

Science, Church and State

Today I had a most remarkable, and disturbing, phone call

by Richard E. Lenski (1995)

Before I tell you about that call, let me explain *why* I want to tell you. As a scientist, I know my profession often does an inadequate job of helping the public to understand our work and why it is worthy of support. As a United States citizen, I feel compelled to speak out against those increasingly loud voices who denounce science while claiming that only *their* religious beliefs are the truth.

I am a university professor, and I study the evolution of microorganisms such as bacteria. Bacteria reproduce so quickly that it is possible to study their evolution in the laboratory. The bacteria in my experiments undergo many generations every day, and each small flask holds millions of individuals. Over the course of months and years, my students and I can see actual changes in the physical appearance and genetic make-up of the bacteria. These changes demonstrate the evolutionary principles of randomness – different mutations occurred in different flasks – and adaptation by natural selection, whereby these bacteria became better suited to the environment in the flasks.

A few weeks ago, *The Chronicle of Higher Education* ran an article on our experiments. Today I received a call from a "Washington reporter" who said he had read the article and wanted to talk to me about the effect of Federal budget cuts on science in America. Some of my research is funded by the National Science Foundation (NSF), which helps to pay for supplies and wages for student assistants and technicians. I answered his questions about the level of funding (which is public information) and the nature of our research.

The caller suddenly switched gears. He challenged the idea that such research should be supported by the government. He asserted that science is funded by "pork-barrel" politics. In fact, research proposals to the NSF are subjected to rigorous scientific review. Most are rejected; many others are deemed worthwhile but cannot be supported because of limited budgets.

I saw now that the caller had deliberately misrepresented his purpose, but I also knew that this was an important issue. As citizen and taxpayer, he – and you and I – support scientific research. If this research is so important, he argued, why isn't it supported by private industry? Many companies do support scientific research, especially in medicine, agriculture, and engineering. But a company can only support research that is likely to yield a profit in a short period of time.

Federal agencies, like the NSF, pay for most research that seeks to answer more basic questions. What is the nature of matter? How old is our universe? How do complex organisms develop from a single cell? How do our brains work? How many species are there on our planet? Where did they all come from? Such science is sometimes described as "curiosity driven" and I can attest to that motivation. But curiosity-driven science is also essential to the health of our economy, our bodies and our planet. After all, the discovery of new principles must precede any practical application that uses those principles. Now, for any of you who don't appreciate curiosity for its own sake, this may seem like a good argument for government funding of *some* projects, but isn't evolution just a bit *too* impractical?

Quite the contrary. Right now, we have very serious problems coping with disease-causing bacteria that are resistant to our antibiotics, and with crop-destroying insects resistant to our pesticides. These resistant organisms pose a real threat and impose a tremendous cost. What's more, they *evolved* from chemically-sensitive ancestors within the last few decades! We really do need to learn more about how evolution works.

As I tried to discuss these issues, the caller became more and more belligerent. It was obvious that this "reporter" was *not* taking pains to write down what I was saying, because he constantly interrupted me. I was concerned that I would be misquoted in anything he might publish. I asked him whether he was taping this phone call – which would be illegal without my consent. But he slickly evaded my question, asking why I wanted to know, etc.

My caller switched gears one more time. He told me that he was a fundamentalist Christian and believed in the absolute and literal truth of the Bible. He then demanded to know my own religious beliefs. I told him it was none of his business! He insisted it was, because tax dollars supported my research. I reminded him of our Constitution's separation of church and state; he changed the subject again.

The final insult came when this caller told me that I was a "sinner" for my beliefs – despite my insistence that I would talk with him only about my scientific views and not my religious beliefs. At this point, I hung up the phone as he continued his harangue. I realized that I was the recipient of a harassing phone call from the religious right.

Does the physical evidence that the Earth is not at the center of the universe challenge a belief in God? How about the geological evidence that our planet is several billion years old? Or the evidence from both fossils and genes that humans are descended from more primitive forms of life? Such evidence has caused some people to change their religious beliefs, but others feel that these findings are entirely compatible with their religion. Some scientists have even suggested that these discoveries may reveal the beauty and subtlety of the natural universe and its laws as God created them.

Whatever we as individuals may believe, science is concerned only with natural forces in the material universe. Science is incapable of proving or disproving the existence of a supernatural God. In our work as scientists, we assume that what we observe obeys natural laws – and that no supernatural force plays "tricks" with our experiments. This applies to all fields of science, from nuclear physics and inorganic chemistry to molecular genetics and evolutionary biology.

The practice of science does not depend on whether an individual scientist is religious, nor on which religion he or she might choose to accept. For someone to suggest otherwise shows a profound misunderstanding of the nature of science as well as a disturbing absence of religious tolerance. The citizens of the United States have prospered greatly because of their scientific enterprise and their tolerance for diverse beliefs. As a nation, we must continue these traditions.