

common evolutionary origin:⁴ the human brain's conception of time, its unique capability of creating images of the future and making long-term predictions, the innate urge to do so, and a feeling of satisfaction when it is done.

References

1. A. Lazcano, *Science* **310**, 787 (2005).
2. R. J. Russell, W. R. Stoeger, G. V. Coyne, eds., *Physics, Philosophy, and Theology: A Common Quest for Understanding*, Vatican Observatory, Vatican City (1988), pp. 14, 29.
3. W. Heisenberg, *Physics and Beyond: Encounters and Conversations*, A. J. Pomerans, trans., Harper & Row, New York (1971), p. 82.
4. J. G. Roederer, *Information and Its Role in Nature*, Springer, New York (2005), pp. 163, 220.

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As a chemical physicist I have followed both chemistry and physics for more than 40 years. In recent years, I have noticed a gradual change in the language of physics. Physicists now are more willing to accept that our knowledge may be limited and to admit that we will probably never be able to answer the major questions of existence that also fall in the realm of religion. In fact, some modern physics theories are beginning to require a certain belief system of their own and could be criticized as to whether they remain science (Burton Richter discusses this in his Reference Frame in *PHYSICS TODAY*, October 2006, page 8). This change has been noteworthy and has provided for a healthier self-analysis by many physicists. However, I was a little shocked by the Opinion piece by Murray Peshkin, a theoretical physicist. It indicated, unfortunately, that the old arrogance of physics is still very much alive. It appears that a theoretical physicist is needed to present both Darwin's theory of evolution and religion to the general public to help resolve any conflict and emphasize that the theory is supported by extensive experimentation. Peshkin apparently has never read Fred Hoyle's book *Mathematics of Evolution* (Acorn Enterprises, 1999), which severely criticized the theory and outlined its limitations. Many chemists and physicists have great trouble with Darwin's theory, especially if one tries to extrapolate it to higher life forms or modify it from an evolutionary concept to one of creation. If scientists cannot agree no wonder the general public is confused. I am still amused that even NASA justifies

some of its programs in the belief that creation of life forms is some simple mechanism and with luck will be easily found somewhere else.

To extrapolate from nothing to the incredibly complex DNA-replicating molecule takes an even greater leap of faith than any religion. If I give a talk to a general audience, I emphasize the severe limitations of science and our lack of true understanding. We have good models and theories and have made great advances, but we still confuse data and the accumulation of knowledge with true understanding. Moreover, because of our apparently superior knowledge, some people now accept science as their religion.

The older I get, the more I recognize the great commonality between the sciences and the arts. In reality, science is no more than the technical branch of the arts. For example, who was more talented: Albert Einstein, Ludwig van Beethoven, Leonardo da Vinci, or William Shakespeare? Each discipline requires ingenuity, creativity, and insight. One would hope also some wisdom but that is an area that still needs more emphasis and is not taught or easily acquired.

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Being a PhD geneticist and a creationist, I was disappointed that Murray Peshkin did not give references for the statement "Hundreds of Darwin's predicted missing links have been found." I find quite the opposite. The scientific turmoil behind whether birds are descendants of dinosaurs is but one example of how the popular press does not accurately reflect the disagreements in the scientific community. As Storrs Olson, curator of birds for the Smithsonian Institution, stated in a 1999 letter to *National Geographic*,

The idea of feathered dinosaurs and the theropod origin of birds is being actively promulgated by a cadre of zealous scientists acting in concert with certain editors at *Nature* and *National Geographic* who themselves have become outspoken and highly biased proselytizers of the faith. Truth and careful scientific weighing of evidence have been among the first casualties in their program, which is now fast becoming one of the grander scientific hoaxes of our age—the paleontological equivalent of cold fusion.

If Peshkin could provide some solid references, it would add credibility to his opinion.

Also, equating Charles Darwin's and Gregor Mendel's theories does not work for me. Mendel observed inheritance patterns and developed a theory of Mendelian genetics, which is verifiable in simple reproducible experiments. His theory of genetic inheritance provides the mechanism for natural selection, which is observable. Darwin, on the other hand, postulated that natural selection would extend to species changes and therefore provide the mechanism for macroevolution. I have never found that to be observable. As traits are favored through selection, genetic information is reduced, not increased. Man's very behavior exhibited through gene conservation activities is evidence that genetic information is not gained, as required for macroevolution to occur, but is actually lost.

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Peshkin replies: We scientists need to teach the nonscientist public what science is about: what an established theory is and how we know when it's right; how the requirement of falsifiability serves as a fence between science and nonscience, defining the limitations of science and insulating it from attacks based on pseudoscience; and especially why science, correctly understood, does not threaten most people's religious beliefs.

Michael Matthews says that the approach I advocate is condescending to the religious. It has not been so perceived by the several dozen people who have approached me after my public lectures or in response to my writings for the public. A majority of the many who identified themselves as people of religious faith, from high-school students to the former president of a theological seminary, started the conversation by saying that they appreciated my respect for religion. Nevertheless, Matthews's warning should be heeded. People can be hypersensitive to unintended slights about their religion, especially slights from scientists. If you do not have respect for people's religion, you should not be conducting such discussions; if you do have that respect, you should make it obvious from the outset. You don't have to pretend to share your audience's religious beliefs; you only have to respect them. Otherwise, people will tune you out.

Matthews misrepresents the fence I described. It surrounds—and is defined