

The Survival of Science: What Scientists Must do
to Defuse the Evolution Controversy

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2005 was a banner year for science, but much to the chagrin of scientists and politicians across the United States. When we weren't being bombarded with photos of broken levees along the Gulf Coast we were saturated with reports of rising temperatures and melting ice caps, and terrified by the dire predictions of a bird flu-infested world. And when a year that started with an inaugural promise for a new understanding between politics and science drew to a close amidst the perplexing South Korean stem cell fiasco, one thing was perfectly clear: there is a strong disconnect between the world of science and the reality of modern society. More than anything else, 2005 was a year in which science and society seemed to collide on the front pages of newspapers almost daily. Sadly, the one common thread weaving these various collisions together was rampant confusion. Politicians and scientists clashed on issues of global warming and hurricane preparedness, with the public caught in the middle wondering who to believe and what role science should play in policy decisions. For a world superpower leading the global economy and investing billions of dollars of public money in science research, such basic ignorance of science, its methods, and its vast potential is troubling, indeed.

Ignorance is a dangerous path to tread, but fortunately even the most egregious misunderstandings can be remedied through education. The United States boasts one of the finest university systems in the world, as well as publicly-funded schools that guarantee all residents a free education until they reach adulthood. Upon this backdrop, common sense dictates that teaching citizens about the ways of science should be relatively straightforward, if not downright easy. But, as with many things that seem so simple, American science education is more complex than meets the eye, a chaotic jumble of under funding, misplaced priorities, and continued controversy that makes even

the most complicated scientific paper easy reading. On top of this, science education is increasingly being twisted and distorted by those with political and cultural agendas, so much so that what remains is barely rooted in science. Such pitiful public science education inevitably gives rise to a fundamental misunderstanding of what science *is*: how scientists gather facts, formulate hypotheses, and choose between competing ideas. And once science is misunderstood it is easy to conflate it with politics, and difficult to comprehend all of the wonderful possibilities that it offers. Simply put, American citizens are suffering because they do not have basic scientific literacy.

This scientific illiteracy rears its ugly head nearly every day, when some science-related public policy issue is debated in the newspapers and in the halls of Congress. A cursory glance at the newsstand reveals many specific examples of pressing public policy decisions involving science. Debates over carbon emissions, cleaner fuel technologies, oil drilling, stem cell research, AIDS prevention, storm preparedness, and the bird flu immediately come to mind. In each case, there are basic scientific facts and a multitude of published studies that must enter into the political debate. However, in our current national climate each and every policy decision involving science is bound to raise controversy and confusion. Politicians and lobbyists will inevitably pick and choose the science they wish to believe, and sometimes distort scientific findings to suit their needs. Immediately this raises a problem. With a basic lack of scientific literacy, many citizens are simply unable to understand these political and scientific debates. If we as a society want to tackle this problem, we must do a better job of teaching science. However, as is clear, relying entirely on our flawed public education system is at best dangerous, and at worst damning. We must find an alternative method of science education, and nobody is

more qualified to lead the charge than scientists themselves, who can communicate with the public and articulate the relevance of science. The obvious place to start is the interminable debate over Darwinian evolution, a sticky conundrum that has unfortunately misrepresented and often vilified science. Indeed, in my view, all attempts to seriously teach science to the American public—and thus make science an integral aspect of public policy decisions—rest on defusing the evolution controversy.

On the face of things, the world has changed drastically since Charles Darwin first articulated his theory of evolution by natural selection in 1859. Slavery was ended in the United States, two world wars were fought and Nazism was defeated, man traveled to the moon, and the Rolling Stones released 30 albums. But, for a variety of reasons, many still find Darwin's ideas unpalatable. For nearly 150 years evolution has had its dissidents, but for the first time in American history this faction has considerable political and economic clout. This clout is so great that, despite overwhelming scientific evidence supporting the reality of evolution, the escalating "intelligent design" movement has gained considerable support in recent years.

Intelligent design (sometimes referred to simply as "ID") has a long and elaborate history embedded in the antievolution, Biblical literalist tradition of William Jennings Bryan and other creationists of ages past. Having been defeated numerous times in court cases across the country, many creationists regrouped in the late 1990s under the banner of "intelligent design," a deceptive religious movement that carefully disguises itself as a scientific alternative to Darwinism. While traditional creationists harped on the literal accuracy of the Bible, this new movement simply holds that certain aspects of the universe are so complex that they cannot be understood by science, and thus must have

been created by a higher power. This higher power is never explicitly named, but that it is nothing other than the Christian God is quite obvious. Several drawbacks of this viewpoint are easily apparent: dismissing certain things as too complex to be understood stifles human discovery, and several religious leaders have lamented that ID constrains and trivializes God. Despite these problems, however, many school boards across the country rushed to debate ID, and one Pennsylvania school in particular attempted to mandate its teaching. In late December, a federal judge ruled that teaching ID amounts to promoting religion, and thus is unconstitutional. But, it would be foolish to think that the debate is over.

The never-ending evolution controversy interests me as a Christian who studies evolutionary biology, a point I'll return to later. Long before I decided on a career in science, however, I was dead set on studying history and political science. On the first day of my U.S. history class in high school, my teacher passionately explained that we must study history for one primary reason: so we can learn from past successes and mistakes. When it comes to debates over evolution, scientists would be wise to do just that. Thinking that creationism had been soundly defeated after the Scopes Trial, American scientists in the late 1920s made the mistake of ignoring fundamentalist religious movements and antievolution sentiment. Perhaps the words of eminent biologist Ernst Mayr, a 1931 immigrant to the U.S., summed it up best: "I thought that (the Scopes Trial) was the end of fundamentalist attacks on evolution. I believe my interpretation was widely shared by American evolutionists. As a result not much time and effort was spent by evolutionists in America to prove the fact of evolution and refute the claims of fundamentalists." (Larson 1998:228). Today, scientists must learn from the

mistakes of Mayr's generation and present the process and progress of science to the public, fully engaging them by showing the everyday relevance of evolution and at the same time understanding and respecting religion. This is a heavy task, but it can—no, must—be done. For me, *all* future attempts to integrate science and public policy directly rest on the ability of scientists to articulate their work and educate the public. And, in no case is this more important than the evolution controversy.

Scientists must endure years of education and training to even earn the right to compete for tenure, but by no means are scientists all-knowing. Thus, there are several essential facts that scientists must grasp in order to competently communicate with the general public. This is especially true of the evolution controversy. First and foremost, scientists must understand the nature of antievolution sentiment. Debate has raged over evolution for 150 years and won't likely die down soon, despite what the federal courts have to say. In fact, the impressive mutability of creationism in the face of numerous damning court decisions should serve as a lesson. Stripped to its bare essentials, creationism (and hence ID) has little to do with science. Instead, antipathy towards evolution is rooted in a broader cultural framework. Many Christians of a certain religious disposition see evolution as problematic and dangerous for two reasons: first, it conflicts with the literal Biblical account of creation, and second, it promotes a naturalistic and materialistic viewpoint that is seen as corroding society. Few creationists even bother to understand the scientific evidence for evolution, because this evidence doesn't matter. In fact, some creationists might not even care if evolution is true or false—they just don't want a materialistic worldview to gain acceptance, for fear that society will be destroyed by the flames of immorality, corruption, and sin. Thus,

scientists cannot constrain the debate to the realm of Galapagos finches, *Drosophila*, and the fossil record. While laying out the factual support for evolution is critical, scientists must also articulate how evolution can participate in a larger worldview that helps humans understand their place in the universe.

Second, scientists need a basic understanding of religion and its history, whether or not they practice it. A scientist ignorant of religion is guilty of the same failing as the religious believer who doesn't understand science. Unfortunately, this is an area in which many scientists fail, and in my opinion is perhaps the most important reason that many religious believers are suspicious of science. Scientists like Richard Dawkins, a fundamentalist atheist who uses his science writing to advance his extreme materialistic worldview, is no different than Pat Robertson or Jerry Falwell. In both cases, these figures fail to understand the basic nature and goals of religion and science, respectively. Whether or not a scientist chooses to believe in God or a religion is not important. What is critical, however, is that scientists understand that religion is important to many people, and often shapes their politics and opinions. Demonizing religion in the name of science will only speak to the converted, and will never win over a religious audience. Worse yet, such actions will serve to further alienate science and religion, an estrangement that many scientists and religious figures see as more artificial than real. While it is true that evolution will never be compatible within a strict Biblical framework, many Christian denominations—including the largest in the world, the Roman Catholic Church—fully integrate evolution and an ancient earth into their theology. Thus, it is clear that an overarching “war” between science and religion does not exist, only between some fields of science and some religious sects. Although polls consistently show that over half of

Americans don't accept the basic tenants of evolution, only a fraction of these people are extremists wedded to a fundamentalist Biblical view. The vast majority are those with some religious misgivings that don't fully understand the science behind evolution. The crucial task is reaching out to this crowd, respecting their religion, and making it clear that their faith and modern science can not only exist side-by-side, but play off of each other to form a fuller understanding of the world and our place in it.

With a full grasp of the true roots of creationism and an understanding of religion, scientists can then concentrate on what comes easiest: the factual support for evolution and the importance of this theory as applied to our modern world. It is this latter aspect that especially must be stressed. Modern scientists take to heart Dobzhansky's comment that "nothing in biology makes sense, except in the light of evolution." A geneticist studying cancer-causing mutations, a pharmaceutical technician developing a new antibiotic, and an ecologist mapping the degradation of an ecosystem are all linked by evolutionary theory. Scientists must articulate to the public all of the wonderful things that the study of evolution has enabled, from vaccines and new drugs to effective conservation strategies and agricultural animal breeding. Unfortunately, too many people see evolution as a process of the past, some irrelevant force confined to deep time that gave rise to dinosaurs and mammoths. Because it is difficult to see species evolve before our eyes, evolution suffers from what one paleontologist calls a "crisis of relevancy," which dismisses evolution as an "abstract concept that has little bearing on humans." (Sampson 2004:108). If scientists really want to drive home the fundamental reality of evolution, they must show the public not only those facts that support natural selection, but also how it critically applies to our modern, volatile world.

These are what I believe to be the three keys to effective communication with the general public regarding evolution: knowledge of the roots and aims of creationism, an understanding of religion and its importance to people, and the need to demonstrate the relevance of evolution in the modern world. These are all things that teachers and educators can do to some extent, but nobody is more qualified than the scientist himself. It is the scientist that is on the front lines day in and day out, observing, connecting, hypothesizing, comparing, and testing. No more can scientists hide away in their labs, running experiments while disconnected from the rest of society. Like never before science is under attack, and the very people that practice science must stand up and defend their profession. But, simply defending science or evolution is not good enough. Scientists must dynamically interact with the general public, and articulate the relevance of science and make it clear that not only can science coexist with religion, but that it must coexist in order to form a complete worldview. The mistake of Mayr's generation cannot be repeated. We must learn from history, and in the process alter history. There is no need for pessimism—we can, in fact, weed out creationism and establish the general scientific literacy that the American public sorely needs. If not, our society will only continue down the path of ignorance, and any hopes of integrating science and public policy will never be realized.

As mentioned above, the ongoing evolution controversy interests me as a scientist and a Christian. I was raised in a strong Christian household, but my parents taught me the importance of traditional morality and modern scientific knowledge at the same time. For them, there was no conflict, and even after nearly a decade of seriously studying science I remain a practicing Roman Catholic. In fact, I fully believe that my strong

upbringing in both religion and science has given me a rich and fulfilling understanding of who I am and how I fit in with the world around me. I fully realize that not all scientists, and not all religious believers, will be able to so easily integrate these two very different avenues of thought. But this can't hold us back. Our society must reconcile science and religion, because if we don't then we can never fully understand either.

While religion is often personal, science is a communal enterprise that is highly relevant to our modern world. The American public—and the citizens of the world as a whole—must understand basic science, no matter their religion or other personal views. A failure to do so will have catastrophic consequences, whether it be the drowning of coastal cities due to global warming, the spread of a deadly virus that we cannot contain, or continued death and suffering due to AIDS. Sound public policy cannot exist without sound science, and sound science can never be integrated with policy without scientific literacy on a global scale. I believe that my background gives me an ideal opportunity to dynamically bring science to the general public, and this is something I wish to devote my career to. But, I can't do it alone. The scientific community must take up this fight—truly the “good fight”—or else science as we know it will suffer, and society will suffer even greater as a result.

BIBLIOGRAPHY

- Anderson, L. 2005. The tough life of a Kansas biology teacher. *Chicago Tribune*, December 30, 2005.
- Anderson, L. 2005. Intelligent design flunked. *Chicago Tribune*, December 21, 2005.
- Anderson, L. 2005. Evolution of intelligent design. *Chicago Tribune*, October 30, 2005.
- Associated Press. 2005. University of Kansas class seeks to debunk intelligent design. November 22, 2005.
- Associated Press. 2005. Intelligent design not science, Vatican says. November 18, 2005.
- Colling, R. 2005. Christians can't afford to oppose evolution. *Chicago Tribune*, November 27, 2005.
- Dodson, P. 2005. Fight the good fight—what paleontologists need to know about religion. *Journal of Vertebrate Paleontology*, 51A.
- Gould, S.J. 1999. *Leonardo's Mountain of Clams and Diet of Worms*. Three Rivers Press, New York, NY.
- Grossman, R. 2005. ID dilutes the drive to discover, invent. *Chicago Tribune*, November 27, 2005.
- Kotulak, R. 2005. Stem cell advances a fraud. *Chicago Tribune*, December 20, 2005.
- Larson, E.J. 1998. *Summer for the Gods: The Scopes Trial and America's Continuing Debate over Science and Religion*. Harvard University Press, Cambridge, MA.
- Manier, J. 2005. Teachers can walk a creative middle road. *Chicago Tribune*, November 27, 2005.
- Mayr, E. 2002. *What Evolution Is*. Basic Books, New York, NY.
- Miller, K.R. 1999. *Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution*. Harper Collins Publishers, New York, NY.
- Moore, J.A. 2002. *From Genesis to Genetics: The Case of Evolution and Creationism*. California University Press, Berkeley, CA.
- Pope John Paul II. 1996. Truth cannot contradict truth. Address to the Vatican Pontifical Academy of Sciences, October 22, 1996.
- Pope Pius XII. 1950. *Humani Generis*. Vatican Encyclical, issued August 12, 1950.
- Sampson, S. 2005. Evoliteracy: establishing the educational relevancy of evolution through connections with ecology and the web of life. *Journal of Vertebrate Paleontology*, 108A.
- Smocovitis, V.B. 2005. Evolution isn't merely a theory; it's a fully developed science. *Chicago Tribune*, March 13, 2005.
- Terry, M. 2005. Evolution education in the time of the wedge. *Journal of Vertebrate Paleontology*, 121A.