In an attempt to verify these accounts and to inform authorities of Danilov's deteriorating health (he suffers from hypertension), both CIFS and APS President George Trilling wrote to President Vladimir Putin. CIFS also has sent inquiries to the mayor of Krasnoyarsk and the governor of Krasnoyarsk region. To date, no response has been received to any of these inquiries. Suggestions and help from the physics community for immediately resolving this urgent and troubling case are welcome. They may be sent to me at the e-mail address below; I will bring all such correspondence to the attention of the members of CIFS.

Danilov was admitted to the hospital in mid-June after suffering a heart attack. It is reported that he is chained to the bed. This information has been verified by Danilov's attorney and his wife.

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Kuhn's Paradigm and a Scientific Border Dispute

In his review of my book *Thomas Kuhn: A Philosophical History for Our Times*, Kenneth Wilson (PHYSICS TODAY, March 2001, page 53) proves to be more Kuhnian than perhaps Kuhn himself. But since I argue that Kuhn's paradigm-based theory of scientific change was largely a bad idea that nevertheless suited its time, it should come as no surprise that Wilson misses the spirit of much of what I wrote.

To be sure, Wilson compliments my book for its account of the philosophy and sociology of science as "pre-paradigm" sciences. He seems to think that these fields are about to embark on a Kuhnian trajectory to normal science, which he takes to be a good thing. However, my point was that, insofar as philosophy and sociology of science have adopted Kuhn's model as their own, they have lost much of their critical edge and have become increasingly obtuse to the changing social character of scientific work.

But would Wilson want to see these fields become paradigms? A strict Kuhnian line implies that professional philosophers and sociologists would be the sole arbiters of what counts as adequate philosophical and sociological research about science. Just as a paradigm-defining moment in the history of science came when the experimentalist Robert Boyle successfully excluded the metaphysician Thomas Hobbes from the Royal Society, so, too, philosophers and sociologists of science would need to exclude scientists from their ranks. And just as we no longer expect experimental scientists to know much about metaphysics, so, too, we would come not to expect philosophers and sociologists of science to know much about science.

So the strict Kuhnian line is simply the "hard line" adopted by many science studies scholars in the ongoing "science wars." I doubt that Wilson would want to follow Kuhn's logic this far, since it would render the philosophy and sociology of science irrelevant to the conduct of science. But if philosophy and sociology of science should remain permeable to scientists, then scientists must also keep their borders open to philosophical and sociological investigation.

Getting beyond Kuhn requires more than mutual accommodation or, as Wilson suggests, a role for science studies as the public relations wing of the scientific community. Rather, it involves a concerted effort to disarm the institutional and intellectual borders that currently divide practitioners of the natural and human sciences. The first step, as I argue in *Thomas Kuhn*, would be to reintegrate the study of history, philosophy, and sociology into the natural science curriculum. For Kuhn, this would be the ultimate step backward in science. But then Kuhn also denied that the sciences were united in a quest to understand a common reality that transcends any particular paradigm.

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WILSON REPLIES: Nothing in Steve Fuller's book persuaded me that Kuhn's theory was a "bad idea." My own assessment is that details of Kuhn's analysis need revision, as stated in the review, but that, overall, Kuhn's ideas remain of major interest. I found Fuller's descriptions of the pre-paradigm phases of the philosophy and sociology of science to be his major accomplishment, even if that was not Fuller's intent.

For me, the most intriguing suggestion in Fuller's letter is his assertion that, if a paradigm emerges for the philosophy and sociology of science, one consequence would be the exclusion of scientists from these two fields. I agree that he has a serious concern; I disagree that the exclusion is likely to occur. If a paradigm emerges, I expect that initially only a small number of very talented individuals would be able to make much sense of it, just as has been the case with the major paradigms in science that Kuhn discussed in his book *The Structure of Scientific Revolutions* (U. of Chicago Press, 1962). But I also expect that one or more very talented scientists would be among those individuals, based on the quality of work that scientists such as John Ziman are already producing in the related field of science studies. See, for example, Ziman's recently published book *Real Science* (Cambridge U. Press, 2000).

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Science, Religion, Templeton Prize

With colleagues in philosophy and religious studies, I constructed a cosmology course that won a prize from the Templeton Foundation. In general, as Mark Friesel suggests (PHYSICS TODAY, February 2001, page 82), the prospect of a cash award will entice participation. The Templeton Foundation's funding of interdisciplinary study in science and religion is no exception. However, I don't believe Friesel needs to be too concerned with the integrity of the participants. Templeton awardees are probably no more likely to compromise their scholarly standards than are NSF grantees. In my case, for example, our cosmology course was constructed before we had even heard of Templeton's program for courses in science and religion.

Interdisciplinary study of religion and science can be a legitimate intellectual exercise. Here are a couple of quotes that I have used to spark classroom discussion. Enjoy!

> Many scientists are deeply religious in one way or another, but all of them have a certain rather peculiar faith—they have a faith in the underlying

simplicity of nature; a belief that nature is, after all, comprehensible and that one should strive to understand it as much as we can. Now this faith in simplicity, that there are simple rules—a few elementary particles, a few quantum rules to explain the structure of the world—is completely irrational and completely unjustifiable. It is therefore a religion.[1]

If a "religion" is defined to be a system of ideas that contains unprovable statements, then Gödel has taught us that, not only is mathematics a religion, it is the only religion that can prove itself to be one.[2]

References

1. S. Glashow in *The Quantum Universe*, coproduced by WETA-TV and The Smithsonian Institution, Washington, DC (1990).
2. J. D. Barrow in *Between Inner Space and Outer Space*, Oxford University Press, New York (1999), p. 88.

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As a Templeton Prize winner, I wish to reply to the letter of Mark Friesel, not to defend myself, but to defend the Templeton Foundation against the accusation that the prize "is a bribe . . . that has successfully lured more than one well-known scientist into becoming a spokesman for the right-wing religious cause." The foundation is well aware of the harm that has been done in the past by religious intolerance and fanatical belief and does not discriminate between Christianity and other religions. Templeton prizes have been awarded to Jews, Muslims, Hindus, and Buddhists as well as to Christians. The main purpose of the foundation is to change religion from a regressive to a progressive force in the modern world. This is a goal that all scientists, whether or not they are religious believers, can share.

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Mark Friesel states that Christians are "not permitted" to question the miracle of the virgin birth. He is mistaken. Some Christians are encouraged to question anything and everything;[1] they seek truth at all costs.

Certainly it is reasonable, on the principle of economy of hypothesis, to try to explain as much as possible without invoking miracles, but failure should be squarely faced. As an example, to my knowledge, decades of effort have as yet produced no rational material explanation of the origin and macroevolution of living organisms on Earth. As honest and rational scientists (whether atheist or not), we should, therefore, be open to the idea of considering nonmaterial explanations.

Also, Friesel omits the important fact that faith plays a central role in science[2] as well as in religion: The use of the experimental method in scientific investigations involves faith in the constancy of Nature.

References

1. A. Lunn, G. Lean, *Christian Counter-attack*, Blandford Press, London (1969).
2. M. Born, *Natural Philosophy of Cause and Chance*, Dover, New York (1964).

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I agree with Mark Friesel's contention that the Templeton Prize has the potential to corrupt the motives of otherwise well-meaning individuals. Neither scientists nor religious leaders can afford to have their work vitiated by avarice or hunger for fame.

However, Friesel's letter also underscores a deeper issue: Since the time of Galileo's excommunication from the Roman Catholic church, religious organizations and scientific leaders have been divided regarding how to understand the universe. This rift often manifests itself through ongoing animosity between science and religion. I believe this is primarily due to misunderstanding. Both disciplines seek truth, but with fundamentally different purposes. Science tries to reveal the physical laws that govern our world. Religion seeks to elucidate why we live and who we are. Scientists, and students like myself, understand a great deal about what governs the universe, but why does it exist?

Trouble comes when people make religion their science or science their religion.

Because much of the world's population is religious, scientific progress depends on our ability to create harmony between these two viewpoints. I do not suggest that we seek experimental evidence for the existence of God—that is incompatible with the basic assumptions of both science and religion. The two disciplines are immiscible, but they are also compatible. As parallel avenues for the investigation of truth, each has its place and fulfills specific needs of humanity. I see no contradiction between the notion of a God who was responsible for the creation of the universe, and scientific understanding of the Big Bang and evolution.