Readers' thoughts on science and religion

As a retired physics professor who has made the occasional foray[1] into the topic of science and religion, I thank Tom McLeish for his civilized and hopefully civilizing approach to the discussion ("Thinking differently about science and religion," PHYSICS TODAY, February 2018, page 10). Center stage is too often dominated by militant atheists, willfully ignorant antiscience religionists, and cynical politicians who feed on the fears of a badly educated segment of the public. McLeish eloquently catalogs the harm done by the rabid nondialog from those groups.

I believe there is a silent minority—at least—of capable academics who could bring their expert views to provide a much-needed elevation of the science and religion discussion. The task is daunting for those professionally involved in a single discipline, be it physics, biology, philosophy, theology, or other, but we need to step outside our comfort zone and take back the center ground of discourse on this important topic.

Reference

1. G. L. Baker, *Religion and Science: From Swedenborg to Chaotic Dynamics*, Solomon Press (1992).

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I am a committed student of science and have been a member of the American Physical Society for 40 years. As a practicing applied physicist, I enjoy reading PHYSICS TODAY and the weekly email alerts. I am also a practicing Christian, like William Newsome of Stanford University and Tom McLeish of Durham University.

I have always claimed that if PHYSICS TODAY is to remain open-minded to worldviews other than the ontological naturalist approach,[1] it needs to consider other views such as those of Newsome, McLeish, and John Polkinghorne. Those scientists adhere to a Judeo-Christian worldview in the tradition of Michael Faraday, Johannes Kepler, James Clerk Maxwell, and others.

You have finally done it. Thank you very much for publishing McLeish's commentary "Thinking differently about science and religion" in your February 2018 issue.

Reference

1. See, for example, L. M. Krauss, "Cosmic humility," *APS News* (April 2017), p. 8.

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With some interest I read the commentary by Tom McLeish regarding the influence of Christianity on the works of Isaac Newton, Michael Faraday, and other figures in the development of modern science. I'm certain that those men were engaged in the critical issues of their time, and theology was one of them. But let's remember also the distinction between theology and science: Theology is sacrosanct; science is fluid. Theology resists innovative ideas; science thrives on new data.

Let's also remember the influence of the Inquisition: Nicolaus Copernicus did not publish his findings until he lay on his deathbed and could no longer be subject to the Church's wrath; Galileo Galilei was nearly deemed a heretic and confined to his home for the last years of his life; Giordano Bruno did not believe that man was the center of the universe, one of the reasons he was burned at the stake; and Isaac Newton's theological work was not published until well after his death, because his beliefs were at odds with the Church of England.

I'm not trying to drive "an unhistorical and unrealistic wedge between science and religion," but I think it's important to recognize our differences. In the pursuit of our common work of bettering the human condition, scientists welcome the support of religious organizations, but we must also remember that theology cannot be made into science, and science is not meant to test theology.

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To underline a common thread that connects the scientific and spiritual realms, it is necessary to first examine the scientific method and process from historical and modern perspectives.

At the foundation of the scientific method is the principle that every claim or hypothesis must be proven by experimentation and data. Fortunately, most scientists understand that claims or assumptions not backed by experimental observations can be discarded as patently false or as an impetus to revise the starting hypothesis. However, when Greek philosophers held sway, they widely believed that facts could be discovered simply based on reason.

Alhazen (Ibn al-Haytham) of Iraq, the great polymath who lived from circa 965 to 1040, was the first among scientists to insist that every claim must be proven by critical examination. Alhazen stated, "The duty of man who investigates the writings of scientists, if learning the truth is his goal, is to make himself an enemy of all that he reads and . . . attack it from every side. He should also suspect himself as he performs his critical examination of it, so that he may avoid falling into either prejudice or leniency."[1]

Tom Kibble and Frank Berkshire, two notable physicists, have offered a modern perspective on the scientific process: "Every scientific theory starts from a set of hypotheses, which are suggested by our observations, but represent an idealization of them. The theory is then tested by checking the predictions deduced from these hypotheses against experiment. When persistent discrepancies are

found, we try to modify the hypotheses to restore the agreement with observation. If many such tests are made and no serious disagreement emerges, then the hypotheses gradually acquire the status of 'laws of nature.' "[2]

The "set of hypotheses," then, is the starting point, the initial thought process, of any scientific effort. That starting point is based on a blind trust that a given set of observations is amenable to being understood in terms of principles, laws, or theories that may emerge.

Having briefly explained the scientific process, we now consider the spiritual world. The Holy Qur'an states that an essential quality of a believer is to "believe in the unseen" (2:4), implying the belief in an all-capable yet unseen God. Mirzā Ghulām Ahmad (1835–1908), prophet and founder of the Ahmadiyya Muslim Community, explained the importance of belief in the unseen: "When upon seeing smoke from a distance a man reckons that there must be a fire where there is smoke—at that stage his state of knowing is only a conjecture—unless he advances in the direction of that smoke and puts his hand in those flames, until that time his knowledge cannot acquire the character of detailed and certain knowing. In fact the condition of such knowledge is what is referred to as faith."[3]

Herein lies the similarity between the scientific process and the pursuit of spiritual enlightenment—that the very genesis of each hinges on a belief in the unseen. The unseen in the scientific process includes, for example, the unknown workings of a cell or the way in which the gravitational force unites with three other forces in nature. Challenges arise in both scientific and spiritual realms in the quest to understand the unseen. Just as our understanding of biology and medicine have not shut the door on death or produced treatments that never fail, similarly the pursuit of spiritual progress can be met with setbacks, such as the misuse of religion or one's inability to completely understand his or her connection with God.

Rather than a conflict between science and religion, I see a shared intellectual tradition that underpins both spiritual and scientific pursuits.

References

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2. T. W. B. Kibble, F. H. Berkshire, *Classical Mechanics*, 5th ed., Imperial College Press (2004), p. 1.
3. W. A. Sayed, "Faith in Science," www.alislam.org/library/articles/Faith-in-Science-201002.pdf, p. 6, and ref. 2 therein.

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As I see it, the most fundamental split—an irreparable one—between science and religion is that religion embraces a supernatural order and genuine science, as opposed to pseudoscience, does not.

From a scientific and objective standpoint, there is simply no way that any purportedly supernatural entity or order can be demonstrated or proven. No scientific methodologies for such exist, nor any credible instruments or measuring techniques. The rejoinder that those things can't be measured merely reinforces the argument that they are no more fit for scientific inquiry than the astrologer's claim of "malefic" influences of Mars at an infant's birth.

Because a supernatural domain cannot be approached in any scientific or objective way, then by my reckoning it doesn't exist. One need not even deny its existence because to all intents the supernatural entity becomes logically unnecessary or redundant. It doesn't help us make scientific predictions or explain natural phenomena—say, coronal mass ejections or auroral substorms. Any doubt about the possibility of knowing something must be vastly multiplied for the supernatural domain.

Pope Francis, while he acknowledges Darwinian evolution, is still not prepared to accept the wholly naturalistic process dependent on natural selection—mutation. Instead we read, "Evolution in nature is not inconsistent with the notion of creation, because evolution requires the creation of beings that evolve," and "He [God] created human beings and let them develop according to the *internal laws* [emphasis added] that He gave to each one so they would reach fulfillment."[1] However, if the role of random evolutionary forces is neglected and the creation of "souls" is given prominence, then the door of inquiry is left open to supernatural agents.

To a genuine scientist—whether biologist, chemist, or physicist—that ought to be totally, emphatically unacceptable because it basically thumbs its nose at true scientific inquiry.

In my article "The God factor" in the March 1990 issue of *Astronomy* magazine, I point out that science selectively excludes problems for which no practical method of inquiry exists. The supernatural falls into that category: It is neither measurable nor verifiable. Such an entity is regarded as an "uncaused cause," but as mathematician John Allen Paulos noted, "If everything has a cause, then God must too, and there is no first cause."[2] Eliminating a first cause—that is, supernatural cause—eliminates the need to posit a realm populated by supernatural beings that can supposedly interact with our world.

What McLeish asks us to do is to look the other way as we embrace a faith-based system, which may occasionally be correct about one scientific discovery or another but nonetheless accepts superstition at its core. Worse, a faith-based system beckons us to give a pass as it upholds a domain for which there isn't a scintilla of evidence, and in which agents and dogmas can be invoked in detrimental ways anytime a religion decides—for example, in condemning artificial birth control or outlawing abortion.

Is it possible for religion and science to coexist? Possibly, but only if religion is diluted to the point that it's devoid of all supernatural memes, agents, and explanations. Otherwise, all bets are off and we are left with embracing glorified superstition, and a deleterious form at that, able to use its fantasy agents to subvert objective human inquiry.

References

1. N. Squires, "Pope Francis says Big Bang theory and evolution 'compatible with divine Creator,'" *Telegraph*, 28 October 2014.
2. J. A. Paulos, *Irreligion*, Hill & Wang Books (2008), p. 43.

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As a physicist who is also trained in history and sociology of science and who has been regularly reading PHYSICS TODAY for more than 30 years, I cannot let Tom McLeish's Commentary on science and religion go unanswered.

Far from "thinking differently," McLeish rehashes the usual confused discourse on the topic. For example, he never defines the term "religion." As a consequence, the author mixes religion as a social institution with the personal beliefs and convictions of scientists. All natural philosophers from the 17th century to late in the 19th century had a personal belief in a kind of god, creator of the universe. But that is a different matter from the social conflicts that have emerged at different times as religious institutions worked hard to impose what they considered the proper understanding of nature. Those conflicts were many; they involved first astronomy, then geology and biology, and, later, history of religious texts and of the origins of humans.

The second confusion at the root of McLeish's argument is between what is and what should be—that is, between fact and norm. That there should not be conflict between science and religion is what we all may want, but such conflicts have existed in various societies and times, and there is no reason to believe they won't continue. The basic logical and philosophical distinctions between what is and what ought to be have been known at least since John Locke and David Hume, but McLeish still writes that "it is, sadly, possible to invent conflict where none needs to be." It should not have happened that—among many—Nicolaus Copernicus, Johannes Kepler, Galileo Galilei, Bernard de Fontenelle, Francesco Algarotti, and even the priests Henry de Dorlodot, John Zahm, and Dalmace Leroy saw their work censured or put in the Catholic Church's index of prohibited books. And it should not have happened that Alexander Winchell lost his job at Vanderbilt University because of his talks on evolution. But those things did happen.[1]

Instead of suggesting that such historical conflicts are "hurting science," we must examine why those events occurred. And to understand them, we must talk about religions as social institutions that have varying amounts of power to limit scientific freedom. Some readers may well agree with McLeish that the literal reading of texts such as Genesis is an "aberration away from orthodox Christianity," but such believers do exist, and they do their best to limit scientific research: Recall President George W. Bush's 2001 decision to limit federally funded research on stem cells.

The best way to think differently about science and religion is first to realize that the personal beliefs and religious convictions of scientists have never been the root cause of those historical conflicts. The conflicts were—and still are—the result of a clash over the social authority of two important institutions: organized religions that want to control the behavior of citizens in the name of a creator and science as a collective organization that pursues the empirical and naturalistic explanation of nature. Negating a reality that one dislikes is not the best way to change it for a better one.

Reference

1. For more about books censured by the Catholic Church between the 17th and 20th centuries and other limits on scientific thought, see Y. Gingras, *Science and Religion: An Impossible Dialogue*, P. Keating, trans., Polity Press (2017).

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▶ **McLeish replies:** I am grateful for the invitation to respond to these letters. I should remark, first, on the overall nature of additional responses sent directly to me. Colleagues had suggested that I be prepared for much negative feedback. Of the more than 100 readers—from high school students to emeritus professors—who emailed me, all were positive; they agreed that moving beyond a narrative of conflict was important in the public understanding of science. Many physicists with a faith commitment wrote of their experience that science and faith are mutually coherent and reported that the article had stimulated ways of expanding their thinking and had affirmed the necessity of doing so.

Of the letter writers to PHYSICS TODAY, Gregory Baker and Kenell Touryan represent the voice of the wider personal correspondence. Baker is also surely right about a "silent minority" who could and ought to be less silent about constructive engagement between science and religious communities.

Ray Stefanski's letter, on the other hand, is an excellent example of the asserted but repeatedly unevidenced narrative of conflict that I suggest has long had its day. His point that theology is "sacrosanct"' and "resists innovative ideas," in stark contrast to science, is one I have heard many times—despite its

being simply wrong. The Reformation in the 16th century, the explicit theological motivation for experimental science in the 17th, and the radicalism of liberation theology in the 20th are just three examples of the historical development of theological ideas. The data are inconsistent with a "frozen theology" theory.

Stefanski then catalogs the alternative facts, largely invented by John William Draper and Andrew Dickson White in their 19th-century polemical works, that shape much of the misinformed narrative of the relationship of science and theology today. I address those arguments with references to real historical scholarship: The Vatican actually encouraged Copernicus to publish[1] and found *De revolutionibus orbium coelestium* largely unproblematic; the Galileo affair is much richer and more complex than the standard one-liner—and it is essential to understand that all the personalities involved were believers;[2] Bruno was not executed for his scientific ideas;[3] and Newton's unorthodox theological ideas refute Stefanski's first point.[4] His final comment is well taken: No one is claiming that theology can be "made into a science"; however, I suggest that it informs the narratives we live by and the values and virtues by which we do science.

Abdul Naseer Malmi Kakkada is right to remind us of the need to move from claims based on authority to those evidenced by experiment and observation; he also rightly highlights the essential role of Islamic natural philosophers in the development of science in the medieval period. He makes a helpful point, as well, about the way scientific ideas are conceived and developed. When a scientific idea is new, it is usually half-formed and formally contradicts at least some data. Nurturing our infant scientific ideas and having faith in them is important if they are to develop to maturity and withstand the robust criticism of our peers.

In terms of Kakkada's notion of a "shared intellectual tradition," I have found it helpful to compare the Christian life (in my own case) with the early stages of a scientific investigation—that is, gathering evidence and adjusting the hypothesis—rather than with the later stage of resolving the hypothesis into a set of established theories. For further discussion, see my 2014 book *Faith and Wisdom in Science*.

Philip Stahl points out that science restricts its inquiries to topics for which its tools are effective. It isn't clear whether he is advocating the logical-positivist position that scientific statements are the only meaningful ones, but he comes close; I don't know how my personal experience of love could be "approached in any scientific or objective way," but I would not deduce in consequence that it doesn't exist. The real fallacy that Stahl brings up, however, is the characterization of religion as fundamentally embracing a supernatural order and thus being irreconcilable to science. Allow me to unravel some reverse logic here.

Although religious tradition naturally requires discourse about personal and corporate encounters with divinity in order to make sense of history and experience, it is far less concerned with the supernatural than with life, hope, and justice here on Earth. So it is not right to declare a parting of the ways at the start. Nor is it appropriate to complain that experience and exploration of God is devoid of rationality. Stahl's presentation of two alternative and fundamentally competing worldviews derives not from a knowledge of history or theology, but ultimately from the Draper and White

polemics, whose alternative history introduced that perspective. For a more nuanced reading of history, see reference 5.

Stahl's letter also manages to capture the misinformed philosophy of most late-modern confusions, especially neo-atheist ones, about the nature of deity.[6] "Everything has a cause," says Stahl, quoting Paulos, quoting Thomas Aquinas, quoting Aristotle. He omits the reminder that the argument of no infinite causal recursion was used by Aquinas, who ran it in reverse as an argument for theism.

As for "superstition," 8th-century English Christian scholar Bede advocated the study of science as a God-given faculty to counter superstition![7] Let's let that sink in. That science can set a person free from some types of fear was a favored insight of Marie Curie, yet it finds its roots in Christian tradition.

I am grateful for the corrective words of Yves Gingras. I did not mean to convey that there is no conflict ever in practice between religious and scientific institutions and individuals. Far from it—conflicts can and have been created by both. I don't apologize for stressing the narrative evidence that conflict is not necessary, since the vast majority of written and broadcast material we encounter leans the other way and enlists a good deal of the falsehood repeated from Draper and White.

Church authorities do accrue power and have at times very sadly sought to use it to suppress truth and discovery. For example, Copernicus's book was indeed eventually "provisionally-banned" pending corrections, albeit more than 70 years later. Such suppression also happens today, tragically and unacceptably, in churches that insist that their young people disbelieve the evolutionary biology that they learn in school. Gingras is correct that the word "religion" has now, and has had in the past, several meanings, which tend to confuse the discussion. The same, of course, is true of the word "science."[5]

It's essential, especially for young people and students, that we drop false stories that unnecessarily create obstacles to the enjoyment and understanding of science. In our book *Let There Be Science: Why God Loves Science, and Science Needs God* (2017), leading UK high school physics teacher David Hutchings and I have attempted to put some of the scholarship I've referred to above into a readable form. The message is not to urge either a theist or atheist position. In the modern world, those positions clearly represent individuals' choices based on their experience, investigation, and reflection. But two points are essential: First, one's choice in that matter is not tied to the activity and findings of science; and second, churches and communities of faith can and must recognize and celebrate science as a gift, not a threat.

References

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