Calvin, Kepler and Galileo held such views, as did Newton. In fact, they have an ancient and continuous history. In the fourth century Augustine had remarked that the Holy Spirit had “willed to make [the disciples] Christians, not mathematicians.” In the thirteenth, Aquinas argued that God spoke to men “in the way men could understand and were accustomed to,” while in the mid-fourteenth century Nicholas Oresme noted that Scripture conforms “to the manner of common human speech.” Galileo himself quoted Cardinal Baronius’s maxim that the “Holy Ghost intended to teach us how to go to heaven, not how the heavens go.”⁴⁵

Calvin found support for neither Ptolemy nor Copernicus in Scripture because it was written according to common usage so that it is accessible to all.⁴⁶ But if Calvin resisted speculative interpretations, it would be a mistake to suppose that the Reformation’s return to the Bible had no effect on the rise of science in the seventeenth century. As has been widely recognized, science in fact flourished in northern Protestant Europe, and Protestants were disproportionately represented in learned scientific societies. Russell accounts for this by the Protestant churches’ comparative impotence to resist science, no matter how much they may have wished to do so, but there are few scholars today who would accept this. In fact, there is a strong school of thought that detects not warfare between science and religion but direct connections between them. Far from trying to resist science, the Reformation replaced Aristotelian and Neo-Platonic reasoning with insights from the Bible and thus provided the soil that enabled science to grow. Thus Calvin advocated “careful examination” to “investigate the motions of the heavenly bodies” and believed that this would give us “brighter views of [God’s] glory” and providence. The same view was expressed thus by Newton, in a letter to his friend Bentley in 1692: “When I wrote my treatise about





[physics], I had an eye upon such principles as might work with considering men for the belief of a Deity; and nothing can rejoice me more than to find it useful for that purpose."⁴⁷ That his intention met with some success is evident from his reception:

[Newton's system incites us] the more profoundly to reverence and adore the great Maker and Lord of all. He must be blind who from the most wise and excellent contrivances of things cannot see the infinite Wisdom and Goodness of their Almighty Creator, and he must be mad and senseless who refuses to acknowledge them.⁴⁸

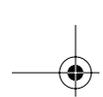
Space prevents a detailed discussion of the relationship between religion and the rise of science,⁴⁹ but I will briefly mention four aspects: the de-deification of creation permitting experiment without impiety; the biblical task of dominion that facilitated the growth of technology; the recognition of reason as within creation and not over it; and trust in God's covenantal faithfulness that suggests that it is worthwhile seeking laws governing the world.

Science and Religion

1. *Nature created, not divine.* Disciples of the Greek philosopher Plato taught that there is no sharp distinction between nature and the divine, and this view gained a renewed influence from the fifteenth century. If nature is itself a divine organism or is occupied by divine "beings" such as the planets, any attempt to subdue or control nature, and especially the heavens, has overtones of impiety. Man would in any case need the help of other divinities, which can be achieved only by magic. Frequently nature was personified as a goddess. To uncover her secrets and penetrate her mysteries is permitted only to a suitor from the pantheon; a mortal could do so only by harnessing the powers of the heavens.

Views such as these militated against the development of natural science, favored superstition and magic, and seriously distorted the biblical command to have dominion over the earth. Dominion over a divinity is simply not possible. A person might achieve temporary and precarious control but only at the risk of impiety. By rejecting Greek tradition as authoritative, the Reformers broke with the Greek deification of nature and opened the way for free inquiry without suspicion of impiety or magic. Conceptions of the earth as a goddess, or of nature as feminine, were rejected as idolatry.





Of course, these two conceptions of the world, one Greek and the other biblical, coexisted in the seventeenth century. Greek ideas persisted in the image of nature, if not as a goddess, then at least as feminine. Comparisons of the scientist-nature relationship with that between a suitor and his mistress were common. Experiment and scientific inquiry demanded a “masculine philosophy,” as Robert Boyle’s publisher put it in his promotional material.⁵⁰ Far from the biblical understanding of dominion, this Greek conception entailed aggressive, even violent imagery of assault on Mistress Nature. As Thomas Sprat wrote in 1667:

The Beautiful Bosom of Nature will be Expos’d to our view . . . we shall enter into its Garden, and taste of its Fruits, and satisfy our selves with its plenty.⁵¹

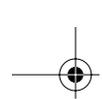
By the eighteenth century the language of the Enlightenment philosophers was “redolent with metaphors of battle and the physical act of penetration.”⁵² “The earth is the Lord’s” becomes “the world is man’s and she is ours to do with as we please.” Domination replaced dominion.

By contrast, Calvin understood God as the Creator, entrusting his world to human beings, constantly taking an interest in it and sustaining it as a sign of his loving care. In complete dependence on the sovereign Lord, we join with all creation in rejoicing in God’s gift and faithfulness. But these “feminine” qualities of love, care and gratitude were banished from the “masculine philosophy” of observation and experiment.

2. *Dominion not domination.* Human beings, however, are not only to learn about the inexhaustible wonders of creation and thus glorify God; we also have the mandate that, as the image of God, we should exercise dominion over creation. This is quite different from the precarious and brittle attempts to control nature characteristic of the Greek worldview. The development of technology received a religious sanction: human beings should exercise responsible dominion over the world in love and service of one another. This insight was a feature of the Reformation but was only partially realized. The seventeenth century saw a return to Greek forms of the domination of a feminized nature by a male science. But however short-lived, it did result in a new respect toward the natural world as God’s creation to be valued and cared for. This is reflected, for example, in the Puritan-inspired legislation of the mid-seventeenth century, which sought to reduce animal cruelty, which I will discuss in more detail in chapter three.

3. *Reason set free.* It is often said that the Greek concept of “reason,” sup-



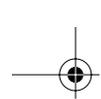


posedly bequeathed to the seventeenth century by the Renaissance, was the central feature in the growth of science. This assumption is characteristic of the arrogance that has afflicted the West since the Enlightenment, and which postmodern thinkers reject. There was, in fact, no shortage of reason prior to the seventeenth century; nor was the medieval world irrational. In a sense, the problem was one of too much reason, rather than too little. Greek thought emphasized that the structure of the universe could be deduced. As we have seen, the supposedly circular orbits of the heavenly bodies are dictated by a reason to which physical reality must, of necessity, conform. This Greek overvaluation of reason in relation to observation had a straitjacketing effect on scientific inquiry. Greek thought, by placing reason on the throne, distorted rationality itself and represented a narrowing of truth to what could be deduced. In his treatise of 1632 Galileo's hero constantly offers *observations* in reply to Simplicio's Aristotelian *reasons*.

The Reformation gave reason its correct place in the world as dependent upon God rather than as a preexistent form that constrained God's creative activity. In doing so, it set reason free and encouraged scientists to look at what God had made in order to explore and discover his creation. Central to this new freedom was a conception of the world (including reason) as dependent on its sovereign Creator, who faithfully sustains it as a sign of his love. Calvin regarded creation as a "mirror in which we ought to behold God,"⁵³ and which should evoke our wonder and awe.⁵⁴ Indeed, in *The Starry Messenger*, Galileo described just this sense of "wondering delight" as he looked at the heavens through his telescope.⁵⁵

4. *Covenant law*. By giving reason its place within creation, the Reformers also facilitated a vital distinction between rationality and law. It is now widely acknowledged that an understanding of the universe as coherent and governed by laws was a major factor in the growth of seventeenth-century science.⁵⁶ Without such an understanding there would simply not be any sense in seeking lawful regularities. The Reformers provided just such a framework by emphasizing the biblical doctrines of God's covenantal dealing with his creation, and his providential governance of the world as a sign of his loving care. Thus, although the order of the world cannot be deduced by an overarching reason, it is nevertheless open to discovery. This was widely recognized by the astronomers of the period. For example, Tycho Brahe spoke of "the wondrous and perpetual laws of the celestial motions, so diverse and yet so harmonious, [which] prove the existence of





God.”⁵⁷ This reliance on God’s providential ordering of the world characterized the flourishing of science and justified reasoning about the world based on observation. “The fact is that Newton was convinced from the beginning that the universe is an ordered cosmos because he knew as a Christian that God had created it.”⁵⁸ By the eighteenth century these insights had been greatly watered down, and “scientific” reason became autonomous, once again distorting the richness of creation as a single form of reason returned to the throne.

For Newton, “experiment” discovered God’s actions in the world. The historian of science Reijer Hooykaas has concluded that “most scientists of the 19th and 20th centuries . . . have been unconscious of the fact that the metaphysical foundations of their discipline stemmed, in spite of all secularisation, in great part from the biblical concept of God and creation.”⁵⁹

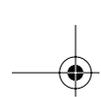
Progress and Atlas

The Galileo story was developed by French Enlightenment thinkers as part of their anticlerical program, but by the late nineteenth century it had created a language of warfare between science and religion. Science carries the shield of tolerance and enlightenment with which to defend democracy against the invasion of religious superstition. Religion, on the other hand, fights a rearguard battle, sniping irrationally at new discoveries and cruelly oppressing the scientists whenever it gets the opportunity. This language survives in, for example, Richard Dawkins’s remark that “scientific beliefs are supported by evidence and they get results. Myths and faith are not and do not.”⁶⁰

By polarizing science and religion, the Galileo story hollows out its discussion of both. Religion is reduced to ignorance and dogma, while science is torn from its historical context. Meanwhile, the ideology of progress slips in unobserved, and man, ostensibly disabused of his pretensions by science, in fact becomes the very Atlas upholding the cosmos.

The naive optimism that “science gets results” overlooks the kind of results it gets and whether they have always been those intended. Despite its obvious achievements, science is widely perceived as having failed to live up to its promises and, in many areas, to have made matters worse. From the destruction of the ozone layer to the pollution of the Aral Sea, from radioactive contamination to the greenhouse effect, science is increasingly seen as part of the problem rather than the solution. Techniques once





hailed as the “white heat of technology” are now as likely to be greeted with skepticism or even, as with some genetically modified organisms, rejected. Many now raise serious questions about the possibility of any science achieving a desired end without unintended consequences and risk, and other stories are emerging to challenge that of modernity. I will discuss this changing role of modern myths in the conclusion. In the next chapter we will look at the other big story of modernity: Darwin and evolution.

