

“Joshua Moritz’s excellent and user-friendly *Science and Religion* accomplishes two interrelated tasks. First, it dispels the myth of the conflict between religion and science by showing that no science can be done without some important presuppositions and that any good theology incorporates critically and sympathetically the best results of scientific investigation. Second, it covers in a most up-to-date manner all key topics in science-religion conversation from the ‘beginning’ to the ‘end.’ Footnotes and a glossary further strengthen this book’s value for classroom and self-study.”

—Veli-Matti Kärkkäinen

Professor of systematic theology, Fuller Theological Seminary,  
and docent of ecumenics, University of Helsinki, Finland

“Joshua Moritz’s *Science and Religion* is a stunning contribution to the dialogue between the scientific and religious communities, laced with enormous scholarship and marvelous humor and driven by a passion to put aside the reported conflict and contribute to creative interaction. Moritz first argues that the purported warfare between science and religion is actually a myth propounded by a collection of outspoken, antireligious scientists. He then provides a detailed and promising assessment of several key areas, including Big Bang cosmology, evolutionary biology, and creation theology; the human person and the image of God; science and miracles; God’s relation to suffering in nature; and the far future of the cosmos and Christian hope. I strongly recommend *Science and Religion* to both the general reader and the scholarly community. It is a must-read for scientists, religious scholars, high school teachers, clergy, and the general public interested in the possibility of a creative interaction between science and religion.”

—Robert John Russell

Center for Theology and the Natural Sciences  
Graduate Theological Union

“One of the many virtues of Joshua Moritz’s well-structured and wide-ranging introduction to the relationship between science and religion is its resourceful use of historical scholarship to illuminate the origins and demonstrate the limitations of an all-pervasive conflict model. Ambitious and controversial in its bid to replace conflict with peace at every opportunity, *Science and Religion* will be accessible and stimulating for a general audience and will prove to be a successful student text.”

—John Hedley Brooke

Andreas Idreos Professor of Science and Religion  
University of Oxford

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# Science and Religion

Beyond Warfare and Toward Understanding

JOSHUA M. MORITZ

The logo for Anselm Academic features a stylized, wavy line above the word "ANSELM" in a bold, serif font. Below "ANSELM" is the word "ACADEMIC" in a smaller, all-caps, sans-serif font.

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**Dedication**  
**To Mom, Dad, Mel, and Xave**

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## Introduction

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Some people, in order to discover God, read books. But there is a great book: the very appearance of created things. Look above you! Look below you! Note it; read it. God, whom you want to discover, never wrote that book with ink; instead He set before your eyes the things that He had made. Can you ask for a louder voice than that?

—Augustine of Hippo<sup>1</sup>

Both religion and science require a belief in God. For believers, God is in the beginning, and for physicists He is at the end of all considerations. . . . To the former He is the foundation, to the latter, the crown of the edifice of every generalized world view.

—Max Planck, Nobel laureate in physics<sup>2</sup>

Within the global culture of the twenty-first century, two of the greatest forces for change and sources of inspiration—whether for good or for ill—are science and religion. The relationship between science and religion is complex.<sup>3</sup> Today, many think there is potential for only conflict when faith meets fact. Others, however, including more than half of practicing scientists, have discovered a way to build a working relationship between the two.<sup>4</sup> Bringing science and religion into conversation, whether in one's personal life or in the academy, requires a vision that can see beyond many popular misunderstandings. Whenever the topic of science and religion is broached, many myths abound. References to the Catholic Church's excommunication and torture of Galileo are typical, as are allusions to Christianity's perennial rejection of Darwinian evolution. Even publicly funded endeavors for scientific education seem to have storylines peppered with the meme that science and religion are at war.<sup>5</sup> For

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1. Augustine, quoted in Clarence Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* (Berkeley: University of California Press, 1967), 203–4. Original source uncited.

2. Max Planck, "Religion and Natural Science," in *Scientific Autobiography and Other Papers*, trans. F. Gaynor (New York: Philosophical Library, 1949), 184.

3. Historian of science John Hedley Brooke notes, "Serious scholarship in the history of science has revealed so extraordinarily rich and complex a relationship between science and religion in the past that general theses are difficult to sustain. The real lesson turns out to be the complexity." John Hedley Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge: Cambridge University Press, 1991), 5.

4. Edward J. Larson and Larry Witham, "Scientists Are Still Keeping the Faith," *Nature* 386 (1997): 435–36. See also David Masci, "Scientists and Belief" Pew Research Center (website), November 5, 2009, accessible at <http://www.pewforum.org/2009/11/05/scientists-and-belief/>.

5. For example, Carl Sagan, Ann Druyan, and Steven Soter, "Standing Up in the Milky Way," *Cosmos: A Spacetime Odyssey*, season 1, episode 1, directed by Brannon Braga, Ann Druyan, Bill Pope, aired March 9, 2014 (Los Angeles: 20th Century Fox, 2014), DVD.

## 8 Science and Religion

instance, the television show *Cosmos*, which has been broadcast to a viewing audience of over a hundred million,<sup>6</sup> weaves timeless tales of scientists being burned at the stake for defending their scientific beliefs. It might come as a surprise to the general viewer when historians of science point out that “no scientist, to our knowledge, ever lost his life because of his scientific views,”<sup>7</sup> that the church has been generally supportive of the natural sciences throughout the ages,<sup>8</sup> and that evolution has been embraced by many key Christian thinkers and numerous church denominations since even before the days of Darwin.<sup>9</sup> Yet, a good story dies hard, and the story that science and religion have been perpetually at war is one of the most enticing. This book illustrates how the narrative that science and religion are at war is a *myth* in two key senses of the word: it is *foundational* to a certain anti-religious worldview, and it is historically *false*. Introducing the topic of science and religion by examining how the warfare myth arose, *Science and Religion: Beyond Warfare and Toward Understanding* also examines why the myth persists, and why the myth is mistaken. Moving beyond the warfare myth, this text explores numerous dimensions of the complex and creative mutual interaction of science and religion in an endeavor to achieve a better understanding of their relationship.<sup>10</sup>

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6. The viewing audience of *Cosmos* was 135 million. See Rick Kissell, “Cosmos’ Draws Biggest Global Audience Ever for National Geographic Channel,” *Variety*, July 7, 2014, <http://variety.com/2014/tv/news/cosmos-draws-biggest-global-audience-ever-for-national-geographic-channel-1201257111/>.

7. David Lindberg and Ronald Numbers, *When Science and Christianity Meet* (Chicago: University of Chicago Press, 2003), 1.

8. For instance, historian of science David Lindberg writes, “A widespread myth that refuses to die . . . maintains that consistent opposition of the Christian church to rational thought in general and the natural sciences in particular, throughout the patristic and medieval periods, retarded the development of a viable scientific tradition, thereby delaying the Scientific Revolution and the origins of modern science by more than a millennium. Historical scholarship of the past half-century demonstrates that the truth is otherwise.” David C. Lindberg, “The Fate of Science in Patristic and Medieval Christendom,” in *The Cambridge Companion to Science and Religion*, ed. Peter Harrison (Cambridge: Cambridge University Press, 2010), 21. See also David Lindberg, *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Context, 600 B.C. to A.D. 1450* (Chicago: University of Chicago Press, 1992).

9. For example, historian of science James Moore writes, “Darwin’s theory of evolution by natural selection could be accepted in substance only by those whose theology was distinctly orthodox; that this was so because the theory itself presupposed a cosmology and a causality which, owing much to orthodox doctrines of creation and providence, could be made consonant *a priori* with orthodox theistic beliefs.” James R. Moore, *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870–1900* (Cambridge: Cambridge University Press, 1979), ix. See also David N. Livingstone, *Darwin’s Forgotten Defenders: The Encounter Between Evangelical Theology and Evolutionary Thought* (Grand Rapids: Eerdmans, 1987).

10. The author is indebted to physicist and theologian Robert John Russell for the phrase “creative mutual interaction” as a description of the relationship between science and religion. See Robert John Russell, *Cosmology from Alpha to Omega: The Creative Mutual Interaction of Theology and Science* (Minneapolis: Fortress, 2008).



## With Science and Religion One Size Does Not Fit All

Not all religions are the same. For instance, Buddhists believe the universe is eternal, with no beginning and no Creator, while Jews, Christians, and Muslims believe the cosmos was created by one God at the beginning of time. In Hinduism, the notion that the souls of humans transmigrate into animal bodies is commonplace, while in Judaism only human beings are said to be created in the image and likeness of God. The fact that religions are dissimilar means that each will have a different kind of relationship with science. In the same way that there is unbounded variety among religions, there is also great diversity within the natural sciences. The categories of mathematical beauty, symmetry, and elegance are more at home in the physical sciences than the biological sciences, which focus more on historical processes, contingency, and adaptive behavior. In a similar manner, discussions of conscious agency in the material world are commonplace in the writings of neuroscientists and psychologists, while the topic of free will is well outside the scientific domain of chemists and physicists. In this way, explains historian of science John Hedley Brooke, “the sciences of quantum mechanics and evolutionary biology might be correlated with religious concerns in quite different ways, and those concerns might vary considerably from one religion to another.”<sup>11</sup> Rather than speaking of the relationship of “science and religion,” then, says Brooke, “it is more helpful to speak of *sciences* and *religions*.”<sup>12</sup>

Following Brooke’s insight, this text will not take a “one-size-fits-all” approach to either religion or science. While some of the discussion in *Science and Religion: Beyond Warfare and Toward Understanding* will apply to all religions—more or less equally—many of the specific case studies and examples will not. For instance, scientific understandings of big bang cosmology have implications for Christian theological understandings of creation that do not apply to any similar religious concepts within Buddhism. Christians who struggle with Darwinism because of their convictions about the age of the Earth can hardly be equated with Buddhists who struggle with natural selection because it offers an explanation for the evolution of life that is an alternative to the law of karma.<sup>13</sup> Since it is important to treat the various religions and the different sciences on their own terms, this text will focus primarily on the theistic faiths in general (and the Christian faith in particular), while treating nontheistic religions in a more summary fashion. In the same way, the topics in the natural sciences

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11. John Hedley Brooke, “The Changing Relations between Science and Religion,” in *Interdisciplinary Perspectives on Cosmology and Biological Evolution*, eds. Hilary Regan, Mark Worthing, and Nancy Murphy (Adelaide: Australian Theological Forum, 2002), 3.

12. *Ibid.*, 3, emphasis in original.

13. For example, because Darwinian evolution appears to replace karma, the Dalai Lama asserts, “the theory of natural selection is not something that Buddhism should easily accommodate.” Donald Lopez, *Buddhism and Science: A Guide for the Perplexed* (Chicago: University of Chicago Press, 2008), 36, 142–43.

that are treated more in-depth will be those with the most relevance for theistic understandings of the cosmos, as it is affirmed as God's creation.

There are a number of reasons why this text will focus on the relationship between Christian theism and science. Christianity is the largest global faith, the most common faith in the English-speaking world, and the religion most represented within the most technologically and scientifically advanced societies. Christianity is consequently the religion that the majority of current, practicing scientists encounter most frequently. The history of Western science is deeply rooted within the late medieval and early modern Christian conceptual framework. As a result, the Christian religion has had a long encounter with modern science that has led to centuries of discussion that people today can evaluate and from which they can learn.<sup>14</sup> Beyond this, many of the philosophical assumptions of early scientists (and most scientists today) derive from a Christian theological context and culture.<sup>15</sup> Owing to these factors, a great deal of the conversation in the academic field of "science and religion" up to the present has been within a Christian context. Perhaps due to the same set of factors, the majority of popular misconceptions, misunderstandings, and myths about science and religion are likewise concerned with theological affirmations that are either specifically Christian or broadly theistic. At a popular level, Hinduism, Buddhism, and Islam are not typically perceived as being at war with science, but Christianity is.<sup>16</sup> As it concerns the Christian faith in particular, then, there is currently far more work to be done—especially at a popular level—in moving the conversation between science and religion beyond warfare and toward understanding.

## Defining the Boundaries of Science and Religion

The first four chapters of *Science and Religion: Beyond Warfare and Toward Understanding* explore the much-disputed borderlands between science and religion. Chapter 1 investigates this boundary to see whether it has inevitably served as the frontlines of a never-ending conflict. Far from finding a perpetual

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14. "Christianity has encountered modern science fully because of the roots of modern science in Europe." Alan Padgett, "Science and Religion in Western History: Models and Relationships," in *Science and Religion in Dialogue*, ed. Melville Y. Stewart (Chichester, UK: Wiley-Blackwell, 2010), 849.

15. As Brooke notes, "In the past, religious beliefs have served as a presupposition of the scientific enterprise. . . . A doctrine of creation could give coherence to scientific endeavor insofar as it implied a dependable order behind the flux of nature." Brooke, *Science and Religion*, 19. See also Christopher Kaiser, *Creational Theology and the History of Physical Science* (Leiden: Brill, 1997).

16. As historian of science Thomas Dixon writes, "A narrative of conflict between science and one religious tradition can simultaneously be reinforced by a story of harmony with another." Thomas Dixon, "Introduction," in *Science and Religion: New Historical Perspectives*, ed. Thomas Dixon, G. N. Cantor, and Stephen Pumfrey (Cambridge: Cambridge University Press, 2010), 6. For how Islam has served this function see Harun Küçük, "Islam, Christianity, and the Conflict Thesis," in *Science and Religion*, ed. Dixon, Cantor, and Pumfrey. For a discussion of Buddhism in this role, see Lopez, *Buddhism and Science*, 36–38.

state of warfare between science and religion, historians of science such as Lawrence Principe have discovered otherwise. “The ‘conflict model,’” says Principe, “has been rejected by every modern historian of science; it does not portray the historical situation. . . . Popular tales of repression and conflict are at best oversimplified or exaggerated, and at worst folkloristic fabrications.”<sup>17</sup> To illustrate Principe’s point, chapter 1 investigates a number of the most popular war stories from the history of science and religion. It uncovers legends about Giordano Bruno and others (who, it is said, have been burned at the stake for practicing science), exposes the myth that medieval Christians believed the Earth was flat, and examines oversimplified accounts of the Galileo affair and fictions about the Scopes Monkey Trial. To further exemplify how science and religion have not been engaged in perpetual conflict throughout the ages, chapter 2 examines a number of historical cases where religious faith played a constructive role within the history of science. Chapter 2 highlights a number of overarching concepts within science, such as the laws of nature, and standard current scientific theories within geology, cosmology, and biology that were initially motivated and supported by religious interests and developed in light of theologically inspired philosophical assumptions.

If religious ideas often influence scientific understandings, what is the difference between religion and science? Chapter 3 takes up this question by looking at how philosophers of science have defined and demarcated the discipline of “science.” Philosophers of science have found that discerning the precise boundaries between science, faith, and philosophy has proven a surprisingly difficult task. The practice of science appears to require a vital element of faith, and scientific theories are inevitably grounded in philosophical presuppositions—some of which originate from within a religious context. In addition to this, religions affirm a number of beliefs that directly concern the nature of physical reality. The discoveries of the natural sciences thus have a significant and immediate bearing on the content of religious faith.

Whether or not such domains might ever be adequately defined theoretically, religion and science, in everyday practice, do not stick to their separate spheres.<sup>18</sup> As physicist, philosopher, and theologian Ian G. Barbour writes, “If science and religion were totally independent, the possibility of conflict would be avoided, but the possibility of constructive dialogue and mutual enrichment

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17. Lawrence Principe, *The Scientific Revolution: A Very Short Introduction* (Oxford: Oxford University Press, 2011), 37. Historian of science Frank M. Turner similarly says, “The relationship of science and religion, as numerous historians have argued, has not always been and is not one of essential conflict or warfare.” Frank M. Turner, “The Late Victorian Conflict of Science and Religion as an Event in Nineteenth-Century Intellectual and Cultural History,” in *Science and Religion*, ed. Dixon, Cantor, and Pumfrey, 88.

18. This is one of the problems with Stephen Jay Gould’s NOMA (Non-Overlapping Magisteria of Authority) approach. See Joshua Moritz, “Rendering unto Science and God: Is NOMA Enough?” *Theology and Science* 7 (November 2009): 363–78.

would also be ruled out.” The reality is, says Barbour, that “we do not experience life as neatly divided into separate compartments; we experience it in wholeness and interconnectedness before we develop particular disciplines to study different aspects of it.”<sup>19</sup> While the fact that science and religion unavoidably influence each other can serve as a potential source of fruitful conversation, it is also often an occasion for genuine conflict. Chapter 4 maintains that much of the historical and current cases of contention between scientific theories and religious beliefs can be understood in terms of the misapplication of philosophical interpretations of science to ultimate reality, on the one hand, and the misapplication of philosophical interpretations of theological convictions about physical reality to science, on the other. In other words, when scientists make claims that go beyond the physically observable and testable universe, such claims cease to be scientific. And when religious believers turn a willfully blind eye to the data of the physical world—in order to insist on a given doctrine about the physical world—they exchange a properly theological faith that seeks understanding for an irrational faith-based skepticism that ultimately undermines itself. In cases where either religious faith or atheistic faith masquerades as science, conflict often arises.

## Religions and Sciences in Conversation

Chapters 5 through 10 examine specific areas of interaction between religious beliefs and concepts on one hand and theories arising from the natural sciences on the other. Chapter 5 examines the question “Why is there something rather than nothing?” and brings religious affirmations about the nature of reality into conversation with contemporary scientific cosmology. The standard big bang theory has been interpreted by many as supporting theistic understandings of creation from nothing at the beginning of time. Beyond this, the initial conditions and laws of the universe appear “fine-tuned” for the existence of intelligent life, giving rise to the question of whether the universe exhibits evidence of transcendent design. Theorizing beyond the realm of what is observable, the notion of an infinite and eternal multiverse evades the question of cosmic fine-tuning and resounds more with Buddhist understandings of cosmic reality.

Chapter 6 transitions from contemplating the beginning of the universe, and considers the origin of the various forms of life. Religions differ widely on how they address the question of where the abundance of Earth’s life comes from. As Donald Lopez explains, the Hindu and “Buddhist answer to why there are so many different species in the world—a question answered by science with the theory of natural selection—[is] the law of karma; the physical forms of the beings in the universe are the direct results of deeds done in the past.”<sup>20</sup> Within

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19. Ian G. Barbour, *When Science Meets Religion* (San Francisco: HarperSanFrancisco, 2000), 22.

20. Lopez, *Buddhism and Science*, 142–43.

the theistic traditions, biological life is acknowledged as being created by God. Focusing on Jewish and Christian understandings of the creation of life as found in the Bible, chapter 6 examines the language of the Hebrew Bible to illustrate how Jews and Christians may affirm an understanding of God's creating plants, animals, and even humans through noninstantaneous, developmental processes. In other words, there seems to be no reason, in principle, to suppose that the Bible is fundamentally opposed to the idea that God creates through evolution. Chapter 6 then goes on to survey both Darwinian and non-Darwinian understandings of evolution and raises the question of whether science can discern a clear direction or trend within the evolutionary history of life.

Chapter 7 discusses theological issues surrounding human nature, human uniqueness, and human destiny as related to the natural sciences. In the Eastern religious traditions, human beings are not claimed to be absolutely distinct from animals, but in the Jewish and Christian understanding humans are said to be uniquely in "the image and likeness of God." However, the Jewish and Christian scriptures do not directly equate any specific characteristics with the image of God in humans, and God's creation of humans in the Bible is not distinguished by any specific terms (such as "spirit" or "soul") that are not also used to describe the creation of animals. As studies of nonhuman animals increasingly reveal more similarities to humans than differences, a precise scientific description of human uniqueness remains elusive. This raises the question of whether human uniqueness resides in a nonphysical soul. While belief in an eternally existing, individual soul is a mainstay of popular religion, many faith traditions disallow this idea. In Hinduism, the soul is essentially one with the undifferentiated cosmic whole. Buddhists explicitly reject the notion of an immortal soul or a permanent self. Even among the Western theistic religions, in traditional Judaism and Christianity the human person is viewed as an undivided psychosomatic unity that depends on God for life, rather than as an amalgam of perishable body and immortal soul. The destiny of human beings in the theistic traditions is physical resurrection of the body rather than eternal life as disembodied souls. Science and numerous religious faiths are thus in harmony in terms of viewing the human person as a unified entity that needs physical existence to experience the fullness of life—either in this world or the next.

Chapter 8 examines the question of miracles and their relation to the natural sciences. Within the major religious traditions, there are numerous ways miracles are understood. Western theistic conceptions of miracles are not easily adapted to beliefs about wondrous events found in the religious traditions of Hinduism and Buddhism.<sup>21</sup> In the West, the notion that there are regular laws of nature has played a key part in how miracles have been defined. Perceptions of miracles and conceptions of the laws of nature have changed throughout the

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21. Gavin Flood, "Miracles in Hinduism," in *The Cambridge Companion to Miracles*, ed. Graham H. Twelftree (Cambridge: Cambridge University Press, 2011), 184.

ages. While initially in the West no sharp divide was discerned between the natural and the supernatural, by the time of the European Enlightenment miracles came to be viewed as scientifically impossible violations of the laws of nature. With the dawn of quantum physics in the twentieth century, it has been shown that the Enlightenment concept of physical law is no longer *scientifically* valid. Consequently, arguments based on Enlightenment assumptions about natural law that reject the possibility of miracles are no longer sound. Beyond this, current scientific understandings have raised new possibilities for how God's interaction with the world of nature can be understood.

Chapter 9 takes up the problem that suffering poses for the various world religions and specifically examines how it relates to the natural sciences and the world of nature. Within Hinduism and Buddhism, "karma, the law of the cause and effect of actions, according to which virtuous actions create pleasure in the future and nonvirtuous actions create pain . . . accounts for all the happiness and suffering in the world."<sup>22</sup> Seeing karma as the cause of all suffering, the Eastern religions hold that no beings are innocent and that there is no all-powerful and all-loving creator God who can be held accountable. Within the theistic tradition, however, one might ask why an omnipotent and omnibenevolent God would permit suffering. For those who affirm belief in one Creator God, much of the suffering that occurs in the world can be understood in light of the conditions necessary to allow God to accomplish certain key goals within creation. The divine goals for creation are likewise inextricably intertwined with the questions of why God does not perform more miracles and why a loving God would choose to create life through evolution.

The final chapter of this volume addresses questions surrounding religious and scientific understandings of the end of the world. According to science, this present universe was not built to last forever, and—one way or another—all life in the cosmos will eventually end. Thus physicist Paul Davies observes, "If there is a purpose to the universe, and it achieves that purpose, then the universe must end, for its continued existence would be gratuitous and pointless."<sup>23</sup> At the point where the vision of science reaches its limits, it would seem that one needs the eyes of faith to discern any prospects of a future cosmic hope. The notion of an absolute end of time is absent from Hindu and Buddhist theological conceptions, and Eastern traditions focus on salvation that lies beyond the realm of the physical. In the West, however, the idea that there is an end to history has played a pivotal theological role because theistic understandings of redemption have traditionally focused on the resurrection and transformation of the physical body and the physical cosmos at the end of days.

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22. Donald Lopez, *The Story of Buddhism: A Concise Guide to Its History and Teachings* (San Francisco: HarperSanFrancisco, 2001), 19.

23. Paul Davies, *The Last Three Minutes: Conjectures about the Ultimate Fate of the Universe* (New York: Basic Books, 1994), 155.

## Resources for Discussion and Further Exploration

At the end of each chapter are resources to assist readers in their further exploration of the topic. The “Discussion Questions” at the end of each chapter are intended to be used in either a classroom or a small group setting and provide an occasion for readers to reflect on the chapter content together with their peers. The “Beyond the Classroom” section features additional discussion questions and activities that allow the reader to creatively engage others outside the class (who have not read this book) with the concepts and information here; these activities can also be used *within* the classroom as “ice-breakers” or conversation starters. The bibliographic and online materials included under the heading “Resources for Further Study” are recommended as additional course texts and readings to instructors and as trustworthy sources to students and readers who wish to learn more about the topic. In this section I have also included my own online lectures that introduce and discuss the material covered in the chapter (see “Internet Resources”). These lectures, which feature numerous illustrative images and examples, may be used in conjunction with the reading.

## A Note on Science and Religion Typologies

One customary approach to presenting issues of science and religion is to introduce various *typologies* or frameworks that provide a conceptual structure defining how science and religion relate to one another.<sup>24</sup> This method of using typologies to discuss science and religion emphasizes that their relationship is complex and that it can take a variety of forms. Late physicist, philosopher, and theologian Ian Barbour, for example, offers a fourfold typology wherein the relationship between religion and science is understood under the categories of conflict, independence, dialogue, and integration.<sup>25</sup> *Conflict* is exemplified by persons, such as Richard Dawkins, who argue that science and religion are always at war.<sup>26</sup> The *independence* position (or *two languages* approach)—espoused by the late Harvard biologist Stephen Jay Gould (who referred to this position as NOMA [Non-Overlapping Magisteria of Authority]) and by biologist Francisco J. Ayala—holds that science and religion do not overlap at all

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24. For example Arthur Peacocke developed an eightfold typology. See Arthur Peacocke, *The Sciences and Theology in the Twentieth Century* (Notre Dame, IN: University of Notre Dame Press, 1981), xiii–xv; and Arthur Peacocke, *Theology for a Scientific Age: Being and Becoming—Natural, Divine, and Human* (Minneapolis: Fortress, 1993), 20–21. See also John F. Haught, *Science and Religion: From Conflict to Conversation* (New York: Paulist Press, 1995); and Mikael Stenmark, *How to Relate Science and Religion: A Multidimensional Model* (Grand Rapids: Eerdmans, 2004).

25. Ian G. Barbour, *Religion and Science: Historical and Contemporary Issues* (San Francisco: HarperSanFrancisco, 1997); Ian G. Barbour, *When Science Meets Religion* (San Francisco: Harper-SanFrancisco, 2000).

26. Richard Dawkins, *The God Delusion* (Boston: Houghton Mifflin, 2006).



because science speaks one language that exclusively deals with issues of fact, while the religion speaks another language that only relates to issues of value and meaning.<sup>27</sup> *Dialogue* focuses on how science and religion share boundary questions (e.g., why is there something rather than nothing?), have a number of methodological parallels—such as reliance on data (e.g., scripture in theology and the natural world in science), and how both make use of models, metaphors, and logic in their pursuit to understand reality. Barbour's fourth category, *integration*, highlights how some thinkers fully join or combine science and religion in such a way that scientific data, theories, and models are brought to bear *directly* on theological concepts and convictions. The discipline known as *natural theology* serves as an example of integration in that it endeavors to arrive at affirmative knowledge about God from scientific knowledge about nature.

The present work will depart from the typological approach to understanding science and religion for a number of reasons. First, any *historical* approach to “science” and “religion” will show that the notion that these two concepts can be clearly distinguished is a relatively recent one. As historian of science Peter Harrison explains, “To speak of the relationship between theology and science” before the mid-nineteenth century “is to ignore the categories that the historical actors themselves were operating with.”<sup>28</sup> Second, contemporary definitions of science that de facto exclude religion, or definitions of religion that *automatically* exclude science are concerned more with philosophical *ideals* or social *constructions* than with the *actual* relationships of science and religion. The conflict position is thus historically untenable, and while the independence (or NOMA) approach might look promising in theory, in practice it is unworkable. This is why, explains physicist and theologian John Polkinghorne, “virtually all of us engaged in the [science and religion] dialogue reject the offer of a false truce, proffered by Stephen J. Gould (1999) through his concept of ‘nonoverlapping magisteria’ (NOMA).”<sup>29</sup> This book will not presume to demarcate the entities called “science” and “religion” by definitional fiat, but rather will explore how these two concepts emerged historically and how their contemporary interactions shed light on how their relationship is best understood. The examples discussed within this volume will show that in the majority of cases the relationship of science and religion both in the past and the present reflects some combination of Barbour's *dialogue* and *integration* categories. Where conflict *does* appear to be present, it will be argued that such apparent conflict is not typically

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27. Stephen Jay Gould, *Rocks of Ages: Science and Religion in the Fullness of Life* (New York: Ballantine Books, 1999), 6; Francisco J. Ayala, *Darwin's Gift to Science and Religion* (Washington, DC: Joseph Henry Press, 2007).

28. Peter Harrison, “‘Science’ and ‘Religion’: Constructing the Boundaries,” in *Science and Religion*, ed. Dixon, Cantor, and Pumfrey, 25.

29. John Polkinghorne, “The Continuing Interaction of Science and Religion,” *Zygon: Journal of Religion and Science* 40, no. 1 (March 2005): 44.



between science and religion per se, but rather conflict emerges as a consequence of how the respective data of science and religion are interpreted and employed.

## Conclusion

While war stories about science and religion have been greatly exaggerated, many tales of science and religion working together in concord are too frequently left untold. The true account of the relationship between science and faith is complex—including instances of both harmony and creative tension. Exploring how religious faith has engaged the natural sciences in the past and the present, this text endeavors to enter into the complex world of “science and religion” in an approachable and nontechnical manner. The search for understanding is fundamental to being human, and understanding is essential for wisdom. The aim of this text is that readers—be they lovers of wisdom or not—may develop a better understanding of two of the greatest forces that shape human culture and inform the human condition. Wisdom will come when it may, and when it does, if joined together with knowledge, it has the power to heal and bring warfare to an end.

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## Resources for Further Study

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- Brooke, John Hedley, and Ronald L. Numbers, eds. *Science and Religion around the World*. Oxford: Oxford University Press, 2011.
- Harrison, Peter, ed. *The Cambridge Companion to Science and Religion*. Cambridge: Cambridge University Press, 2010.
- Lopez, Donald. *Buddhism and Science: A Guide for the Perplexed*. Chicago: University of Chicago Press, 2008.
- Polkinghorne, John. *Faith, Science, and Understanding*. New Haven: Yale University Press, 2000.
- Richardson, W. Mark, Robert John Russell, Philip Clayton, and Kirk Wegter-McNelly, eds. *Science and the Spiritual Quest: New Essays by Leading Scientists*. London: Routledge, 2002.
- Ruse, Michael. *Science and Spirituality: Making Room for Faith in the Age of Science*. Cambridge: Cambridge University Press, 2010.
- Southgate, Christopher, ed. *God, Humanity and the Cosmos: A Text in Science and Religion*. 3rd ed. London: T&T Clark, 2011.



# Science versus Religion

## The War That Never Was

Since the beginning of history, a deep rift has existed between science and religion.

—Dan Brown, *fiction writer, Angels and Demons*

Science began as an outgrowth of theology, and all scientists, whether atheists or theists . . . accept an essentially theological worldview.

—Paul Davies, *physicist, Are We Alone?*

### In This Chapter

- Science and Religion at War: The Birth of a Modern Myth
- How Columbus *Didn't* Prove the World Was Round
- How Galileo *Never* Went to Jail
- How the Scopes Monkey Trial Was *Not* about Science versus Religion
- Discussion Questions
- Beyond the Classroom
- Resources for Further Study

Many think the relationship between science and religion—especially the Christian religion—has been one of conflict, debate, or even all-out warfare. Ask the average person on the street, and they will likely tell you the war between science and religion is as old as history. Everyone seems to know for a “fact” that religion and science have always had a hard time getting along. This common notion, that science and religion have experienced a long history of conflict or warfare is called the conflict thesis by historians of science and religion. This chapter first examines the historical roots and social context of the origin of the conflict

thesis and then evaluates three historical cases that are often cited in support of the conflict thesis: (1) that Christopher Columbus was persecuted by the Roman Catholic Church for holding that the Earth is a globe and not flat; (2) that the Church hounded, tortured, and imprisoned Galileo Galilei (and Nicolaus Copernicus before him) for suggesting that the sun is the center of the solar system; and (3) that John T. Scopes—the defendant in the famous 1925 Scopes Monkey Trial—was a “martyr for science” who heroically taught evolution and paid the price by being thrown behind bars. Investigation of these three cases will demonstrate that the language of warfare falls far short of historical reality. A more accurate understanding of these events reveals a complexity of interactions characterized by both creative tension and constructive dialogue.<sup>1</sup>

## Science and Religion at War: The Birth of a Modern Myth

In Dan Brown’s best-selling novel *Angels and Demons* (also a 2009 movie), the hero of the story, Harvard professor Robert Langdon asserts that “early scientists were branded alive, on the chest, with the symbol of a cross,” and “outspoken scientists like Copernicus were murdered by the church for revealing scientific truths.” He also declares, “Since the beginning of history, a deep rift has existed between science and religion,” and “religion has always persecuted science.”<sup>2</sup> While Hollywood films are *not* typically viewed as authoritative sources for historical truth, high school and college textbooks generally *are*. And here one often finds the same theme—that the Christian church has resisted science and persecuted scientists from the beginning. Many textbooks include references to popes who banned the number zero or excommunicated Halley’s Comet, bishops who opposed vaccination and human dissection, or how the Catholic Church burned at the stake the early scientist Giordano Bruno (1548–1600) for his scientific support of heliocentrism.<sup>3</sup> Students are often surprised to learn that these stories are false in a variety of ways. As a number of contemporary historians of science

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1. Oxford historian John Hedley Brooke makes a case for what he labels the “complexity thesis” to describe the historical relationship between science and religion. See *Science and Religion: Some Historical Perspectives* (Cambridge: Cambridge University Press, 1991). Historian James Hannam describes the relationship as one of “creative tension.” See James Hannam, *The Genesis of Science: How the Christian Middle Ages Launched the Scientific Revolution* (Washington, DC: Regnery Publishing, 2011).

2. Dan Brown, *Angels and Demons* (New York: Simon and Schuster, 2000), 31.

3. For a reference to popes banning vaccination and dissection, see the college textbook by Emily Jackson, *Medical Law: Text, Cases, and Materials* (Oxford: Oxford University Press, 2013), 7. For a reference to Bruno being burnt at the stake for his science, see the popular college textbook by Louis P. Pojman, *Philosophy of Religion* (New York: McGraw-Hill, 2001), 147. For a discussion on why these are all myths, see Ronald L. Numbers, ed., *Galileo Goes to Jail, and Other Myths about Science and Religion* (Cambridge, MA: Harvard University Press, 2009).

have pointed out, the truth is that the church never did any of these things. In fact, the Catholic Church encouraged the early practices of vaccination and supported human dissection. Moreover, there is not one clearly documented instance of the church ever burning *anyone* at the stake for scientific opinions.<sup>4</sup>

While professional historians of science try their best to set the record straight, a good story dies hard, and the notion of the perennial warfare between science and religion is a persistent myth. But from where does the myth of the ages-long warfare between religion and science derive? According to historian of science Thomas Dixon, the conflict thesis was invented by anti-church rationalists of the European Enlightenment in the late 1700s and then embellished and propagated by anti-Christian secular “free-thinkers” in the late 1800s.<sup>5</sup> The Enlightenment rationalists contrasted their own “Age of Reason” with what they called the “Dark Ages” of Christian Europe, and they promoted the story of the warfare between science and religion to make a case for social revolution. Among these Enlightenment rationalists were the French patriot Voltaire (1694–1778) and the American patriot Thomas Paine (1737–1809), both scientific thinkers who were opposed to Christianity and who viewed the institutional churches of France and England as the oppressive tentacles of the established monarchies. In his enormously popular book *The Age of Reason* (1794), Paine railed against “the continual persecution carried on by the Church, for several hundred years, against the sciences and against the professors of science.” Paine contended that Christianity placed shackles on the mind and that no scientifically progressive person could ever embrace the central doctrines of the Christian faith. What Paine sought through his literary efforts, however, was not to end religion but to replace the Christian religion with a secularized “rational” religion based on science.<sup>6</sup>

In the 1800s, the rhetorical torch of the anti-religious Enlightenment thinkers was taken up by the “free-thinkers” of the Victorian Age who sought to stage a social revolution in the scientific establishment, which at that time was dominated by religiously devout practitioners.<sup>7</sup> Foremost among the free-thinkers were “Darwin’s Bulldog,” British naturalist Thomas Henry Huxley (1825–1895), along with the American promoters of science and secular education, John W. Draper (1811–1882) and Andrew Dickson White (1832–1918). Huxley, who resented the influence of the Anglican establishment within the scientific culture of his day, embellished a vision of Western history where “extinguished theologians lie about the cradle of every science as the strangled snakes

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4. For an in-depth discussion of why such stories are unfounded see Hannam, *Genesis of Science*, and Numbers, ed., *Galileo Goes to Jail*.

5. Thomas Dixon, *Science and Religion: A Very Short Introduction* (Oxford: Oxford University Press, 2008), 9.

6. See *ibid.*, 11–12.

7. See Peter Harrison, “Religion, the Royal Society, and the Rise of Science,” *Theology and Science* 6, no. 3 (2008): 255–71.

beside the cradle of Hercules.”<sup>8</sup> Coining the term “agnostic” to describe his own position on religion, Huxley enlisted Darwin’s scientific theory to champion the cause of religious skepticism. He had no patience with scientific colleagues, such as Roman Catholic biologist St. George Mivart who accepted evolution and insisted that Darwinism was perfectly compatible with historic Christian teaching. Huxley, infuriated by Mivart’s position, insisted that Mivart choose whether he wanted to be “a true son of the Church” or “a loyal soldier of science.”<sup>9</sup> If Huxley was to create a proper war between science and religion, he could not afford to have soldiers fighting loyally for both sides.

To further the cause of secularizing the scientific establishment and help spread the message of the war between science and religion, Huxley also founded the X-Club—a group of like-minded, agnostically oriented, and scientifically influential friends, whose key aim was to reform the foremost British scientific organization, known as the Royal Society. (Draper and White were distinguished members.) The explicit mission of Huxley and his colleagues in the X-Club was to rid—with an evangelical fervor—the discipline of the natural sciences of women, amateurs, and Christian clergy, and to place secular science into the center of cultural life in Victorian England.<sup>10</sup> Between the time of its inception in 1864 and the end of the nineteenth century, the X-Club and its members gained much prominence within the scientific community, exerting considerable influence over scientific thought. “The enduring legacy of this group,” explains historian of science Peter Harrison, “has been the perpetuation of the myth of a perennial warfare between science and religion.”<sup>11</sup>

Draper (a prominent chemist, founder and first president of the American Chemical Society) and White (the first president of Cornell University) prosecuted the war of rhetoric against religion in the United States. From these authors come two books that have been in print for more than a century and are still among the most widely read books in the history of science and Christianity. Draper’s book, *The History of the Conflict between Religion and Science* (1874), tells of “ferocious theologians” hounding the pioneers of science with a Bible in one hand and a flaming torch in the other. His book is primarily a tirade against the Roman Catholic Church, which he blames for almost everything he

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8. Quoted in Richard G. Olson, *Science and Religion, 1450–1900: From Copernicus to Darwin* (Baltimore: Johns Hopkins University Press, 2006), 204.

9. Timothy Larsen, “‘War Is Over, If You Want It’: Beyond the Conflict between Faith and Science,” *Perspectives on Science and Christian Faith* 60, no. 3 (September 2008): 149–50. As Larsen says, “Huxley and others who aspired to turn scientific pursuits into a profession . . . ‘needed’ a war between science and religion.”

10. See Ruth Barton, “‘An Influential Set of Chaps’: The X-Club and Royal Society Politics 1864–85,” *British Journal for the History of Science* 23, no. 1 (March 1990): 53–81.

11. Peter Harrison, “‘Science’ and ‘Religion’: Constructing the Boundaries,” in *Science and Religion: New Historical Perspectives*, ed. Thomas Dixon, Geoffrey Cantor, and Stephen Pumfrey (Cambridge: Cambridge University Press, 2010), 27.

views as wrong in Western history (including encouraging the “evolutionarily unfit” to breed). Draper was reacting to the new wave of Catholic immigrants in America, to the first Vatican Council, and, in particular, to the doctrine of papal infallibility. On top of this, he was angry that his own sister had become a nun.

White’s book, *A History of the Warfare of Science with Theology in Christendom* (1896), similarly speaks of the struggle between religion and science as “a war waged longer, with battles fiercer, with sieges more persistent, with strategy more shrewd than in any of the comparatively transient warfares of Caesar or Napoleon.” Indeed, he tells the reader, “The coming of Christianity arrested the normal development of the physical sciences for over fifteen hundred years . . . imposing a tyranny of ignorance and superstition that perverted and crushed true science.”<sup>12</sup> White, too, was annoyed with the Christian church, but for different reasons. He was provoked to write because of criticism he received for establishing Cornell University without a religious affiliation. Beyond this, White’s Cornell was competing with religiously affiliated colleges to get money from Congress; thus he had to make a historical case to show why religion and the natural sciences shouldn’t mix.

What do historians of science make of the conflict thesis that science and religion have been in a perpetual state of warfare? University of Wisconsin historians of science David Lindberg and Ronald Numbers explain that “recent scholarship has shown the warfare metaphor to be neither useful nor tenable in describing the relationship between science and religion.”<sup>13</sup> Johns Hopkins University historian of science Lawrence Principe likewise says that the historical formulation of Draper and White “rests on very shaky (and sometimes fabricated) foundations and was contrived largely for quite specific political, professional, and racist purposes. . . . Serious modern historians of science have unanimously dismissed the warfare model as an adequate historical description.”<sup>14</sup>

## How Columbus *Didn’t* Prove the World Was Round

Although professional historians of science have “unanimously dismissed” the rhetorical fictions of Draper and White as anti-religious propaganda, Draper and White’s legacy lives on in the anecdotes of popular culture. One legend from White’s work that remains ubiquitous today is the notion that Christians in the European Middle Ages thought the world was flat—an idea White

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12. Quoted in David Lindberg and Ronald Numbers, eds., *God and Nature: Historical Essays on the Encounter between Christianity and Science* (Berkeley: University of California Press, 1986), 3.

13. David C. Lindberg and Ronald L. Numbers, “Beyond War and Peace: A Reappraisal of the Encounter between Christianity and Science,” *Perspectives on Science and Christian Faith* 39, no. 3 (September 1987): 140–49, at 141.

14. Lawrence Principe, “The Warfare Thesis,” *Science and Religion*, recorded lecture (Chantilly, VA: The Teaching Company, 2006).

picks up from Washington Irving's fictional *Life of Columbus* (1828) and then asserts as history. As the story goes, the Spanish explorer Christopher Columbus (1451–1506), pictured as an enlightened man of science, defies the dogmatic superstitions held by medieval Christian culture and boldly ventures to prove, by experiment, the error of the Church's ways. Yet, declares White, "even after he was triumphant, and after his voyage had greatly strengthened the theory of the earth's sphericity, the Church by its highest authority solemnly stumbled and persisted in going astray."<sup>15</sup>

This myth is still at work in many places. For example, a 2013 *Infinity* car commercial opens with a reference to Columbus: "If no one ever challenged the status quo, the earth would still be flat." A popular play from a few years earlier, titled *Christopher Columbus*, includes the following dialogue:

**COLUMBUS.** The Earth is not flat, Father, it's round!

**ROMAN CATHOLIC PRIEST.** Don't say that!

**COLUMBUS.** It's the truth; it's not a mill pond strewn with islands, it's a sphere.

**ROMAN CATHOLIC PRIEST.** Don't, don't say that; it's blasphemy.<sup>16</sup>

As part of elementary school and high school education, many Americans grew up with stories about Columbus proving the world was round and his crew begging him to turn back lest they sail off the edge of the earth. In the 1980s, the popular fifth-grade history textbook *America Past and Present* explained to elementary school pupils: "The European sailor of a thousand years ago believed . . . that a ship could sail out to sea just so far before it fell off the edge of the sea."<sup>17</sup> A widely used middle-school textbook at that time asserts, "Columbus felt he would eventually reach the Indies in the East. Many Europeans still believed that the world was flat. Columbus, they thought, would fall off the earth."<sup>18</sup> Thus, there remains the quite common notion that a flat earth—as opposed to a spherical earth—was generally assumed by the average person who lived in medieval Europe.

Is there any historical truth in this tale? In fact, there is no written record of *anyone* in medieval Europe believing in a flat earth. University of Santa Barbara historian Jeffrey B. Russell explains that "no educated person in the history of Western Civilization from the third century B.C. onward believed that the earth

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15. Andrew Dickson White, *A History of the Warfare of Science with Theology in Christendom* (Buffalo, NY: Prometheus, 1993), 108.

16. Quoted in Edward Grant, *God and Reason in the Middle Ages* (Cambridge: Cambridge University Press, 2002), 345.

17. Joan E. Schreiber, *America Past and Present* (Glenview, IL: Scott Foresman, 1983), 98.

18. David Bidna, *We the People: A History of the United States of America* (Lexington, MA: Heath, 1982), 28–29.



was flat.”<sup>19</sup> Lindberg observes, “The truth is that the sphericity of the earth was a central feature of theoretical dogma as it came down to the Middle Ages—so central that no amount of contrary theoretical or empirical argumentation could conceivably have dislodged it.”<sup>20</sup> British historian of science James Hannam agrees: “We can state categorically that a flat Earth was at no time ever an element of Christian doctrine and that no one was ever persecuted or pressurized into believing it.”<sup>21</sup>



De Agostini Picture Library / Bridgeman Images

Martin Behaim constructed this globe, or *Erdapfel* (“Earth-apple”), between 1491 and 1493. Its spherical shape represents the consensus of European scholarship at the time of Columbus’s voyage.

Earth’s circumference is around 16,500 miles; Columbus argued for this smaller figure. The Spanish geographers wisely urged Columbus not to set sail—warning that he and his crew would most likely starve during the long ocean voyage across half the globe. Fortunately, at least for Columbus and his crew, the Americas lie between the Atlantic and Pacific Oceans. Thus, if Columbus proved anything about the shape of the Earth, he proved that the majority of medieval, geographical experts were correct about the size of its circumference and that he, in fact, was wrong.

19. Jeffrey Burton Russell, “The Myth of the Flat Earth,” American Scientific Affiliation Conference, August 4, 1997, Westmont College, Santa Barbara, CA. See also Jeffrey Burton Russell, *Inventing the Flat Earth: Columbus and Modern Historians* (New York: Praeger, 1991).

20. Quoted in Russell, *Inventing the Flat Earth*, 2.

21. Hannam, *Genesis of Science*, 28.

## How Galileo Never Went to Jail

A second myth regularly cited in popular discussions of science and religion is the story of how the famous astronomer Galileo Galilei (1564–1642) defied the dogmatism of the Catholic Church in the name of science and paid for it dearly. This myth generally asserts that Galileo, for holding certain scientific views, was persecuted by the church, tortured by the Catholic Inquisition, and thrown in a dungeon to rot for the rest of his life. In some versions of the myth, he is burned at the stake as a scientific heretic. In other words, the myth holds that Galileo essentially became “a martyr for science” at the hands of the Roman Catholic Church. Again, Andrew Dickson White is primarily responsible for the popularization of this myth. White says that, for his scientific heresies, “Galileo was tortured and humiliated as the worst of unbelievers.”<sup>22</sup> The historical truth, however, is quite different. From the available evidence, it is clear Galileo was not burned at the stake and was neither persecuted for his scientific views nor tortured by the Church. He was *not* thrown in a dungeon to rot away; in fact, he never spent a single day in prison. Beyond this, the Galileo affair was not even a clear case of science versus religion. Indeed, much of the controversy was theological in nature and concerned with how to (and who may) properly interpret the Bible.

Because the events surrounding Galileo’s trial are complex, a bit of background aids in understanding the theological and scientific situation in Galileo’s day. Long before 1609 when Galileo began advocating the view of Nicolaus Copernicus (1473–1543) that the planets went around the sun (known as heliocentrism), several key religiously orthodox Christian thinkers had already discussed the possibility that the planet Earth was rotating. They had also debated whether the sun and planets were moving relative to the Earth or vice versa. The famous professor of the University of Paris John Buridan (1295–1362) and the fourteenth-century bishop Nicole Oresme (1320–1382) both discussed the issue of relative motion in the solar system and argued that the observable data of physics alone could not demonstrate whether the Earth was rotating or not. Cardinal Nicholas of Cusa (1401–1464) likewise freely discussed the possible motion of the Earth. In his well-known book *On Learned Ignorance*, Nicholas proposed that the Earth is a star like other stars, that it is not the center of the universe, and that it is not at rest.

By the time Copernicus came onto the scientific scene in the early sixteenth century, there was no reason to think that the reappearance of the idea of a moving Earth would cause a theological controversy.<sup>23</sup> When Copernicus published his famous *Revolutions of the Celestial Spheres* in 1543, it was after many high-ranking church officials had encouraged him in his astronomical work. For

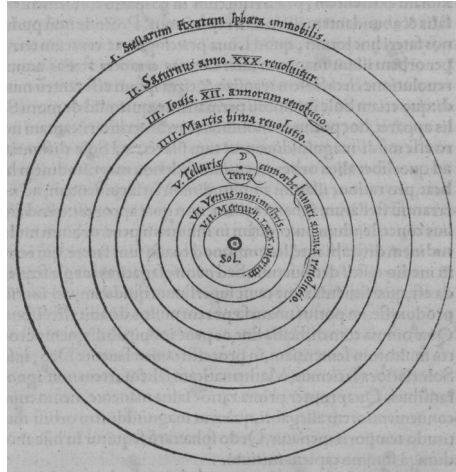
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22. Quoted in Numbers, ed., *Galileo Goes to Jail*, 2.

23. Lindberg and Numbers, “Beyond War and Peace,” 141.

example, in 1515 Pope Leo X (1513–1521) and other church leaders sought the astronomical expertise of Copernicus to help reform the Julian calendar. In 1533, Pope Clement VII (1523–1534) was so fascinated by Copernicus's new model that he invited his personal secretary (and Copernicus's disciple) Johann Widmannstetter to the Vatican gardens to give a public lecture on the subject, "to the delight of Pope Clement and several cardinals."<sup>24</sup> Then on November 1, 1536, Cardinal Nicolas von Schoenberg wrote to Copernicus saying, "With the utmost earnestness I entreat you, most learned sir, unless I inconvenience you, to communicate this discovery of yours to scholars."<sup>25</sup> From this series of events, it is clear that "if Copernicus had any genuine fear of publication, it was the reaction of scientists, *not* clerics, that worried him."<sup>26</sup> And there was a good reason for this: Copernicus, in fact, had no new empirical evidence to justify his theory. Rather, he thought that his view had more internal coherence and greater explanatory power than Ptolemy's, and that it was more theologically satisfying.<sup>27</sup>

Living in the 1600s, Galileo was researching and writing in the wake of the Protestant Reformation—a time when more conservative theological and scientific views were on the rise within Roman Catholic culture. One of the central tenets of the Protestant Reformers was that each individual Christian had the right to interpret Scripture and read the Bible in his or her own language, rather than encountering the teaching of Scripture only through the mediation of professional Bible scholars and priests. To discourage further schism in the Church,



Library of Congress, Rare Book and Special Collections Division

Copernicus first published his heliocentric theory in 1543, some seventy-two years before Galileo's trial. Copernicus's book included this diagram of the solar system.

24. Lawrence Principe, *The Scientific Revolution: A Very Short Introduction* (Oxford: Oxford University Press, 2011), 49.

25. Jack Repcheck, *Copernicus' Secret: How the Scientific Revolution Began* (New York: Simon and Schuster, 2007), 79.

26. Lindberg and Numbers, "Beyond War and Peace," 142, emphasis in original.

27. Richard J. Blackwell, "Galileo Galilei," in *The History of Science and Religion in the Western Tradition: An Encyclopedia*, ed. Gary B. Ferngren (New York: Garland, 2000), 98; see also John Hedley Brooke, "Religious Belief and the Content of the Sciences," in *Science in Theistic Contexts: Cognitive Dimensions*, ed. John Hedley Brooke, Margaret J. Osler, and Jitse M. van der Meer (Chicago: University of Chicago Press, 2001), 15.

the Roman Catholic Council of Trent (1545–1563) countered this individualistic Protestant notion of reading the Bible and forbade any reinterpretation of Scripture “contrary to the consensus” of the patristic writers. In Galileo’s day, the dominant understanding of Scripture held by the Catholic Church favored a *geostatic* (i.e., a nonmoving or stationary Earth) and *geocentric* (i.e., Earth as the center of the solar system) view of the solar system over that of Copernicus. Galileo, for his part, attempted as a layman to make a scriptural case to the contrary. In doing this he, in essence, “violated ‘intellectual turf’ by claiming that his biblical interpretations were superior to those of the theologians, especially while he told theologians to stay out of natural philosophy.”<sup>28</sup>

In 1615, Galileo went to Rome to defend the Copernican theory, certain that he possessed the empirical truth. However, at this time—and even to the end of his life—a conclusive proof of the Copernican system still had not been found. Galileo believed that he had such a

proof in his argument that the motion of the Earth causes the tides, but many

other astronomers and physicists

remained unconvinced (and scientists now know, in hindsight,

that Galileo’s theory of the tides was wrong). Beyond this,

there were other models of the solar system that could explain

the observational data just as well—including that of Danish astronomer Tycho Brahe

(1546–1601), which was partly heliocentric and partly geocentric. As a result, Galileo’s

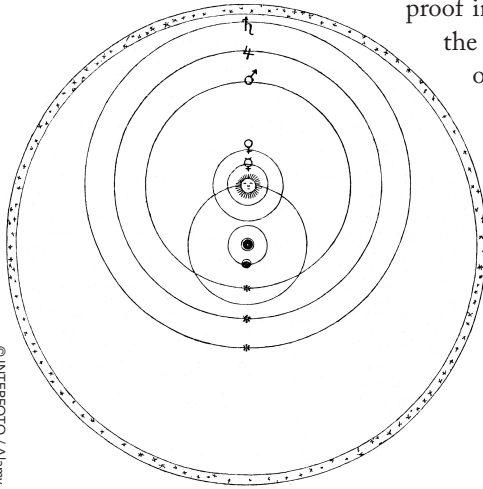
case was empirically undecidable, and there was sufficient

doubt about the relative merits of Copernicanism and the

alternatives “that an objective

observer would have pronounced the scientific question an open one.”<sup>29</sup> Many

influential Catholic Church officials believed that Galileo might be right, but they had to wait for more scientific proof.<sup>30</sup>



The Copernican model’s chief rival was the “geoheliocentric” model of Tycho Brahe (1546–1601), shown here. Since both models fit the data available at the time, there was no clear, scientific basis for preferring one over the other.

28. Lawrence Principe, “Galileo’s Trial,” *Science and Religion*, recorded lecture (Chantilly, VA: The Teaching Company, 2006).

29. Dixon, *Science and Religion*, 31.

30. Jerome J. Langford, *Galileo, Science, and the Church* (Ann Arbor, MI: University of Michigan Press, 1992), 69.

In 1616, a committee was asked to report on the question of Copernicanism and concluded that it was at that time both unfounded as scientific theory and contrary to the teachings of Scripture. However, “the decree was issued in a reformable manner by a fallible authority . . . without any special endorsement of the Pope.”<sup>31</sup> In light of the committee’s decision, Cardinal Robert Bellarmine asked Galileo not to present Copernicanism as *literally true* and as a *scientifically proven fact*. Galileo agreed to comply with Bellarmine’s request. Bellarmine permitted Galileo to continue to research and write, with the understanding that he should treat his scientific theories tentatively until he had conclusive evidence. “Prove your theory,” said Bellarmine, “and we will change our exegesis, otherwise teach it as a hypothesis.”<sup>32</sup> Bellarmine conceded that a sound demonstration of the Earth’s motion would lead to reinterpretation of Scripture, but, as of yet, Galileo had no such proof.

Then in 1623, Galileo was exceedingly encouraged when his friend Cardinal Maffeo Barberini was elected as Pope Urban VIII. Barberini had been an admirer and active supporter of Galileo’s work since 1611; he even composed a poem celebrating Galileo’s scientific discoveries. Galileo, now a scientific celebrity and feeling that he could do no wrong, embarked for Rome to speak with the new pope. Urban VIII warmly received Galileo, “granted him no less than six audiences; gave him a painting, two medals. . . . and the promise of a pension for his son; and, last but not least, agreed that he could write about the motion of the earth provided he represented it not as reality but as a scientific hypothesis.”<sup>33</sup> In other words, Galileo was granted permission from the pope to write about the Copernican system as long as he treated it as a *theory* and *not* as an *established fact* that was proven beyond all doubt.

Galileo, however, was not entirely satisfied with these conditions. Instead of abiding by the pope’s request, Galileo published his *Dialogue Concerning the Two Chief World Systems* (1632), where he not only defended Copernicanism as a *proven fact* and as *physically true*, but also placed the Pope’s own arguments about its *hypothetical* character in the mouth of the dim-witted, bumbling Aristotelian fool, Simplicio; Galileo claimed the name was meant to refer to Simplicius of Cilicia, a sixth-century commentator on Aristotle, but many believed the name was intended as a pun on the Italian word for “fool” (*simplice*). Galileo also made various arguments against the theologians and biblical scholars about the correct way to interpret Scripture. In addition, the pope learned for the first time of Galileo’s 1616 legally binding agreement with Bellarmine where he promised not to present the Copernican theory as an established fact—something Galileo failed to mention when he met with the pope. The combination of these

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31. Ibid., 101.

32. Ibid., 69.

33. William R. Shea, “Galileo and the Church,” in *God and Nature*, ed. Lindberg and Numbers, 128.

actions alienated Galileo from the pope, who up to that point had been Galileo's enthusiastic supporter and friend. As a result, Galileo fell prey to his scientific rivals who wanted him silenced (largely due to personal jealousies and insults they had received from his pen). Beyond this, Galileo found himself caught in a power struggle between rival *scientific* schools of thought roughly corresponding to the views of the Dominicans and Jesuits. While all of Galileo's accusers were Dominicans, Galileo was on good terms with the Jesuits, who had confirmed his telescopic discoveries and supported his work. Indeed, the Jesuit astronomers were quite eager for further scientific proof so they could come out solidly in favor of Copernicus and abandon Brahe's system.

It was for breaking his agreement with high-ranking officials of the Church, rather than for seeking to understand the natural world through observation and reasoning, that Galileo was tried and convicted in June 1633. It was not Galileo's scientific opinions that led to his trial, but *how he conducted himself* as he promoted them. When he was tried, Galileo was neither charged nor convicted of scientific heresy. He was charged with promoting Copernicanism as a *fact* and, by doing so, breaching his legally binding agreement. Guilty as charged, Galileo was not a hapless victim.<sup>34</sup> And even at the end of the proceedings, several cardinals did not sign the conviction—a signal that Galileo still had the support of Church leaders and that the trial was intended to be something of a slap on the wrist.<sup>35</sup>

As far as the part of the myth that says Galileo went to jail, it is a point of historical fact that "Galileo was never held in prison, either during the trial (as was universal custom) or afterward." Throughout all the events surrounding Galileo's trial, explains historian Maurice Finocchiaro, he received "unprecedentedly benign treatment."<sup>36</sup> When he was summoned to Rome, he was permitted

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34. In 1979 Pope John Paul II initiated an interdisciplinary commission to re-investigate the Galileo case in order to expose the "wrongs from whatever side they come." The investigation took 13 years. In its final report in 1992 the commission emphasized that Galileo did not possess solid scientific proof for the Copernican hypothesis. Thus, explained the report, Galileo, "had not succeeded in proving irrefutably the double motion of the earth" as Cardinal Bellarmine had challenged him to do. When, however, an "optical proof" of the Earth's motion around the Sun became available in the following century, Pope Benedict XIV had the Holy Office grant the official stamp of approval to Galileo's works in 1741 ("Galileo: Report on Papal Commission Findings," *Origins: Catholic News Service*, November 12, 1992, 22, 375–6). While reaffirming that the scientists at the time of Galileo were objective in their request for more evidence, the Pope censured the theologians of the time as shortsighted. In this respect, says John Paul II, "Galileo as a sincere believer, showed himself to be more perceptive in this regard than the theologians who opposed him." According to the pope the key lesson to be learned from the Galileo affair is the fundamental harmony between science and religion. "The myth of Galileo's case had encouraged the erroneous idea that science and Christian faith were in opposition," but, declares John Paul II, "this sad misunderstanding now belongs to the past" (Pope John Paul address to the Plenary session on "Emergence of Complexity in Mathematics, Physics, Chemistry and Biology" October 31, 1992); see also Maurice A. Finocchiaro, *Retrying Galileo, 1633–1992* (Berkeley: University of California Press, 2005), 354–55.

35. Principe, "Galileo's Trial."

36. Maurice A. Finocchiaro, "Myth 8: That Galileo Was Imprisoned and Tortured for Advocating Copernicanism," in Numbers, ed., *Galileo Goes to Jail*, 74.





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Following his trial, Galileo was ordered to return to his villa in Arcetri, shown here. He was free to leave the grounds to visit his children, and he was permitted to continue to publish his scientific research.

to lodge at the Tuscan embassy. For eighteen days of his trial, he was housed in a six-room apartment, together with a servant who brought him meals from the Tuscan embassy. Later Galileo moved to the Villa Medici in Rome, a luxurious palace owned by the grand duke of Tuscany. After his trial, Galileo was allowed to leave for Siena, where he was hosted at the palace of the archbishop (a good friend of Galileo's); later, he moved back home to Arcetri near Florence where, under "house arrest," he was restricted to the confines of his spacious villa and country estate. He was permitted to visit his children who lived nearby and to continue publishing scientific papers.

In conclusion, the Galileo affair was neither about the Church's persecution of Galileo nor a matter of Christianity waging war on science. All participants called themselves Christians, and all acknowledged biblical authority. On all sides of the Galileo case, there was agreement that it was proper and rational to seek accurate knowledge of the world through observation of nature and to base one's beliefs on the study of Scripture. The dispute was not between the empirical sciences and dogmatic religious faith. Rather, it was a disagreement—complicated by personal rivalries—between differing views *within* the Catholic Church about how to interpret both nature and Scripture when they seem to disagree.<sup>37</sup>

37. Dixon, *Science and Religion*, 18.

## How the Scopes Monkey Trial Was *Not* about Science versus Religion

A third frequently cited case of “science versus religion” is the *Inherit the Wind* story—named after the popular 1955 play and 1960 film starring Spencer Tracy, Frederic March, and Gene Kelly—that purports to accurately dramatize the events surrounding the famous Scopes Monkey Trial in Dayton, Tennessee, in 1925. According to the popular version of this story, John T. Scopes (1900–1970) is portrayed as a “heroic evolutionist standing up against a repressive Christian establishment in 1920s Tennessee.”<sup>38</sup> Scopes is pictured as a champion of learning and of human rights who merely wanted to bring a little scientific light into a dogmatically dark place but instead ended up a victim of religious bigotry and anti-scientific fundamentalism. The movie version has the free-thinking, science-loving Scopes passionately introduce his students to the evolutionist ideas of Charles Darwin (1809–1882), only to be violently denounced by the religious town leaders. Scopes is thrown into prison and there awaits his fate as his sweetheart—the preacher’s daughter—begs him to renounce his belief in Darwin’s theory. To the rescue comes defense lawyer Clarence Darrow (1857–1938), who is portrayed as the defender of the “little man,” champion of the underdog, and advocate of science, truth, reason, learning, and humanity. Darrow’s counterpoint, the prosecuting attorney William Jennings Bryan (1860–1925), is revealed as an ill-mannered ignorant bigot, a young Earth creationist, and a Christian Fundamentalist who opposes science and freedom of thought.<sup>39</sup> As the script reads:

**DARROW.** Darwin took us forward to a hilltop from where we could look back and see the way from which we came; but for this insight and for this knowledge, we must abandon our faith in the pleasant poetry of Genesis.

**BRYAN, interrupting.** We must not abandon faith! Faith is the most important thing!<sup>40</sup>

Thanks to the *Inherit the Wind* version of the Scopes Monkey Trial, it is often interpreted in the popular mind as a classic case of science versus religion. What, however, is the historical truth? The true story of the Scopes Monkey Trial starts with the American Civil Liberties Union (ACLU) placing an

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38. Ibid., 13.

39. In *Inherit the Wind* (directed by Stanley Kramer [Beverly Hills, CA: United Artists, 1960]), Bryan declares: “A fine Biblical scholar, Bishop Ussher, has determined for us the exact date and hour of the Creation. It occurred in the year 4004 BC. . . . It is not an opinion. It is literal fact, which the good Bishop arrived at through careful computation of the ages of the prophets as set down in the Old Testament. In fact, he determined that the Lord began the Creation on the twenty-third of October in the Year 4004 BC at—uh, at 9 a.m.!”

40. Ibid.



advertisement in the *Chattanooga Times*, offering legal support to any teacher prepared to stand trial for teaching evolutionist ideas (in order to oppose Tennessee's Butler Act of 1925, which prohibited the teaching of evolution in public schools). Local business leaders in Dayton, led by mining engineer and manager George Rappleyea and drugstore owner Frank Robinson, thought this trial—if held in Dayton—might be a good opportunity to publicize the town and boost the economy. Finding this plan agreeable, they recruited Scopes as the “sacrificial lamb.” Scopes was not a biology teacher and never actually taught evolution. He was a part-time football coach and a general science instructor in the areas of physics and math. He did, however, fill in for the regular biology teacher from time to time. Thus Scopes agreed to be tried for teaching evolution, and the “Drugstore Conspirators”—as they were later called—sent a telegram to the ACLU to say they had found their man. Scopes volunteered to be arrested knowing that his fees and fines would be covered. He was charged with violating the Butler Act, and then immediately released on bail. At no time was Scopes held in jail on this charge.

Historian of science Edward Larson explains that for many Americans at this time the application of Darwinian natural selection to humans was associated “with a survival-of-the-fittest mentality that justified laissez-faire capitalism, imperialism, and militarism.”<sup>41</sup> In the previous generation, industrialists such as Andrew Carnegie and John D. Rockefeller claimed Darwinism and the survival of the fittest as justification for their cutthroat business practices. During the years immediately preceding the Scopes trial, a scientific-sounding form of such social teachings aimed at culling the “evolutionarily unfit” gained widespread public attention under the name eugenics. In one of the popular biology textbooks of the day, George Hunter defined this term as “the science of improving the human race by better heredity.”<sup>42</sup> One of Hunter's other textbooks, *A Civic Biology*, was the textbook from which John Scopes taught. As such it was the centerpiece of the trial. The evolution chapter in Hunter's *Civic Biology* explained, with regard to the mentally ill, mentally disabled, habitual criminals, and epileptics:

If such people were lower animals, we would probably kill them off to prevent them from spreading. Humanity will not allow this, but we do have the remedy of separating the sexes in asylums or other places and in various ways preventing intermarriage and the possibility of perpetuating such a low and degenerate race.<sup>43</sup>

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41. Edward J. Larson, *Summer for the Gods: The Scopes Trial and America's Continuing Debate over Science and Religion* (New York: Basic Books, 1997), 27.

42. George Hunter and Walter Whitman, *Civic Science in the Community* (New York: American Book Company, 1922), 422.

43. George Hunter, *A Civic Biology: Presented in Problems* (New York: American Book Company, 1914), 263.

William Jennings Bryan was no fan of eugenics. Bryan—a three-time Democratic Party nominee for the US presidency—had “built his political career on denouncing the excesses of capitalism and militarism,” and in light of eugenics opposed the social application of Darwinism as “the merciless law by which the strong crowd out and kill off the weak.”<sup>44</sup> Bryan was uneasy about the social implications of the theory of natural selection. He believed the militarism, racism, and eugenics programs of German society could be linked to its use of natural selection in social policy, and he saw America moving in the same direction. By the time of the Scopes trial, “24 states had passed laws permitting eugenic sterilizations, and about 12,000 sterilizations had been performed.” The popular public support for eugenics “reflected both prejudice against recent immigrants and the growing faith in science of American intellectuals, who saw eugenics as a means of applying their scientific knowledge to social problems.”<sup>45</sup>

Bryan’s objection to the teaching of Darwinian evolution in public schools was not so much to the *scientific* theory as it was to the *social application* of the theory to US public policy. Bryan had read and understood Darwin’s *Origin of Species* and *The Descent of Man* and was able to quote from them—and frequently did so during the trial. Contrary to myth within *Inherit the Wind*, Bryan publicly accepted the testimony of geologists regarding the great antiquity of the Earth, thought that the “days” of Genesis represented long eons of time, and had no objection to biological evolution up to the point of human beings.<sup>46</sup> As historian of science Ted Davis explains, “The real Bryan was a populist reformer, not a reactionary.”<sup>47</sup>

For Clarence Darrow, the renowned attorney and outspoken atheist from Chicago, the Scopes trial was first and foremost a chance to attack Bryan’s Christian views—and the Christian faith in general. When the Scopes trial arose, explains Larson, “Darrow volunteered his service for the defense—the only time he ever offered free legal aid—seeing a chance to grab the lime-light and debunk Christianity.”<sup>48</sup> Rather than defending the underdog—as the

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44. Edward Davis, “Science and Religious Fundamentalism in the 1920s,” *American Scientist* 93 (May–June 2005): 254–55.

45. *Ibid.*, 255.

46. Ronald L. Numbers, “Creationism in 20th-Century America,” *Science* 218 (1982): 538–44. See also Edward J. Larson, *Trial and Error: The American Controversy over Creation and Evolution* (New York: Oxford University Press, 1985). It must be stressed that, at this time, even many chief scientific supporters of Darwinian evolution resisted applying natural selection to the origin of human beings. Many prominent scientists at the time who had no affection for the Christian religion likewise “doubted whether the development of the human mind could be reduced to the action of natural selection.” John Hedley Brooke, “Darwin and Victorian Christianity,” in *The Cambridge Companion to Darwin*, ed. Jonathan Hodge (Cambridge: Cambridge University Press, 2003), 205. Even Thomas H. Huxley insisted that the human mind “could not be explained in mechanistic terms.” Peter Bowler, *Evolution: The History of an Idea*, 3rd ed. (Berkeley: University of California Press, 2003), 219.

47. Davis, “Science and Religious Fundamentalism,” 254.

48. Larson, *Summer for the Gods*, 73.

popular movie indicates—Darrow had a reputation for defending the rich and notoriously corrupt. Only months before the Scopes trial, he defended Nathan Leopold and Richard Loeb, the sons of two of the richest families in Chicago, when they gratuitously murdered fourteen-year-old Bobby Franks for apparently no other reason than to see if they could get away with it. Here, “Darrow used arguments of psychological determinism to save two wealthy and intelligent Chicago teenagers from execution for their cold-blooded murder of an unpopular former schoolmate.”<sup>49</sup>

While the Scopes Monkey Trial myth holds up Darrow as a staunch defender of Darwin’s science (and of scientific truth in general), in historical actuality Darrow “mixed up Darwinian, Lamarckian, and mutation-theory concepts in his arguments, utilizing whichever best served his immediate rhetorical purposes.” Darrow’s social views shaped his scientific ideas, rather than vice versa; and he embraced the most atheistic versions of Darwin’s theory for the sake of its rhetorical expedience. Though Darrow spoke of “science as an objective arbitrator of truth,” he nevertheless “would only present scientific evidence that supported his position.” In short, says Larson, “he was a lawyer.”<sup>50</sup>

Ironically, Darrow’s personal lifelong quest to destroy the Christian religion was driven by the very myth of which he would become a central part. As a child in Kinsman, Ohio, Darrow imbibed the warfare model of science and religion as his fiercely anti-clerical father eagerly read Huxley, Draper, and White, “and made sure that his son did too.” As a Chicago lawyer and politician, “Darrow quoted Draper and White in his public addresses and denounced Christianity.”<sup>51</sup> Darrow saw Bryan’s popular anti-evolution movement as one more chapter in the age-long war of religion against science. Enlisting himself in the militant ranks opposing religion, Darrow—inspired by the rhetoric of Draper and White—took up the banner of Scopes and Hunter’s *Civic Biology* and tragically, perhaps unwittingly, came to the defense of “the scientific racism of the day.”<sup>52</sup>

To summarize, then, a closer look at the historical and social context of the Scopes Monkey Trial shows that the main conflict was not between “science and religion” as such. Rather, the debate was chiefly between those who, like Darrow, utilized science to attack religion, a view called scientism, and those who, like Bryan, accepted scientific geology and even many of the scientific components of evolutionary theory, but, in the name of the values of the Christian religion, objected to the social application of Darwin’s theory in eugenics. As for Scopes himself, far from being a martyr for science at the hands of religion, he was, instead, a willing party in a community-wide publicity stunt aimed at putting Dayton, Tennessee, on the map.

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49. Ibid., 71.

50. Ibid., 72.

51. Ibid., 22.

52. Ibid., 23. Darrow was not generally a supporter of eugenics.

## Conclusion

The culturally widespread notion that science and religion have experienced a long history of warfare is called the conflict thesis. This chapter has examined the historical roots of the conflict thesis and how it originated primarily in the late nineteenth-century anti-religious propaganda of Thomas H. Huxley's X-club and in the best-selling books of the American promoters of secularism, John Draper and Andrew Dickson White. Three cases from the history of science, that are often enlisted to support the conflict thesis, were then evaluated: (1) that Christopher Columbus was persecuted by the Church for holding, against Roman Catholic doctrine, that the Earth is a globe and not flat; (2) that the Church hounded, tortured, and imprisoned Galileo (and Copernicus before him) for suggesting that the sun is the center of the solar system; and (3) that John T. Scopes—the defendant in the famous 1925 Scopes Monkey Trial—was a “martyr for science” who taught evolution in defiance of angry, anti-science fundamentalist mobs led by William Jennings Bryan. Investigating these three cases shows that the popularly held versions of these stories are baseless myths and that the language of warfare falls far short of a historically accurate picture of the much more complex, rich, and creative interaction of religion and science during these historical events.

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## Discussion Questions

1. Today, no professional medieval historian would argue that medieval Europeans believed the Earth was flat. Yet this myth persists, in spite of all available documentary evidence—owing largely to Andrew Dickson White's invention and propagation of the story. Do you think John Draper and White were justified in fabricating myths about religion to promote science and secularism in education? Why or why not?
2. Why do you think the myth of the historical war between science and religion persists, despite the unanimous agreement of professional historians of science that science and religion were never at war?
3. What do you think such lessons from history can teach us about the present philosophical and theological search for truth?
4. Do you think striving for historical accuracy plays an important part in arriving at philosophical and theological truth? Explain why or why not.

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## Beyond the Classroom

Together with others who have not read this chapter, watch the short video “The World Was Never Flat,” accessible at <http://vimeo.com/39912829> or <http://www.youtube.com/watch?v=a8HFDiVzWsM> (time 0:03:21). Lead a discussion on the

film. Some suggested discussion questions are: “Does any of this information presented in this video surprise you? Why or Why not?” “Why do you think such myths were constructed? Whose interests do you think they serve?”

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## Resources for Further Study

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### Books

- Bowler, Peter J. *Gorilla Trials and Monkey Sermons: Evolution and Christianity from Darwin to Intelligent Design*. Cambridge, MA: Harvard University Press, 2007.
- Dixon, Thomas, Geoffrey Cantor, and Stephen Pumfrey, eds. *Science and Religion: New Historical Perspectives*. Cambridge: Cambridge University Press, 2010.
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- Hannam, James. *The Genesis of Science: How the Christian Middle Ages Launched the Scientific Revolution*. Washington, DC: Regnery, 2011.
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- Olson, Richard. *Science and Religion, 1450–1900: From Copernicus to Darwin*. Westport, CT: Greenwood, 2004.
- Principe, Lawrence M. *The Scientific Revolution: A Very Short Introduction*. Oxford: Oxford University Press, 2011.

### Internet Resources

“Bede’s Library: The Mythical Conflict between Science and Religion.” Accessible at <http://www.bede.org.uk/conflict.htm>.

Davis, Ted. “Christianity and Science in Historical Perspective.” Test of Faith (website). Accessible at <http://www.testoffaith.com/resources/resource.aspx?id=623>.

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Stanford Encyclopedia of Philosophy. "Religion and Science." Revised May 27, 2010. Accessible at <http://plato.stanford.edu/entries/religion-science/>.