

# Science and Christianity Conflicts: Real and Contrived

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Extinguished theologians lie about the cradle of every science as the strangled snakes beside that of Hercules; and history records that whenever science and orthodoxy have been fairly opposed, the latter has been forced to retire from the lists, bleeding and crushed if not annihilated; scorched, if not slain. (Thomas H. Huxley, *Darwin on the Origin of Species*, 1860)<sup>1</sup>

*One typical “knee jerk” answer to the question, “What is the relation between science and religion?” is, “There is a conflict.” The roots of this widely held response go deep. It is easy to select historical examples to justify it and arrive at a narrative in which religion (and here we study, in particular, Christianity) is driven into permanent retreat by science. However, using a different set of historical examples, it can be argued that, at times, Christianity, under the guise of a foe, did the work of a friend for science. The conclusion of a wealth of historical information is that a “conflict-retreat” portrayal of science-religion relations tells only part of a story that, in fact, is much more complex.*

Science has become a definitive part of contemporary culture. As this has happened, awareness of the narrative of the history of science has become a key element in explaining how we have arrived where we are today. In understanding science and religion relations, historical examples provide crucial insights.

In 1990, Ian Barbour proposed a four-way classification of the relationship between science and religion: conflict, independence, dialogue, and integration.<sup>2</sup> Although other classifications have been proposed, Alister McGrath, another leading figure on science and religion, has argued that “despite its limitations, the framework set up by Barbour remains helpful.”<sup>3</sup>

Relevant here is his identification of conflict as the most pervasive way of representing the relation between science and religion. McGrath makes it clear that the conflict and warfare themes have continued to be important. He writes,

... some scientists and religious believers see them as locked in mortal

combat: science and religion are thus at war with each other, and that war will continue until one of them is eradicated.<sup>4</sup>

However, he also reminds us that this warfare metaphor “is not seen by historians of science as being particularly reliable or defensible”<sup>5</sup> as “the relationship between science and religion has always been complex.”<sup>6</sup> The complex nature of this relationship has been defended and studied in detail for decades.<sup>7</sup>

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In a recent paper, McGrath has observed that

to those in the know, this “science versus religion” narrative is stale, outdated and largely discredited. It is sustained not by the weight of evidence, but by endless uncritical repetition, which studiously avoids the new scholarship which has undermined its credibility.<sup>8</sup>

An example of how better awareness of the history of science can illuminate science-religion relations is the 1989 work of historian Colin A. Russell, who criticized what he called “the widespread myth of an endemic conflict between science and religion,” whose origins he located in the late nineteenth century.<sup>9</sup> He claimed that this “conflict metaphor,” as he called it (which has also been named as “warfare model,” “conflict thesis,” “military metaphor,” “conflict model,” etc.), “is not an assertion in the *philosophy* of science but rather in *history* of science, alleging what actually happened in the past and continues to the present day.”<sup>10</sup> In studying the foundations of this conflict model, Russell pointed out that “the evidence points strongly in the direction of a myth conjured into being on the slender basis of a few *causes célèbres* [...]”<sup>11</sup>

More recently, another historian of science, John Henry, has pointed out how some *causes célèbres* (he mentioned the Copernican revolution, the Galileo affair and Darwinism) “are too often regarded as demonstrating clearly and irrefutably that science and religion just do not mix, and indeed are essentially incompatible with one another.”<sup>12</sup>

### A Conflict-Retreat Model for Science and Religion

In this article, we wish to illustrate how these *causes célèbres* are frequently used to foster one specific variety of the conflict model that claims that science and religion are locked in a perennial conflict, and that there is a progressive historical “retreat” of religion in this conflict. This view comprises three core beliefs:

1. A conflict between “science” and “religion” (in general terms) is inevitable, as both compete for the same territory;
2. This is an age-old, perennial conflict; and
3. In this battle, “religion” is in an inevitable retreat, losing ground in the face of the victorious advance of “science.”

Certain key historical episodes have prompted this view. Our focus here is on Western Christianity, as historically this is the usual context for this conflict model, and the context in which we ourselves live and work. In some cases, Christians have *enlarged* the dominion of “religion” to compete for the territory of science. To a certain extent, there was not only an interest in controlling scientific ideas per se, but also a question of authority related to the desire of the Christian churches to buttress their authority in as many fields as possible. At other times, Christians unfortunately indulged in a *god-of-the-gaps* approach between religion and science, in which scientific gaps were improperly filled with references to God. In due time, these occupied territories were reclaimed by science; hence, the inevitable retreat. Indeed, theologians themselves have criticized the *god-of-the-gaps* as a false god that is indeed in retreat. Dietrich Bonhoeffer wrote most perceptively in 1944:

If in fact the frontiers of knowledge are being pushed further and further back (and that is bound to be the case), then God is being pushed back with them, and is therefore continually in retreat. We are to find God in what we know, not in what we don't know.<sup>13</sup>

This “conflict-retreat” model could be seen as a refinement of the general “conflict model” for science and religion relations. Some presentations of the conflict model do not have a historical angle and are content with an epistemological argument for incompatibility along the lines of the above point 1. It is interesting to mention that to see science and faith as competing, it is necessary to consider them as separate domains – something that was not so until two or three centuries ago. The history of their separation has been recently charted by Peter Harrison.<sup>14</sup> In this regard, we have used, throughout this article, the words “science” and “scientists” for historical periods from the ancient world to our own time. This has been done for the sake of simplicity, but Harrison's observation should be taken into consideration, as an additional layer of complexity, in that the professionalization of science became a reality only in the nineteenth century.

In other cases, we can see the history of science (and religion) enlisted to portray, as Russell pointed out, not just a metaphysical/ideological conflict, but a historical continuous combat (like a trench warfare), giving this purported conflict a centenarian or even millennial-deep perspective, as suggested in point 2,

that illustrates the inevitability of such a conflict. However, many proponents of the conflict model go further and combine the idea of a historical conflict with the idea of scientific progress (point 3 above) to add directionality and create a historical account of a purported long struggle of science to free itself from the shackles of a retreating religion! In the recent words of Harrison,

The history of Western thought is understood in terms of a protracted struggle between these opposing forces, with religion gradually being forced to yield more and more ground to an advancing science that offers superior explanations. Wherever possible, religion has resisted this ceding of territory, thus hindering the advance of science.<sup>15</sup>

The way this struggle is framed is by picking selected examples of science-Christianity conflicts (those so-called *causes célèbres*) that are historically aligned and in which Christianity is predictably subjected to an inevitably continuous retreat in the face of the triumphant scientific fire, thus making a case for this enduring struggle between science and Christianity. The enumeration of examples such as the debates surrounding Galileo or Darwin, or others, marching in historical chronological progression, is enough to create by itself the impression that there is a connecting thread among them all, a continuous pressure to push Christianity out of the frame by progressive scientific achievements.<sup>16</sup> Of course, this argument has a moral: the long battle will continue until the annihilation of the retreating religious enemy is complete, and until an idealized future with science free of religious interference is achieved. This can be considered as reminiscent of Comte's view of directionality in human history.<sup>17</sup>

In the abstract of a seminal 1987 paper, David C. Lindberg and Ronald L. Numbers pointed to the need to contest the traditional examples, the *causes célèbres*, of the conflict model throughout history:

Recent scholarship, however, has shown the "warfare" thesis to be a gross distortion—as this paper attempts to reveal, employing illustrations from the patristic and medieval periods and from the Copernican and Darwinian debates.<sup>18</sup>

Apart from debunking many false pseudo-historical details in the "conflict" literature, the main straightforward method of confronting such biased historical reconstruction is to realize that these debates were hardly "science vs. religion." As a host of historians have shown, in each of these occasions, there were

Christians and frequently even scientists (as well as persons who combined both trainings) on *both* sides of the argument, as in the case of Galileo:

The Galileo affair [...] was not a matter of Christianity waging war on science. All of the participants called themselves Christians, and all acknowledged biblical authority. This was a struggle between opposing theories of biblical interpretation: a conservative theory issuing from the Council of Trent versus Galileo's more liberal alternative, both well preceded in the history of the church.<sup>19</sup>

However, we would like to go further and argue that by selecting those particular historical examples, an *agenda* is already set that is designed to reach the conclusion that there is a conflict, consisting of a continuous retreat of the positions of Christians, who "got it wrong" on science. Using a different set of historical examples, we suggest that this has not always been the case. As an example, we can recall the founding father of the Big Bang theory, the priest and scientist Georges Lemaître, who, during a visit to the US in 1933, affirmed that he had "no conflict to reconcile"<sup>20</sup> between his Christian faith and his scientific work. In cases like this, no trench seems to be lost by Christians and no retreat found. Similarly, other examples are offered, not with the intention to show that the opposite of the "conflict-retreat" model is the case, but rather, to indicate that the history of science and Christianity relations is more complex than what this model pretends to show.

## Learning from the Past: Unnecessary Family Quarrels

In the hands of a good narrator, the succession of clashes—almost always depicted with two contesting sides, and always with the same side (Christianity) shown defending nonsense views that were destroyed by science—promoted an irresistible moving narrative: in short, a victorious science pushing a defeated religious enemy that would be smashed and would retreat time after time and eventually fade away and disappear.

In support of the science versus Christianity narrative, four episodes are typically described: (1) in the ancient/patristic times, the debate over the shape of the earth; (2) in the medieval times, the denial of the antipodeans; (3) in the modern era, the debate on the movement of the earth; and, finally, (4) in contemporary times, the rejection of evolution. In all

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these cases, we are told that Christianity finally had to abandon its formerly held positions/trenches and retreat, recognizing the authority of science over the disputed ground until a new conflict broke out at the new science/Christianity border.

However, a strong case can be made that more careful research of these oft-repeated historical episodes shows a much more complex picture, one that resists these simplistic and neat battleground realignments.

### *The Ancient/Patristic Age: Christian Flat-Earthers*

The sphericity of the earth was already known by Plato's time in the early fourth century BC and became the standard view during the Hellenistic and Roman periods, enshrined in the geographical and astronomical work of Ptolemy in the second century AD. Although popularizers still believe that the cosmological view of ancient (and even medieval) Christians was that of Cosmas Indicopleustes's flat-earth/chest-shaped universe, we can find in his own time (sixth century) criticisms of his views from Christians: the Alexandrian philosopher/scientist/theologian Philoponus (sixth century), the Armenian scientist/mathematician Anania Shirakatsi (frequently known as Anania of Shirak, seventh century), and the Patriarch of Constantinople Photius (ninth century). Cosmas enlisted several quotations from earlier Christian writers to support his position, mainly connected with the particular theology of the School of Antioch, which by Cosmas's time had become the stronghold of Nestorianism. However, it is interesting that although Cosmas had predecessors, he had hardly any disciples. Even though his texts survived in the Eastern Mediterranean and were copied in the medieval and modern times, it is important to note that they went unnoticed in the West until translated into Latin and printed in the eighteenth century.

The only ancient Christian flat-earth author that was well known in the West was Lactantius, who in the fourth century mocked the sphericity of the earth, although, interestingly, not on theological grounds. Later, Augustine (fourth–fifth centuries) and Isidore (sixth–seventh centuries) were sometimes not completely clear about the sphericity of the earth. However, they neither denied the sphericity of the earth and never defended a flat earth, as did Lactantius and Cosmas, while Cassiodorus

(fifth–sixth centuries) recommended the work of the prominent Roman astronomer and geographer, Ptolemy, to his monks and also mentioned a translation, now lost, by his contemporary Boethius. Starting with Bede (seventh–eighth centuries), a consistent exposition and defense of the sphericity of the earth was clear in Western Europe and made its way into university teaching.<sup>21</sup> Nobody in the Middle Ages took notice of Lactantius's rejection of the sphericity of the earth.

### *The Medieval Age: Augustine against the Antipodes*

Much more complicated problems were posed by the possible existence of the antipodeans (i.e., humans who lived on the opposite side of the earth). While they were an impossible race of people for flat-earthers, the acceptance of the sphericity of the earth did not necessarily imply by itself the existence of dry land on the other side of the earth, and even less that it was populated by "antipodeans." In fact, the idea of a symmetrical continent on the other side of the earth had no scientific or historical basis.<sup>22</sup> Therefore, there were plenty of non-Christian writers who rejected it (such as Lucretius; see also references to this rejection in Pliny, Plutarch, and Lucian) or ignored it as in the case of geographers (e.g., the second-century Alexandrian Ptolemy, who concentrated his efforts in describing the known world: the Euro-Asian-African landmass or "*oikoumene*").

Although the earliest Christian mention of the antipodes by Clement in the late first century seems to have accepted their existence, later when Augustine famously denied the existence of antipodeans, he did so, not in association with a flat earth, as previously Lactantius and later Cosmas, but on the basis of the lack of historical evidence, the speculative nature of the "symmetrical" argumentation for the antipodes/antipodeans, and, finally, on the theological threat of having humans that could not be descended from Adam or Noah. Nothing changed in the scientific/geographical knowledge during the next millennium that could move the argument forward. The issue was resolved on empirical grounds (as it should be) during the age of exploration by Portuguese and Spanish seafarers in the fifteenth–sixteenth centuries. They found both: continents in the antipodes—although not arranged in a symmetrical way as Crates expected—and antipodean inhabitants on them.<sup>23</sup> Interestingly, the discoveries did not imply

any of Augustine's feared theological problems, as it was soon realized by the Spanish Jesuit José de Acosta in the late sixteenth century that humanity remained a single species, with the inhabitants of America and Oceania related to the Asian people.

### *The Modern Age: Galileo and the Inquisition*

Again, in the seventeenth century it is simplistic to speak of Galileo vs. the Inquisition as science vs. Christianity. In fact, in the 1616's condemnation of Copernicanism, the three books condemned were written by churchmen—Nicolaus Copernicus, Diego de Zuñiga, and Paolo Foscarini; and even more tellingly, the publication of Copernicus's *De Revolutionibus* had been urged by several friends of the author, all clerics: Bishop Paul von Middelburg, future Bishop Tiedemann Giese, and Cardinal Nikolaus von Schoenberg, and dedicated to Pope Paul III. On the Protestant side, several people, such as the mathematician Rheticus and the theologian Osiander, contributed to the publication of the book in the city of Nuremberg. Later, in the 1633 trial of Galileo, on the one side, his judges rightly considered themselves supported by the mainstream science of their age and also of the previous two millennia. On the other side, Galileo was supported by theologians and churchmen, including disciples such as the Benedictine mathematician Benedetto Castelli, and a helpful friend, the Archbishop of Siena, Ascanio Piccolomini, who hosted Galileo for several months at his palace after the condemnation by the Inquisition.

As with the antipodeans and Augustine, this was in the context of scientific evidence that was not at all clear at the time of Galileo. Although some of his discoveries such as the phases of Venus had ruled out the geocentric system of Aristotle/Ptolemy, Galileo was never able to completely discard the geo-heliocentric system of the sixteenth-century astronomer Tycho Brahe, a Lutheran who was followed with enthusiasm by the Jesuit enemies of Galileo, and he even declined to discuss it. Galileo thought that he had proven the Copernican system beyond doubt with his particular theory of the tides, which was probably his worst scientific blunder. It took another generation, and Newtonian mechanics, to discard Brahe's overcomplicated system in which all planets circled the Sun that in turn circled the earth, and to establish the Copernican system beyond doubt. As

can be seen from this brief summary (and the quotation above corresponding to note 19), all the people mentioned were Christians, so the confrontation of science vs. Christianity does not help in understanding the situation.<sup>24</sup>

### *The Contemporary Age: Darwin and Christianity*

It is popularly assumed that the only response from Christians to Darwin's 1859 *On the Origin of Species* was that of a bitter and vicious opposition based on theological prejudices. However, detailed study of the contemporary reactions shows us at least three important and often overlooked considerations for the case we are making here.

First, some notable scientists at the time, although Christian themselves, opposed Darwin on real scientific grounds: for example, Adam Sedgwick, Charles Lyell, St. George Jackson Mivart, Louis Agassiz, and Richard Owen. The famous Anglican Bishop Samuel Wilberforce, an amateur scientist himself, has been universally mocked as the prototype theologian talking nonsense in a famous 1860 debate against Darwin's defender, T. H. Huxley. However, Wilberforce based his criticisms on scientific grounds, as can be seen in the critical review of Darwin's book that he wrote before the debate and published the following month. Darwin wrote about it to his friend Hooker: "It is uncommonly clever; it picks out with skill all the most conjectural parts, and brings forward well all the difficulties."<sup>25</sup>

The second conclusion is that Christian responses to evolution were not always negative: Babbage, 1837; Kingsley, 1859; Baden Powell, 1860; and Henslow (Darwin's mentor), 1860;<sup>26</sup> are telling examples. Babbage even proposed a sort of evolution long before Darwin (although we have to keep in mind that Babbage was, as the 1859 Darwin, closer to deism, and that not all Christians who accepted evolution supported Darwin's mechanism, in that it was based on natural selection). As with the previous examples from the medieval age and the modern age, this position has particular merit here, because, contrary to the assumed view, Darwin did not solve all the problems posed by his theory and had to face stiff opposition on purely scientific grounds (it took up to the twentieth century to solve some of these points). In any case, the study of Darwin's correspondence has shown that hundreds of his correspondents

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belonged to the clergy. During the rest of the nineteenth century, several Christian scientists were also supportive of evolution: Asa Gray, Charles Lyell (after initial criticisms), Aubrey L. Moore, James D. Dana, George F. Wright, and Alexander Winchell, as well as various well-known theologians: John H. Newman (Catholic), the Archbishop of Canterbury Frederick Temple (Anglican), Aubrey L. Moore (Anglican), James McCosh (Presbyterian), Benjamin B. Warfield (Presbyterian), Augustus Hopkins Strong (Baptist), and George F. Wright (Congregationalist). Furthermore, in recent times, there have been careful historical studies of what have been called the nineteenth-century Christian “defenders” of Darwin and evolution.<sup>27</sup> And they continued active during the twentieth century (e.g., Teilhard de Chardin, Ronald Fisher, Theodosius Dobzhansky) and into our own days (e.g., Francis Collins, Francisco J. Ayala, Simon Conway Morris).

The third point we would like to stress is that, interestingly, Darwin himself did not show an aggressive anti-Christian position, even though he abandoned his Christian faith years before 1859. By this time he was a deist, believing in a Creator that had ordered the world by laws, as we will see below. Furthermore, while at an advanced age Darwin considered himself an agnostic, he still dismissed the inevitability of a science and Christianity conflict over evolution: “It seems to me absurd to doubt that a man may be an ardent Theist & an evolutionist.”<sup>28</sup> In that view he was followed by none other than T. H. Huxley.<sup>29</sup>

### Aligning the Historical Examples of “Conflict” to Build the Conflict-Retreat Model

The rhetoric of science and faith conflict-retreat has not been built simply by accumulation of historical examples of conflict. Some authors have aligned them according to presumed historical parallels as a first step to the idea of directionality in the process that will be seen as moving toward the demise of religion. It is a known blunder of Freud that Darwin’s removal of humans as the center of biology, by making us descendants of other animal species, parallels Copernicus’s removal of humans’ planet from the center of the universe. According to Freud, these were “two great outrages upon its [humanity’s] naïve self-love.”<sup>30</sup> In fact, Freud viewed himself as inflicting a third blow to humanity’s pride by removing the core of the human personality from

the conscious sphere to the unconscious with his psychoanalytic theory.<sup>31</sup>

This well exemplifies the idea of a continuous conflict with a retreating religion. However, it is an incorrect view of the historical events, not only in their individual description, but also in the way they are forced into a fictitious parallelism and progression. Copernicus did remove the earth from the center of the universe. But that was hardly a degradation for humankind, as the earth was considered from both physical and moral points of view as the bottom of the universe, its lowest and filthiest place. The center of the earth was also the center of the universe and was the abode of the devil and hell.<sup>32</sup> In contrast, with Copernicanism, humans were raised to the sky, to the abode of the planets that moved in perfect and divine circles closer to God. Among those thus welcomed was the new “planet” Earth.<sup>33</sup> Freud was a victim of a historical anachronism (“Copernican cliché”), as in a very short time, between the sixteenth and the seventeenth centuries, a great intellectual mutation took place, reversing the importance given to the “center.”<sup>34</sup>

If evolution challenged fixism in biology by introducing a dynamic history for the living beings, then the parallel challenge to fixism at the cosmological level was not heliocentrism, but the Big Bang theory that ironically developed during the lifetime of Freud. This new cosmology challenged the immutability and the eternity of the world, an idea that went back to Aristotle, and introduced a dynamic history for the universe at large. However, this parallel does not fit well in the conflict-retreat model of science against Christianity: whereas Christianity was used by some to *resist* heliocentrism, Christianity was suspected of *promoting* the Big Bang (see below). This explains why the birth of the modern Big Bang is omitted from the conflict models. What is even more interesting is that if we are to find a common pattern between heliocentrism, evolution, and the Big Bang, it is not in the retreat of Christianity, but in the demise of Aristotelianism (in its geocentrism, its fixity of species, and its eternally static universe).

It would, however, be a travesty of the truth to conclude this section by pointing out only adverse influences of Aristotelianism upon science. In the Middle Ages, Aristotelianism reinvigorated the Christian intellectual culture and stimulated an interest in science. However, modern science needed later to overcome its limitations (see below).

## Challenging the Hidden Agenda of the Conflict-Retreat Model

The overview given above shows how a robust response to the “conflict-retreat” model can be articulated on historical grounds. It is crucially important to mention that this clarification of the historical circumstances should not be used as an excuse to avoid acknowledging the mistakes of the past: there was indeed conflict in these examples. Twenty-first-century Christians should not feel obliged to defend or seek to justify the errors of fellow Christians of past centuries, and lessons must be learned from those mistakes to avoid future episodes of this kind. However, Geoffrey Cantor and Chris Kenny give an important observation: “Our main point is that while numerous conflicts have occurred, the conflict thesis is highly problematic as a general claim about the relationship between science and religion.”<sup>35</sup>

The fact remains that by choosing these particular four historical episodes, the result was that the popular media and some outspoken anti-Christian authors (from the late nineteenth century to present days) set the *agenda* for most contemporary science and Christianity discussions. In this way, they take the initiative and choose a suitable battleground to justify their continuous “retreat” picture. Unfortunately, this conditions the science and Christianity dialogue, in the sense that most debates and propaganda on the historical relations of science and Christianity revolve around these few particular historical cases, even for those authors opposed to the conflict model paradigm. Indeed, Jason M. Rampelt has observed:

It is easy to see how one would be led to believe that there is a conflict if the only information before them were examples where scientific ideas destroyed religious ones (the immortality of the soul, Transubstantiation, physical resurrection, etc.). It has been less common to have examples of the doubly opposite case, that is, where science has not destroyed religion, but instead religion assisted in the growth of science.<sup>36</sup>

While the examples that Rampelt gave are not the ones that we might have chosen for a relevant historical overview, his point is nevertheless well made. We suggest that it is time to replace this paradigm not only by a more- or less-detailed refutation/clarification (as outlined above), but also by opening the windows to contemplate other historical episodes that illustrate an even more complex but more representative account of science-Christianity relations.

## Learning from the Past: How Christianity, under the Guise of a Foe, Did the Work of a Friend for Science

To stimulate further debate, we offer instances in which Christianity does not seem to have “lost” any battle or “abandoned” any trench, inspired by the challenge formulated by John H. Evans and Michael S. Evans in a provocative way:

It is interesting to note that there is no literature (of which we are aware) of science influencing religion in which science is predicted to lose.<sup>37</sup>

By way of argument and illustration, we select four examples: (1) in ancient/patristic times, Augustine’s criticism of astrology—his criticism was mainly based on the idea of human free will and on relevant empirical evidence (like the study of twins); (2) in medieval times, Philoponus’s (and some medieval theologians and scientists) criticisms of Aristotelian physics/cosmology—their criticisms were based on the idea of creation and some particular scientific ideas (anti-Aristotelian mechanics); (3) in the modern era, the influence of Christian theology on the development of the modern concept of the laws of nature; and, finally, (4) in contemporary times, the birth pains of the Big Bang model, rejected by some scientists as the embodiment of the Christian idea of creation.

In all of these cases, the situation differs from what we saw before. However, these are not counter-examples in the sense of Christianity fighting against science and winning any battle. They can be seen rather as Christian faith supporting a matrix of ideas that contributed to the development of science (in particular, in examples 2 and 3), at the same time fighting some previous preconceptions, but ones that today we would not regard exactly as “science,” for example, astrology and Aristotelian philosophical physics (examples 1 and 2). In example 4, the situation is more complicated, since the science of the Big Bang was not created in the name of Christianity, but was a development from Einstein’s general theory of relativity. The problem was rather that some scientists were suspicious of the Big Bang theory as being too close to a Christian model of creation.

It hardly needs saying that we, as those engaged in scientific research for many years and who are enthusiastic about scientific progress, will not make a knee-jerk claim that “science” was defeated or

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retreated in any way. Playing with Moore's famous observation that Darwinism, "under the guise of a foe, did the work of a friend"<sup>38</sup> for Christianity, we suggest that at times, Christianity too, under the guise of a foe, did the work of a friend for science.

### *The Ancient/Patristic Age: Augustine's Anti-astrology*

While it is very common to find Augustine being criticized for his rejection of the antipodeans and for his unclear attitude to the sphericity of the earth, it is not so common to read about his views on astrology in the context of science and faith. Augustine, along with other Christian theologians both before and after him, proposed a well-thought-out series of objections to the popular beliefs about astrology. We should remember that astrology, having its origins in Mesopotamia, became common in the Hellenistic culture and later in the Roman Empire. Astrology was not separated from astronomy at that time, and both were supported by the top scientists of the time.

In spite of the acceptance of astrology and its inclusion in astronomy, some Christian authors, and Augustine in particular,<sup>39</sup> challenged astrology and criticized it on the basis of Christian ideas that can be seen as rooted in the Hebrew Bible and some later Jewish literature, as well as in the New Testament: (1) the defense of free will against deterministic astral fatalism, (2) the view that all things were not supernatural, including planets and stars, and were created under the dominion of the Creator, and (3) the criticism of idolatry, particularly the astral cultic practices. Very importantly, Augustine also relied on empirical arguments, going back as far as Carneades in the third-second centuries BC and other philosophers through Cicero (first century BC):<sup>40</sup> in particular, the divergent fates of twins<sup>41</sup> and the similarity in behavior (e.g., cultural customs) of entire nations that have no simultaneous birth of all their individuals. However, Augustine was able to recognize a material influence of the heavenly bodies on the earth (seasons, tides, etc.). Interestingly, it was the theologian Origen, another influential Christian critic of astrology (although he was willing to give more room for the astral influence on the material affairs on Earth than Augustine, centering his attack on the astral fatalism) who was the first to deploy an innovative scientific argument against astrology using the astronomical concept of the precession of the equinoxes attributed to Hipparchus.<sup>42</sup>

The enduring influence of Augustine on this topic dominated the medieval era, up to the Renaissance, when Giovanni Pico della Mirandola again combated astrology, following the ideas of Augustine.

It went to such a point the strength that he displayed, that the position of Augustine remained as the paradigm of the rejection of the Church to pseudoscience and it provided plenty of argumentation to those who, after him, attacked it again.<sup>43</sup>

Interestingly, and sadly, we have to say that for all the good insights that Augustine's criticisms provided, their general effect was minimal over the centuries on the large majority of the population. Things changed only toward the late seventeenth century, when scientists finally turned their backs on astrology for good (most notably Descartes and Newton)—although at a popular level astrology is still as strong as ever today.

It is an irony that ancient Church Fathers, frequently mocked in the conflict literature as ignorant and superstitious, could be closer at some points to what we regard as "science" today than those who, at the time, were supposed to be the expert "scientists" (e.g., Ptolemy). In ancient times, what today is science, philosophy, and religion—and even, at times, superstition—were all merged into a single body of knowledge, as in the Platonic or Aristotelian systems, and even more confusing in the Neoplatonic thinking of the late antiquity. The problem was that for common Christians, who were not trained in the study of the natural world, it was very hard to discriminate between things that differed. How, for example, could Lactantius know that the sphericity of the earth was sound knowledge and that astrology was not? Both were proclaimed by the top experts of Alexandria. Indeed, the same Ptolemy who wrote the great astronomical treatise *Almagest* and the *Geography*, also wrote the astrological classic *Tetrabiblos*. It is easy for us to see the difference in retrospect, but it had to be very hard for Christians of that era.<sup>44</sup> It needed a Christian scientist/philosopher such as John Philoponus to clarify things. Although he criticized the divinity of the heavenly bodies, Philoponus was able to recognize that other ideas, such as the sphericity of the earth, had sound scientific foundations and should be retained by Christians (see below).



*The Medieval Age:  
Philoponus's Anti-Aristotelianism*

A century after the "revolt of the medievalists," the medieval period is still sadly portrayed as the Dark Ages, reflecting, in fact, our own enduring ignorance about this millennium of history. If there is an area in which the imagination of today's generation believes that this age was particularly dark, it is in relation to science. A recent example is the film *Ágora*, which portrays the life and death, at the hands of Christian extremists in Alexandria, of the philosopher and mathematician Hypatia in 415, indicating that this was the end of ancient science.<sup>45</sup> However, the last glorious days of ancient Alexandrian science were to come in the sixth century with the much less popular figure of John Philoponus.

Educated by pagan philosophers who still taught in Christian Alexandria, Philoponus became the most prominent critic of Aristotle in antiquity. He particularly targeted aspects of Aristotle's physics and metaphysics. Sometimes, in debates, his criticisms that we would consider more philosophical/theological (eternity of the world vs. creation) were made in the name of Christian ideas. However, at other times, Philoponus combined ideas of theological inspiration with philosophical/scientific reflections in order to overturn some key aspects of Aristotelian science, as when he fiercely attacked the perfection of the heavens, defending the view that the heavenly bodies were of the same matter as the earth, comparing the sun with fire, and leading to a certain unification in science. All this scandalized the pagan philosophers, who considered the sun a divine being.<sup>46</sup> Philoponus also held other ideas of a scientific nature, which, although with some precedents among certain Greek scientist/philosophers, were almost forgotten by his time, and continued to be so until the late medieval and early modern periods, such as the possibility of movement in a vacuum and the idea of impetus to explain the movement of projectiles.<sup>47</sup>

To complete an extraordinary career, Philoponus made a vigorous defense of the sphericity of the earth against fellow Christians who denied it. He also mocked those who believed that the heavenly bodies were moved by angels (a Christianized concordist view based on pagan gods or "intelligences" which animated the heavenly bodies). Rather, he argued that it was God's initial creation that set them in movement until today. He even wrote a commen-

tary on Genesis 1, *De Opificio Mundi*, in which he aired his views on science and Christianity.<sup>48</sup>

What was the impact of Philoponus? Most of his books disappeared, but his views were never forgotten. Although his pagan enemies criticized him as a dangerous anti-Aristotelian,<sup>49</sup> his influence survived in Eastern Christianity. In the ninth century, Photius praised Philoponus's commentary on Genesis 1.<sup>50</sup> The Muslims, soon after Philoponus conquered Egypt, preserved some of his ideas and transmitted them to the West, where some of his books were already printed by the sixteenth century.

A controversy among experts has raged in the late twentieth century to determine the extent of his influence on medieval and modern science. This has been a polemical topic with much ideological content fueling some debates. Of particular interest is his idea of "impetus," which resurfaced with some medieval Muslim scientists and also in Buridan at the University of Paris in the fourteenth century, and its potential relation with the modern concept of "inertia" (this latest connection is not generally favored by historians, although it helped to soften the dominance of Aristotle). Furthermore, the application of this idea to cosmology, and even to cosmogony, in the context of the Christian idea of creation, is not so different in Philoponus<sup>51</sup> and Buridan,<sup>52</sup> both of whom criticized the idea of planets moved by "intelligences" or angels.

Regardless of the extent of Philoponus's influence on medieval and modern science, what he did is sufficient for the sake of the argument we are presenting here. He was an example of a remarkable Christian thinker who does not fit the science and Christianity "conflict model." Indeed, it could be argued that his theology, rather than suppressing his science, helped it. It was a tragedy that circumstances prevented his ideas from becoming better known. Instead, medieval Christianity in the West followed Aristotle, who was non-Christian. Following him forced theologians to make difficult compromises in order to "conciliate" his ideas with Christianity. That paradox shows to what an extent medieval Christians, rather than suppressing ancient pagan knowledge, made all sorts of efforts to assimilate it, even against their own interests. Samuel Sambursky writes:

One is tempted to speculate on how the course of the history of ideas would have been changed had the doctrine of Philoponus been accepted by the

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Church instead of the Aristotelian conceptions. Had for instance Thomas Aquinas chosen Philoponus' ideas and incorporated them in the scientific foundations of Christian philosophy, the birth pangs of the Copernican and Galilean revolution would perhaps have been less severe and scientific progress possibly accelerated.<sup>53</sup>

### *The Modern Age:*

#### *Creation and the Laws of Nature*

One of the key pieces of Western European "modern" science, and one that was strongly advocated by the leaders of the scientific revolution of the sixteenth and seventeenth centuries, was the idea of the "laws of nature," still a fundamental notion in science today. Galileo, Kepler, Descartes, Pascal, Boyle, Newton, and Leibniz all shared the belief in the existence of laws imposed on nature, typically prescribed by a rational "lawgiver" God at the moment of the creation of the universe. Nature was docile in following these laws that were the same in any place, at any time, and independent of the human observer. Galileo, for example, explained it clearly in his public letters on science and Christian faith of the early 1610s:

For the Holy Scripture and nature both equally derive from the divine Word, the former as the dictation of the Holy Spirit, the latter as the most obedient executrix of God's commands; ... nature is inexorable and immutable, and she does not care at all whether or not her recondite reasons and modes of operations are revealed to human understanding, and so she never transgresses the terms of the laws imposed on her ...<sup>54</sup>

This idea was inherited from philosophical-theological views that can be traced back to the medieval age, with even earlier precedents: (1) the views held by some Greek/Hellenistic thinkers; and (2) the biblical view of God as the creator and lawful ruler of the universe. One particular verse that summarized this view, and has been cited over and over by Christian authors, is found in Wisdom 11:20b: "You, however, ordered all things by measure, number and weight."<sup>55</sup> Jewish and Muslim scholars shared these ideas with medieval Christians.

It seems that biblical theology on the concept of creation, and the relation between the Creator and its creation, matured during the medieval age and was a pervasive influence in developing the concept itself of the law applied to nature that crystallized later

in the modern era. In parallel, Greek mathematics provided the scientists of the sixteenth and seventeenth centuries with the tools to find these laws. A further development was to fuse all these ideas and to bridge the Aristotelian gulf between natural philosophy and mathematical astronomy to obtain mathematical laws in physics. The idea of a rational/mathematical Creator helped considerably to build that bridge. As the twentieth-century scientist Carl F. von Weizsäcker pointed out:

The concept of exact mathematical laws of nature which was only dimly present in Greek thought gained far greater convincing power by means of the Christian concept of creation ... it was a sort of Christian radicalism which transformed nature from the house of gods into the realm of law.<sup>56</sup>

A recent general study of the development of the concept of laws of nature by historian Peter Harrison points to that more specifically:

That there are laws of nature, however, seems to be a presupposition of science, rather than the outcome of its investigations. In light of this we can ask three important questions about such laws of nature: Why are there laws at all? Why are these laws mathematical? Why are they necessary or, to put it another way, what gives these laws their exceptionless character? In the seventeenth century, when the modern notion of laws of nature was first articulated, the answer to each of these questions entailed reference to God. The very idea of a law of nature, from the moment of its birth, was thus underpinned by theological considerations.<sup>57</sup>

Twentieth-century historians of science have pointed to a larger religious context in which some biblically based ideas contributed to the inspiration and support of modern scientists who often appropriated and customized them for their own goals:

- a desacralization/mechanization view of nature as it belonged completely to the created realm,
- the rationality of the Creator God that implied the rationality of the creation and humanity as part of the creation,
- the contingency of creation by the free will of God that considered the universe, not as a "necessary" being that could be understood by a priori abstract speculative thinking, but as a creation that has to be explored by experimentation in order to discover the precise laws chosen by God to govern it,

- the status of humans as a fallen image of God that implied the optimistic hope of unraveling the laws of nature imposed by the Creator, with a realistic dose of pessimism about human rationality and the suspicion, again, that rationality abandoned to itself was not sufficient to understand nature,
- a desire to recover the wisdom of “Adam” before the Fall that inspired the scientific activity to recover “dominion” over the creation, lost due to the original sin,
- a positive view of manual labor that favored experimental work, contrary to classical tradition, and was inspired by the Bible (in particular among Protestants, also in connection with the principle of the “priesthood of all believers”), and
- a more “literal” reading of the Bible that influenced a more straightforward reading of the “book of nature,” contrary to the traditional “allegorical” reading in which one looked for moral allegories in nature (in particular among Protestants).<sup>58</sup>

If seventeenth-century physicists and astronomers sought to understand the physical universe with the concept of “laws of nature,” it was none other than Darwin who, in the first page of *On the Origin of Species* (1859), at a time when he was no longer Christian but deist, still used the quotes of two Christian philosophers of science, Francis Bacon (1605) and William Whewell (1833), to advance an evolution of life governed by laws, while attempting to preempt criticism on religious grounds.<sup>59</sup>

### *The Contemporary Age: Lemaître’s Big Bang*

The “consensus” view among scientists before the theory of relativity, regarding the history of the universe, was one of static eternity – in some ways, not different from the Aristotelian view – unchallenged on this point by the “classical” Newtonian physics. That was so even though, from a philosophical/theological point of view, Jews, Christians, and Moslems had traditionally been reticent to accept an eternal universe (we should remember here Philoponus), although later Aquinas defended the view that an eternal universe could be compatible with Christian theology.<sup>60</sup> However, as soon as Einsteinian relativity came along, it was clear that it had possible implications for views about the history of the universe. While Einstein himself supported a static model of the universe in 1917, the Russian mathematician

Alexander Friedmann proposed, in papers published in 1922 and 1924, alternative “dynamic” models of a nonstatic universe, including the possibility of an expanding, contracting, or oscillating universe.

In a famous 1927 paper, Georges Lemaître, a Belgian mathematician-physicist, defended again, independently of Friedmann who had died in 1925, a nonstatic universe; he also interpreted some astronomical evidence (red-shift of galaxies) to show that the universe is actually expanding. By 1931, Lemaître concluded that the expansion had a “beginning” or an “origin” in a “primeval atom” which had given rise to everything we now know: matter, energy, space, and time.

What was remarkable was that this proposal initially evoked an incredible visceral reaction, as some, including Einstein, felt a “biblical” flavor in the idea of an expanding universe. Of course, it did not help the early development of the Big Bang model that Lemaître was a Catholic priest. The opposition to the possibility of the Big Bang was fierce in some quarters, as the physicist von Weizsäcker remembered decades later a confrontation that he had had in 1938 with the old Nobel Laureate Walther Nernst regarding the origin of the universe:

He said, the view that there might be an age of the universe was not science. At first I did not understand him. He explained that the infinite duration of time was a basic element of all scientific thought, and to deny this would mean to betray the very foundations of science ... He was just angry, and thus the discussion, which was continued in his private study, could not lead to any result; ...

... I think, a deeply irrational trait of scientism was revealed in his view: the world had taken the place of God, and it was blasphemy to deny it God’s attributes.<sup>61</sup>

The Big Bang model was relaunched at the end of the 1940s by the Russian scientist George Gamow (who studied under Friedmann and later emigrated to the US), only to be confronted with the same kind of criticisms, that this time went much further, to the point of giving rise to a counter-theory: the steady state model that, contrary to the first law of thermodynamics, postulated the continuous creation of matter to keep the density constant in an eternally expanding universe. It was precisely one of the chief advocates of the steady state model, Fred Hoyle, who coined the term “Big Bang” as a kind of insult!

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Probably the most remarkable aspect of this story is that Lemaître himself never used the Big Bang in Christian apologetics. Rather the opposite, he differentiated between the scientific idea of “beginning” for the universe and the philosophical-theological idea of “creation.” He made public his views on science and Christianity relations in an interview to the *New York Times* in 1933 and in a lecture at the Sixth Catholic Congress of Malines in 1936, where he defended the idea—very much in line with what we saw in the previous section—that the main contribution of Christianity to science was

the advantage of knowing that the enigma has a solution, that the underlying logic is ultimately the work of an intelligent being, that, therefore, the problem posed by nature was posed to be solved, and that its difficulty is probably proportionate to our human abilities, be it today or tomorrow.<sup>62</sup>

Later, he famously disagreed with the “apologetic” use of the Big Bang by Pope Pius XII.<sup>63</sup>

In the end, the empirical finding of the microwave background radiation, a key prediction of the Big Bang model, by Penzias and Wilson in 1965, ensured the triumph of the Big Bang. Since then, we have seen, on the one hand, the rise in the “apologetical” use of the Big Bang in favor of “religious” worldviews, worryingly crossing the line that Lemaître did not want to cross. On the other hand, legitimate speculations on pre-Big Bang stages of the universe, or even the possibility of multiverses, are seen with suspicion among Christians. While Christians frequently have a skewed interest in the Big Bang apologetics, these other speculations frequently attract an inflated interest as “liberating” views from the inexorability of a Creator felt by many nonreligious people in the current situation. This is also a biased abuse of science. We should affirm science, and follow it wherever it leads without pressing it into a pre-defined “religious” or “irreligious” mold. Christian scientists should have the confidence to be at the front line in so doing.

### After the Conflict and Anti-conflict Models: Resetting the Agenda on the History of the Science and Faith Relationship

The popular idea of a conflict, a battle between science and Christianity, in which the latter is in a millennial-old retreat and losing ground to the for-

mer, is a modern tale, with a clear anti-Christian axe to grind. This conflict-retreat model, it seems, did not become popular until the final decades of the nineteenth century.<sup>64</sup> R. L. Numbers has traced its beginnings at least as far back as an 1845 article in a US newspaper in which it was stated: “Every new conquest achieved by science, involved the loss of a domain to religion.”<sup>65</sup> However, this idea was already in the intellectual milieu of the Enlightenment.<sup>66</sup>

The conflict model is an oversimplification, since the history of science and Christianity relations shows a much more complex and richer story. The eight examples in the two sets of historical episodes discussed above tell us that these relationships can, at times, take unexpected twists. Therefore, general overarching historical models of friends and foes are inaccurate. If the idea of conflict as the explanation for science and Christianity relations is inadequate, then the use of historical episodes that give the impression of a historical directionality—that is, a Christian retreat under the marching of science, here described as a “conflict-retreat” model—is pure fabrication and manipulation of the evidence. Pointing to the fact “that one and the same scientific innovation could be given both sacred and secular readings,” John H. Brooke has reached the conclusion that “the ‘relations between science and religion’ cannot be reduced to a simple pattern of religious retreat as the sciences advanced.”<sup>67</sup> In fact, one should be more critical and question even the possibility of any generalization, as Brooke himself pointed out years ago: “There is no such thing as *the* relationship between science and religion. It is what different individuals and communities have made of it in a plethora of different contexts.”<sup>68</sup> Recently, Peter Harrison has also questioned the very use of the words “science” and “religion” in generalizations spanning centuries, as these words have had huge transformations in their meanings over time.<sup>69</sup>

If we focus on the examples in the second set of historical episodes described above (pp. 139–42), it is clear that we will get a very different picture of science and Christianity relations than what is usually conveyed with the first “traditional” set of historical episodes (pp. 134–36). Focusing on the second set will paint a much more positive image of Christianity. However, we do not intend to use this image to propose an “anti-conflict” model, only to provide a corrective to the usual bias and to illustrate that a more complex description should be provided.

That is the reason why we cannot accept some of the “apologetic” attempts to deny/minimize the historical debates surrounding the relations of science and Christianity, in particular with thorny issues that, for good or bad reasons, were seen in some historical periods as controversial.

An anti-conflict thesis to advance the cause of Christianity should not be acceptable when bending the historical evidence. This anti-conflict thesis has been justly counted as a myth about science and religion in a recent book.<sup>70</sup> In the past, historians such as Duhem and Jaki, and even Hooykaas, have been criticized for this kind of reasoning. It is true that they emphasized the positive contributions of Christianity to the development of modern science (with some of the historical episodes we noted here in our second set of examples), although it is debatable to what extent their views overstated the limits of both the historical evidence available and sound interpretation.<sup>71</sup> This kind of debate goes beyond the scope of this article, but should remain as an important warning.<sup>72</sup>

Nowadays, historians have moved away from conflict and anti-conflict models<sup>73</sup> to find the complexity of real life, as noted by David C. Lindberg:

Thus the story recounted in this chapter is not one of warfare between science and the church. Nor is it a story of unremitting support and approval. Rather, what we find, as we ought to have suspected, is a relationship exhibiting all of the variety and complexity with which we are familiar in other realms of human endeavor—conflict, compromise, accommodation, dialogue, alienation, the making of common cause and going of separate ways.<sup>74</sup>

We would like to finish by pointing out that although historians have studied intensively in the last century the relations between science and Christianity and most have reached that balanced view, popular media have still to discover these complex interactions. A complete account of science and faith relations must make sense of the peaceful events as well as of the conflicts. It is, we believe, time for a *resetting of the agenda* in the dissemination of the history of science and faith, in particular at popular levels—TV, films, plays, press, educational resources, school textbooks, and others.

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## Notes

<sup>1</sup>Thomas H. Huxley, “Darwin on the Origin of Species,” *Westminster Review*, 2nd ser., 17 (1860): 556.

<sup>2</sup>Ian G. Barbour, *Religion in an Age of Science* (San Francisco, CA: HarperSanFrancisco, 1990), chapter 1.

<sup>3</sup>Alister McGrath, *Science and Religion: A New Introduction*, 2nd ed. (Malden, MA: Wiley-Blackwell, 2010), 50.

<sup>4</sup>*Ibid.*, 1.

<sup>5</sup>*Ibid.*

<sup>6</sup>*Ibid.*, 11.

<sup>7</sup>A very good historical review of how the conflict model has been dismantled among historians during the twentieth century can be found in the introduction to the book by David C. Lindberg and Ronald L. Numbers, ed., *God and Nature: Historical Essays on the Encounter between Christianity and Science* (Berkeley, CA: University of California Press, 1986). The complexity of such relations was defended with many examples by John H. Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge, UK: Cambridge University Press, 1991). See also endnote 73 below.

<sup>8</sup>Alister McGrath, “Conflict or Mutual Enrichment? Why Science and Theology Need to Talk to Each Other,” *Science and Christian Belief* 27, no. 1 (2015): 7.

<sup>9</sup>Colin A. Russell, “The Conflict Metaphor and Its Social Origins,” *Science and Christian Belief* 1, no. 1 (1989): 3, abstract.

<sup>10</sup>*Ibid.*, 4.

<sup>11</sup>*Ibid.*, 7.

<sup>12</sup>John Henry, “Religion and the Scientific Revolution,” in *The Cambridge Companion to Science and Religion*, ed. Peter Harrison (Cambridge, UK: Cambridge University Press, 2010), 39.

<sup>13</sup>From a letter written in 1944 from a Nazi prison cell, Dietrich Bonhoeffer, *Letters and Papers from Prison* (London: SCM Press, 1971), 311.

<sup>14</sup>Peter Harrison, *The Territories of Science and Religion* (Chicago, IL: The University of Chicago Press, 2015).

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<sup>15</sup>Peter Harrison, "That Religion Has Typically Impeded the Progress of Science," in *Newton's Apple and Other Myths about Science*, ed. Ronald L. Numbers and Kostas Kampourakis (Cambridge, MA: Harvard University Press, 2015), 195.

<sup>16</sup>A similar strategy has been denounced in the characterization of Enlightenment, in contrast to the seventeenth century, as promoting secularization, because

the methods and conclusions of the natural philosophers were turned against the authority of the established Churches. *With carefully selected examples, this story can be attractive and plausible.* (Our italics)

from John H. Brooke, "Science and Religion," in *The Cambridge History of Science: Volume 4, Eighteenth-Century Science*, ed. Roy Porter (Cambridge, UK: Cambridge University Press, 2003), 741.

<sup>17</sup>For Comte, history could be viewed in three phases: (1) a theological phase with supernatural explanations for natural phenomena, (2) a metaphysical phase with reasoned explanations using abstract ideas, and (3) positive science giving the right explanations based on the scientific method. For more on that, see John H. Brooke, "Science and Secularization," in *The Cambridge Companion to Science and Religion*, ed. Peter Harrison (Cambridge, UK: Cambridge University Press, 2010), 103–23 (in particular, p. 104). A striking example of this approach can be seen in Anthony Wallace, *Religion: An Anthropological View* (New York: Random House, 1966):

The evolutionary future of religion is extinction. Belief in supernatural beings and supernatural forces that affect nature without obeying nature's laws will erode and become only an interesting historical memory ... belief in supernatural powers is doomed to die out, all over the world, as the result of the increasing adequacy and diffusion of scientific knowledge. (p. 265)

<sup>18</sup>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 (1987): 140. This was a minimally corrected and revised version of a paper previously published in *Church History* 55, no. 3 (1986): 338–54.

<sup>19</sup>Lindberg and Numbers, "Beyond War and Peace," 145. For a recent book with more details, see Ronald L. Numbers, ed., *Galileo Goes to Jail and Other Myths about Science and Religion* (Cambridge, MA: Harvard University Press, 2009).

<sup>20</sup>Duncan Aikman, "Lemaître Follows Two Paths to Truth," *New York Times* (February 19, 1933): 18.

<sup>21</sup>For details on these debates, see Jeffrey Burton Russell, *Inventing the Flat Earth: Columbus and Modern Historians* (New York: Praeger, 1991); Lesley B. Cormack, "That Medieval Christians Taught That the Earth Was Flat," in Numbers, ed., *Galileo Goes to Jail and Other Myths about Science and Religion*, 28–34; Pablo de Felipe, "The Antipodeans and Science-Faith Relations: The Rise, Fall and Vindication of Augustine," in *Augustine beyond the Book: Intermediality, Transmediality, and Reception*, ed. Karla Pollmann and Meredith J. Gill (Leiden, The Netherlands: Brill, 2012), 281–311; Lesley B. Cormack, "That before Columbus, Geographers and Other Educated People Thought the Earth Was Flat," in *Newton's Apple and Other Myths about Science*, ed. Numbers and Kampourakis, 16–22; Louise M. Bishop, "The Myth of the Flat Earth," in *Misconceptions about the Middle Ages*, ed. Stephen J. Harris and Bryon L. Grigsby (New York: Routledge, 2008), 97–101.

<sup>22</sup>The most common model, dating back to Crates of Mallus in the second century BC, included the existence of four isolated land-masses, one in each of the quarters of the surface of the spherical earth.

<sup>23</sup>A classical survey of the evolution of views on the shape of the earth and the antipodes can be found in William G. L. Randles, "Classical Models of World Geography and Their Transformation Following the Discovery of America," in *The Classical Tradition and the Americas*, vol. 1, *European Images of the Americas and the Classical Tradition*, ed. Wolfgang Haase and Reinhold Meyer (New York: Walter de Gruyter, 1993), 5–76. Reprinted in W.G.L. Randles, *Geography, Cartography and Nautical Science in the Renaissance: The Impact of the Great Discoveries* (Aldershot, UK: Ashgate, 2000). See also de Felipe, "The Antipodeans and Science-Faith Relations." For a more popular introduction, see \_\_\_\_, "The Modern Myth of the Medieval Flat Earth," in *Evangelische Akademie im Rheinland* (2017), <http://www.theologie-naturwissenschaften.de/startseite/leitartikelarchiv/flat-earth-myth.html>, accessed on February 16, 2017.

<sup>24</sup>Stillman Drake, *Galileo: A Very Short Introduction* (Oxford, UK: Oxford University Press, 1980); Ernan McMullin, ed., *The Church and Galileo* (Notre Dame, IN: University of Notre Dame Press, 2005); and Annibale Fantoli, *Galileo: For Copernicanism and for the Church*, 3rd English ed. (Vatican: Vatican Observatory Publications, 2003).

<sup>25</sup>The review was published in July 1860 in *The Quarterly Review*, and contained this telling declaration:

Our readers will not have failed to notice that we have objected to the views with which we are dealing solely on scientific grounds. We have done so from our fixed conviction that it is thus that the truth or falsehood of such arguments should be tried. We have no sympathy with those who object to any facts or alleged facts in nature, or to any inference logically deduced from them, because they believe them to contradict what it appears to them is taught by Revelation. We think that all such objections savour of a timidity which is really inconsistent with a firm and well-intrusted faith.

Quoted in John R. Lucas, "Wilberforce and Huxley: A Legendary Encounter," *The Historical Journal* 22, no. 2 (1979): 318. Darwin's letter to Hooker is quoted by Lucas. For more on the Oxford debate, see Sheridan Gilley, "The Huxley-Wilberforce Debate: A Reconsideration," in *Religion and Humanism*, ed. Keith Robbins (Oxford, UK: Blackwell, 1981), 325–40. See also John H. Brooke, "The Wilberforce-Huxley Debate: Why Did It Happen?," *Science and Christian Belief* 13, no. 2 (2001): 127–41.

<sup>26</sup>Henslow criticized the Christian geologist Sedgwick in defense of Darwin during a public lecture in May 1860:

I got up, as Sedgwick had alluded to me, and stuck up for Darwin as well as I could, refusing to allow that he was guided by any but truthful motives, and declaring that he himself believed he was exalting and not debasing our views of a Creator, in attributing to him a power of imposing laws on the Organic World by which to do his work, as effectually as his laws imposed on the inorganic had done it in the Mineral Kingdom.

I believe I succeeded in diminishing, if not entirely removing, the chances of Darwin's being prejudged by many who take their cue in such cases according to the views of those they suppose may know something of the matter.

Letter from J. S. Henslow to J. D. Hooker, May 10, 1860, published in *L. Huxley, Life and Letters of Sir J. D. Hooker*,

vol. 1, p. 512, and quoted here from Nora Barlow, ed., *Darwin and Henslow: The Growth of an Idea* (London: Bentham-Moxon Trust, 1967).

<sup>27</sup>Two “classical” studies are 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, UK: Cambridge University Press, 1979); and David N. Livingstone, *Darwin’s Forgotten Defenders: The Encounter between Evangelical Theology and Evolutionary Thought* (Vancouver, BC: Regent College Publishing, 1984). Many more books and papers have been published on the Christian responses to Darwinism in the nineteenth century, studying specific historical characters and key events. A recent book on the subject is David N. Livingstone, *Dealing with Darwin: Place, Politics, and Rhetoric in Religious Engagements with Evolution* (Baltimore, MD: Johns Hopkins University Press, 2014).

<sup>28</sup>Darwin’s letter to John Fordyce, May 7, 1879, in *Darwin Correspondence Project*, <https://www.darwinproject.ac.uk/entry-12041>, accessed on February 16, 2017.

<sup>29</sup>Thomas H. Huxley, “The Interpreters of Genesis and the Interpreters of Nature,” in *The Nineteenth Century* 18, no. 106 (1885): 849–60, writes,

The antagonism between science and religion, about which we hear so much, appears to me to be purely factitious-fabricated, on the one hand, by short-sighted religious people who confound a certain branch of science, theology, with religion; and, on the other, by equally short-sighted scientific people who forget that science takes for its province only that which is susceptible of clear intellectual comprehension; and that, outside the boundaries of that province, they must be content with imagination, with hope, and with ignorance.

Quoted from the republication in *Science and Hebrew Tradition* (New York: D. Appleton and Company, 1895), 160–61.

<sup>30</sup>Sigmund Freud, *Introductory Lectures on Psycho-Analysis: A Course of Twenty-Eight Lectures Delivered at the University of Vienna*, trans. Joan Riviere (London: George Allen and Unwin, 1922), 240–41. Quoted in Dennis R. Danielson, “That Copernicanism Demoted Humans from the Center of the Cosmos,” in *Numbers*, ed., *Galileo Goes to Jail and Other Myths about Science and Religion*, 50.

<sup>31</sup>Friedel Weinert dedicated a whole book to this idea, *Copernicus, Darwin & Freud: Revolutions in the History and Philosophy of Science* (Malden, MA: Wiley-Blackwell, 2009). He apparently was unaware of the criticism offered in the references in endnote 34.

<sup>32</sup>That was the typical medieval cosmology reflected, for example, in Dante’s *Divine Comedy*, in the early fourteenth century.

<sup>33</sup>The title of a book by John Wilkins defending the Copernicanism is very telling: *A Discourse Concerning a New Planet* (London: John Maynard, 1640).

<sup>34</sup>Danielson, “That Copernicanism Demoted Humans from the Center of the Cosmos,” 51. A longer detailed analysis of this topic was offered before by the same author in “The Great Copernican Cliché,” *American Journal of Physics* 69, no. 10 (2001): 1029–35. This topic has also been discussed by Michael N. Keas, “That the Copernican Revolution Demoted the Status of the Earth,” in *Newton’s Apple and Other Myths about Science*, ed. Numbers and Kampourakis, 23–31.

<sup>35</sup>Geoffrey Cantor and Chris Kenny, “Barbour’s Fourfold Way: Problems with his Taxonomy of Science-Religion Relationships,” *Zygon* 36, no. 4 (2001): 769.

<sup>36</sup>Jason M. Rampelt, “Religion as a Cause in Scientific Research,” *Annals of Science* 67, no. 1 (2010): 121.

<sup>37</sup>John H. Evans and Michael S. Evans, “Religion and Science: Beyond the Epistemological Conflict Narrative,” *Annual Review of Sociology* 34 (2008): 97.

<sup>38</sup>Aubrey L. Moore, “The Christian Doctrine of God,” in *Lux Mundi*, ed. Charles Gore, 10th ed. (London: John Murray, 1890), 99.

<sup>39</sup>There were other previous attacks against astrology by the church fathers, such as Hippolytus in the third century with his *The Refutation of All Heresies*.

<sup>40</sup>The main anti-astrological texts by Augustine are in *Confessions* 7.6,8–10 and the *City of God* 5.1–7. For discussion, see Cristóbal Macías Villalobos, *Ciencia de los Astros y Creencias Astrológicas en el Pensamiento de San Agustín* (Madrid, Spain: Ediciones Clásicas, 2004).

<sup>41</sup>A particularly problematic situation was the birth of twins of different sex that were conceived at the same time and that were different only by a brief difference in the timing of birth; the timing could not affect the sex that was already determined before birth.

<sup>42</sup>Origen, “*Commentaria in Genesisim*,” in *Patrologiæ Græcæ*, ed. Jacques Paul Migne (Paris: J.-P. Migne, 1862), vol. 12, col. 79. On that point, see Stephan Heilen, “(2002–2003): Teaching ‘Astrology in Greece and Rome,’” *The Classical Journal* 98, no. 2 (2002–2003): 201–10 (see footnote 44 and the references within).

<sup>43</sup>Villalobos, *Ciencia de los Astros y Creencias Astrológicas en el Pensamiento de San Agustín*, 162 (our own translation).

<sup>44</sup>Thus, although at times Augustine wrote showing an interest in science, he also wrote, in 397, in relation to astronomy:

Knowledge of this kind in itself, although it is not allied with any superstition, is of very little use in the treatment of the Divine Scriptures and even impedes it through fruitless study; and since it is associated with the most pernicious error of vain prediction it is more appropriate and virtuous to condemn it.

Augustine, *On Christian Doctrine* 2.29.46, trans. W. D. Robertson (Indianapolis, IN: Bobbs-Merrill, 1958), 66. Quoted in Albert E. Wingell, “Dante, St Augustine and Astronomy,” *Quaderni d’italianistica* 2, no. 2 (1981): 124 (our italics).

<sup>45</sup>The film appeared in 2009 and was created and directed by Alejandro Amenábar.

<sup>46</sup>He even suggested that the different colors in the heavenly bodies were related to different temperatures, as in the terrestrial fires. See Samuel Sambursky, *The Physical World of Late Antiquity* (London: Routledge and Kegan Paul, 1962), 158–60.

<sup>47</sup>Some of his criticisms of Aristotle are rooted in the ideas of Xenarchus, who was an Aristotelian philosopher himself, and who already criticized the Aristotelian idea of ether in a lost book entitled *Against the Fifth Element*. In some way, the fifth element of Aristotle was continuously challenged in Antiquity by Platonists, Stoics, and Neo-Platonists who held to the fiery nature of the heavens. However, different from Philoponus, they considered the heavenly fires as beings endowed with a soul and as almost divine entities, and so, in the end, all divinized the heavenly bodies. See Sambursky, *The Physical World of Late Antiquity*.

<sup>48</sup>Ibid.

<sup>49</sup>His better-known critic was his contemporary, the Aristotelian philosopher Simplicius, whose name was later used by Galileo in the *Dialogue of the Two Chief Systems of the World* (1632), to represent a foolish follower of Aristotle.

# Article

## Science and Christianity Conflicts: Real and Contrived

<sup>50</sup>Photius, *Library* XLIII.

<sup>51</sup>Philoponus, *De Opificio Mundi* 1.12, quoted in Sambursky, *The Physical World of Late Antiquity*, 151–52.

<sup>52</sup>Buridan, *Quaestiones super octo physicorum libros Aristotelis* 4.4, trans. Marshall Clagett, *The Science of Mechanics in the Middle Ages* (Madison, WI: University of Wisconsin Press, 1959), 536. The topic appeared again at the end of *Quaestiones in Aristotelis de Coelo et mundo* 2.12, published in Iohannis Buridani, *Quaestiones Super Libris Quattuor de Coelo et Mundo*, ed. Ernest A. Moody (1942; reprint, New York: Kraus Reprint Co., 1970), 176–81.

<sup>53</sup>Sambursky, *The Physical World of Late Antiquity*, 174, 175.

<sup>54</sup>Galileo's *Letter to Castielli* (December 21, 1613). *The Essential Galileo*, ed. and trans. by Maurice A. Finocchiaro (Indianapolis, IN: Hackett Publishing Company, 2008), 104, 105 (reprinted from *The Galileo Affair: A Documentary History*, trans. and ed. Maurice A. Finocchiaro (Berkeley, CA: University of California Press, 1989). Nearly the same arrangement of words are used in the even more famous *Letter to the Grand Duchess Christina* (1615):

For the Holy Scripture and nature derive equally from the Godhead, the former as the dictation of the Holy Spirit and the latter as the most obedient executrix of God's orders; ... nature is inexorable and immutable, never violates the terms of the laws imposed upon her, and does not care whether or not her recondite reasons and ways of operating are disclosed to human understanding; (p. 116)

<sup>55</sup>*The New Jerusalem Bible* (1985). Available online, <http://www.catholic.org/bible/> (accessed on February 16, 2017). There are parallels there with this text in Job 28:23–27:

God alone understands her path and knows where she [the wisdom] is to be found.

(For he sees to the remotest parts of the earth, and observes all that lies under heaven.)

When he willed to give weight to the wind and measured out the waters with a gauge, when he imposed a law on the rain and mapped a route for thunderclaps to follow,

then he saw and evaluated her, looked her through and through, assessing her.

<sup>56</sup>Carl F. von Weizsäcker, *The Relevance of Science* (London: Collins, 1964), 120–21.

<sup>57</sup>Peter Harrison, "The Development of the Concept of Laws of Nature," in *Creation: Law and Probability*, ed. Fraser Watts (Aldershot, UK: Ashgate, 2008), 13 (see also the detailed bibliography in footnote 1 of that paper). See also Peter Harrison, "Laws of Nature, Moral Order, and the Intelligibility of the Cosmos," in *The Astronomy Revolution: 400 Years of Exploring the Cosmos*, ed. Donald G. York, Owen Gingerich, and Shuang-Nan Zhang (Boca Raton, FL: CRC Press, 2012), 375–86 (what seems a draft version of it is available online, <http://www.lse.ac.uk/CPNSS/research/concludedResearchProjects/orderProject/documents/Publications/HarrisonLawsOfNature.pdf>, accessed on February 16, 2017).

<sup>58</sup>A departure point to navigate the immense bibliography on these topics of science and faith in relation with the period of the "Scientific Revolution" can be found in John Henry, "Religion and the Scientific Revolution."

<sup>59</sup>Charles R. Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (London: John Murray, 1859), ii. The quotes were the following:

But with regard to the material world, we can at least go so far as this—we can perceive that events are brought

about not by insulated interpositions of Divine power, exerted in each particular case, but by the establishment of general laws. (William Whewell, *Bridgewater Treatise*)

To conclude, therefore, let no man out of a weak conceit of sobriety, or an ill-applied moderation, think or maintain, that a man can search too far or be too well studied in the book of God's word, or in the book of God's works; divinity or philosophy; but rather let men endeavour an endless progress or proficience in both. (Francis Bacon, *Advancement of Learning*)

In the second edition (1860), a further quotation from Joseph Butler's *Analogy of Religion, Natural and Revealed* was added in between the above two quotations:

The only distinct meaning of the word "natural" is stated, fixed, or settled; since what is natural as much requires and presupposes an intelligent agent to render it so, i.e., to effect it continually or at stated times, as what is supernatural or miraculous does to effect it for once.

<sup>60</sup>William E. Carroll, "Aquinas and Contemporary Cosmology: Creation and Beginnings," *Science and Christian Belief* 24, no. 1 (2012): 5–18.

<sup>61</sup>Carl F. von Weizsäcker, *The Relevance of Science* (London: Collins, 1964), 152ff.

<sup>62</sup>G. Lemaître, "La culture catholique et les sciences positives," in *Actes du VI<sup>e</sup> congrès catholique de Malines*, vol. 5, *Culture intellectuelle et sens chrétien* (Bruxelles: A.S.B.L., 1936), 65–70. Translated in Pablo de Felipe, Pierre Bourdon, and Eduardo Rianza, "Georges Lemaître's 1936 Lecture on Science and Faith," *Science and Christian Belief* 27, no. 2 (2015): 179.

<sup>63</sup>On the interplay of scientific and religious ideas in Lemaître, see Dominique Lambert, *L'itinéraire spirituel de Georges Lemaître* (Bruxelles: Éditions Lessius, 2007) and several chapters in Rodney D. Holder and Simon Mitton, eds., *Georges Lemaître: Life, Science and Legacy* (Berlin/Heidelberg: Springer-Verlag, 2012).

<sup>64</sup>Key works to popularize the "conflict model" were the following well-known books: John William Draper, *History of the Conflict Between Religion and Science* (1874); John Tyndall, *Address Delivered before the British Association Assembled at Belfast* (1874); Andrew Dickson White, *The Warfare of Science* (1876); and \_\_\_\_ *A History of the Warfare of Science with Theology in Christendom* (1896). Their portrait of the historical science and Christianity relationship fits not only the simple conflict model, but also the conflict-retreat model. For more details on this history, see Colin A. Russell, "The Conflict Metaphor and its Social Origins."

<sup>65</sup>"Science and Religion," *Boston Cultivator* 7 (1845): 344. Quoted by Ronald L. Numbers, "Introduction," in *Galileo Goes to Jail and Other Myths about Science and Religion*, 4.

<sup>66</sup>John H. Brooke, "Science and Religion," in *The Cambridge History of Science: Volume 4, Eighteenth-Century Science*, ed. Porter, 739–61.

<sup>67</sup>*Ibid.*, 746.

<sup>68</sup>John H. Brooke, *Science and Religion: Some Historical Perspectives*, 321 [Canto Classics edition, 438].

<sup>69</sup>See Harrison, *The Territories of Science and Religion*.

<sup>70</sup>Noah J. Efron, "That Christianity Gave Birth to Modern Science," in Ronald Numbers, *Galileo Goes to Jail and Other Myths about Science and Religion*, 79–89.

<sup>71</sup>A direct criticism of Jaki's and Hooykaas's historical views on the major influence of Christianity over the development of modern science appeared in the introduction and some chapters of the book by Lindberg and Numbers, ed.,



*God and Nature: Historical Essays on the Encounter between Christianity and Science*. An even harsher criticism of Jaki's views can be found in David C. Lindberg's review of Jaki's 1988 book, *The Savior of Science*, in *Isis* 81, no. 3 (1990): 538–39. Regarding Hooykaas, it is fair to say that the criticisms he received were mainly for his *Religion and the Rise of Modern Science* (1972) that has been labeled as an apologetic in favor of Protestantism (in particular, taking into account that he was Protestant himself). See, for example, the fierce review of this book by Lindberg in *Journal of the American Scientific Affiliation* 26, no. 4 (1974): 176–78. Also see the later exchange of letters between D. M. MacKay and Lindberg in *Journal of the American Scientific Affiliation* 27, no. 3 (1975): 141 and in vol. 28, no. 1 (1976): 48. However, these criticisms do not mention his work emphasizing the role of Portuguese seafarers in the rise of modern science a century before the Reformation: Reijer Hooykaas, "The Portuguese Discoveries and the Rise of Modern Science," *Boletim da Academia Internacional da Cultura Portuguesa* 2 (1966): 87–107; \_\_\_\_, *Science in Manueline Style* (Coimbra, Portugal: Academia Internacional da Cultura Portuguesa, 1980); and \_\_\_\_, "The Rise of Modern Science: When and Why?," *The British Journal for the History of Science* 20, no. 4 (1987): 453–73.

<sup>72</sup>An early discussion of the "apologetic" use of the history of science to foster Christianity can be found in Rolf Gruner, "Science, Nature, and Christianity," *Jour-*

*nal of Theological Studies* 26, no. 1 (1975): 55–81. See other discussions and criticisms of that apologetic approach in John H. Brooke, "HISTORY: The Rise of Science," in *Perspectives, Christian Academic Network*: <http://www.christianacademicnetwork.net/newjoomla/index.php/perspectives/a-i/history/the-rise-of-science>, accessed on February 16, 2017. Edward B. Davis, "Christianity and Early Modern Science: Beyond War and Peace?," *Perspectives on Science and Christian Faith* 46, no. 2 (1994): 133–35. Willem B. Drees, "Worldly Interests: Apologetics, Authority and Comfort," in *Religion and Science in Context: A Guide to the Debates* (London: Routledge, 2009), 11–38.

<sup>73</sup>A historical overview of how the conflict thesis has been undermined during the last fifty years has been written recently by John H. Brooke, "Historians," in *The Idea That Wouldn't Die. The Warfare between Science and Religion: Historical and Sociological Perspectives*, ed. Jeff Hardin, Ronald L. Numbers, and Ronald A. Binzley (Baltimore, MD: Johns Hopkins University Press, in press). Special thanks to Prof. Brooke for this reference.

<sup>74</sup>David C. Lindberg, "The Fate of Science in Patristic and Medieval Christendom," in Peter Harrison, ed., in *The Cambridge Companion to Science and Religion*, 34.

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