

Incompatibility of science and religion

The ongoing dialog in the Letters section regarding science and religion has been most interesting (see, for example, *PHYSICS TODAY*, January 2008, page 10, and February 2007, page 10). However, I think the writers are missing the point. The two disciplines start with different and incompatible perspectives. What I would call true science is totally objective. Whatever a scientific investigation turns up, even if it overthrows previous work, must be accepted as long as the findings pass all tests. Religion starts with truths that cannot be falsified and must be accepted. Any scientific evidence to the contrary is therefore false.

In the multiplicity of religions and sects, there is room for people to believe in various aspects of science. For example, the Big Bang can be seen as an act of divine creation billions of years ago, with no later divine interference in the evolution of the universe. Or everything humans see can be taken as having been created in six days a few thousand years ago. Regardless, religious people accept divine intervention and reject any attempt to refute whatever degree of intervention they believe in. True science holds that religious beliefs must be subject to testing and that they so far have not been proven.

Religious people, whether lay or clergy, can and do make contributions to science. But in the larger sense, the religious cannot claim to be true scientists. As long as belief can trump scientific findings, religion and science can never be compatible. Therefore, I recommend that scientists and religious people work together wherever possible, but that scientists continue to vigorously promote their findings and to expose what we believe to be false or misleading information. On the other hand, scientists should recognize that religion, with its matters of life, death, and morality, is grounded in individual and collective belief and not subject to scientific argument.

I would also like to say a word about "theory." I think it is time we dropped the word; it carries too many interpretations. We should speak of "models" instead. Implicit in the word is the notion that models are snapshots of current knowledge, are subject to change, and must be constantly tested. Even evolution can be considered a model.

In this way we may separate science from the immutabilities of religion.

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Truth and the media

As a high-tech entrepreneur, I found both the Union of Concerned Scientists' book *A Scientist's Guide to Talking with the Media* and Stephen Maran's review of it quite on point (*PHYSICS TODAY*, October 2007, page 58). Varying perspectives can explain media outcomes that are very different from scientists' expectations, even though scientists and journalists both seek the truth.

The scientific community has accepted a cultural standard that judges its product, knowledge of nature, in as methodical and objective a manner as possible by requiring repeatability of measurement and observation. On the other hand, media organizations judge their product, truth in human affairs, in a subjective manner that reflects the outlook of the publisher or owner. The success of that media product is typically evaluated by the success of advertising to a targeted subpopulation.

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Credit for relativity theory

The letter by Vladimir Krasnopolsky in the July 2007 issue of *PHYSICS TODAY* (page 8) touches on a topic long ago settled by the experts and the broad consensus of physicists.

It is, of course, a fact that all theories have precursors. That is true of the special theory of relativity. But it does not alter the fact that this theory in its essential fundamentals is due entirely to Albert Einstein. As my teacher, Wolfgang Pauli, emphasized in his celebrated 1958 review,

Einstein's paper of 1905 was submitted at almost the same time as [Henri] Poincaré's article and had been written without previous knowledge of [Hendrick] Lorentz's paper of 1904. It includes not only all the essential results contained in the other two papers, but shows an entirely novel, and much more profound understanding of the whole problem.¹

That judgment is the solid basis for Einstein's authorship of the special theory of relativity. According to Max Born, "Lorentz . . . probably never became a relativist at all, and only paid lip service to Einstein at times, to avoid arguments."²

The issue was thoroughly examined again 75 years later in Abraham Pais's authoritative biography of Einstein³ and was settled in Einstein's favor. It is amusing to recall that Pais examined and dismissed the claims made by Edmund Whittaker, who referred to "the relativity theory of Poincaré and Lorentz."

Einstein's reaction to Whittaker's writing was instructive. He wrote, "I do not have to read the thing. . . . If he manages to convince others, that is their own affair."

References

1. W. Pauli, *Theory of Relativity*, G. Field, trans., Pergamon, New York (1958).
2. M. Born, *The Born-Einstein Letters: Correspondence Between Albert Einstein and Max and Hedwig Born from 1916-1955*, Walker, New York (1971), p. 198.
3. A. Pais, *"Subtle Is the Lord . . .": The Science and the Life of Albert Einstein*, Oxford U. Press, New York (1982).

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Hertz, Einstein, and the photoelectric effect

The article "Geodetic Laser Scanning" (*PHYSICS TODAY*, December 2007, page 41) includes a sidebar (page 42) titled "Albert Einstein and Geodesy." That otherwise informative box contains an error. In the last paragraph, the first sentence states that Albert Einstein discovered the photoelectric effect; that is not true. Einstein explained the photoelectric effect by introducing early quantum ideas, but Heinrich Hertz discovered the effect in metals experimentally in 1887. (Earlier observations of similar effects in nonmetals were made by Alexandre Becquerel in 1839 and Willoughby Smith in 1873; both can be explained by Einstein's theory.)

In defense of the authors, I would agree that Einstein's explanation of the effect paved the way for the later development of devices based on a correct understanding of it.

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