

Draft: "Why We Should Teach About Creationism in Science Classes"

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Still trying to track down some references (and pointers from those in the group would be appreciated). References are linked on the web site version (see bottom of the main page).

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Why We Should Teach About Creationism in Science Classes

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"Dealing with Creationism in Astronomy",

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Draft

In recent years, the proponents of teaching "Intelligent Design" and its precursor "Scientific Creationism" have redoubled their efforts to impose their pseudo-science in the classrooms of our public schools.

Yet, in all the turmoil created by these battles in the school boards and courts, there is one solution that has been overlooked, or perhaps avoided. In the true spirit of turning a problem into an opportunity, if we wish to improve the critical thinking skills of our students, "Scientific Creationism" provides many examples of a pseudo-science that can be analyzed in detail to teach students why it just doesn't work.

My particular field is astrophysics, and over the past ten years I've examined a number of claims by the "Young Earth Creationists" (YEC) who object to modern cosmology's evidence that the universe is on the order of 14 billion years old. Creationist "theories" such as claims that the speed of light was significantly higher in the recent past (to solve the light-travel time of seeing galaxies billions of light-years away in a less than ten-thousand year old universe) have errors so obvious that they can be addressed by students with a high school (or advanced middle school) understanding of physics or mathematics. YEC claims using general relativity might have to be dealt with in undergraduate to graduate-level physics classes, but nonetheless will

better prepare future physicists for dealing with these issues. Many amateur and professional scientists have analyzed creationist claims and the results are available through a number of resources such as Talk.Origins.

In college level physics classes, many Creationist claims can be examined directly. Gigabytes of astrophysical data are already freely available online to support such a project. For primary and secondary education, curriculum developers need to be able to convert the analyses of pseudo-science claims into workable lesson plans and then deliver the resources and necessary training to the schools and teachers. This is not an easy task, but the price of NOT doing it is the loss of American leadership in science and engineering. I have done some work from the astrophysical side of the problem, but geologists and biologists need to take a similar approach.

Advocates of "Creation Science" and "Intelligent Design" fear such an approach. While it's not received much attention, some have publicly admitted that their 'theory' (actually a hypothesis) has had no success in the laboratory. That's why they fall back to "teaching the controversy" as it is an easy way to avoid this problem while they try to maneuver other components of their agenda into the classroom (this is why the Discovery Institute describes it as the "Wedge Strategy"). "Intelligent Design", as a real scientific theory, failed a century ago, and belongs in the dustbin of failed theories with the luminiferous aether and the plumb-pudding model of the atom. The claim that "Evolution is a theory, not a fact" is just playing games with words. Electromagnetism is a theory. Quantum mechanics is a theory. Even gravity is a theory. I've yet to see anyone demonstrate a useful better antenna design, a better semiconductor component design, or develop a trajectory to send a spacecraft through the Solar System without using these "theories". We've sent spacecraft to distant regions of our own Solar System, but I've yet to see a Biblical geocentrist compute the trajectory to send a spacecraft to the Moon or Mars. This might be an important issue for human crews in the not-to-distant future.

Creationists like to claim that we can't "know" what's happening or what happened in distant regions of the cosmos or far back in time, yet physicists have done this from the time of Galileo with great success. Newton's theory of gravity was explaining how planets and stars move in empty space nearly three centuries before machines and humans could travel in space to test it. Einstein's revision to that theory was explaining observations in the distant cosmos years before some of the predictions could be tested in Earth-based experiments and decades before it's effects were incorporated into the Global Positioning System (GPS). Quantum theory was explaining atomic behavior in rarefied regions of distant space and the incredible high-density structure of stellar remnants such as white dwarf and neutron stars decades before the conditions could be even partially reproduced in the laboratory, even before it became a key component in

the development of microelectronics. When astrophysicists discovered a deficit in the number of neutrinos emitted from the Sun in the late 1960s, called the Solar Neutrino Problem, Creationists touted this as evidence that the Sun was not powered by nuclear reactions and the 4.5 billion year age of the Sun was not possible. Real scientists checked their calculations and concluded that a neutrino mass (up to that time, the neutrino was assumed to be massless), far smaller than was possible to measure at the time, could explain the deficit. In recent years, we've been able to confirm this effect in Earth-based experiments. We've even discovered properties in the atomic nucleus based on cosmological constraints. Cosmology isn't just something that happens 'out there' – it has often provided guidance on physical phenomena years before controlled laboratory experiments were possible. There have been no similar successes or utility from Creation "science" or "Intelligent Design". Cosmology has real implications for our technology and life on Earth.

Since the dawn of the atomic age in WWII, science has enjoyed the grateful generosity of taxpaying public. Scientists have used this generosity to unlock the tiniest secrets of the atom to the most distant regions of the cosmos and has generated useful products and methodologies in the process.

In spite of all this advancement, the American scientific community has left behind an intellectual vacuum in the education system that crackpots and con-artists have been all too willing to fill. The scientific community has ignored this growing problem and now it threatens to infect our society. Our nation would not be the first to take this self-destructive path. Stalin dismissed Darwinian selection in favor of Lysenko's theories on adaptation, allowing the political process, instead of the scientific process, define the science. When they applied Lysenko's ideas to Soviet agriculture, crop failures ensued. This was the reason for the U.S. grain sales to the Soviet Union in the 1970s. Their resulting inability to feed their own people was a contributor to their collapse. The Nazis despised "Jewish Physics" and touted their own "Aryan Physics". The famous "Einstein Letter", advocating the development of the atomic bomb, was sent to FDR in August of 1939. At that time, all the research with nuclear energy weren't much more than tabletop experiments. The only indication that the energy release would extrapolate to levels necessary for an atomic bomb were the successes at that time of explaining the energy production in the Sun and other stars. "Aryan Physics" touted the superiority of experimentalists over the 'extrapolations' of theorists, and (thankfully) may have hindered their own thinking on such a weapon .

And we don't need to limit the debunking to creationism. There are a plethora of pseudo-science claims with their adherents, many who post their ramblings on the World Wide Web. A perusal of Crank dot Net yields a cornucopia of pseudoscientific claims from free-energy scams to "proofs" that relativity is wrong, with a broad range of

sophistication. Teaching students how to analyze these claims with real science gives them a valuable tool not only for their professional future but also for their role as citizens in a technologically–advanced society.

I've raised this issue with scientists and teachers who express reluctance to address debunking pseudo–science in the classroom. However, the scientific community can no longer afford the luxury of letting this battle play out in the courts and hoping for the best. Over the past five years, this problem has grown from a single state to challenges all over the United States. The approach I propose gives the scientific community the chance to take control of the issue rather than continuing in this guerilla war strategy of the Creationists.

The scientific community holds all the cards in this debate, it's time we play them.

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"They're trained to believe, not to know. Belief can be manipulated. Only knowledge is dangerous." --Frank Herbert, "Dune Messiah"