

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 censored 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 unevicenced 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

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