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# Science as a Guide to Progressivism

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**There are more things in heaven and earth, Horatio,  
Than are dreamt of in our philosophy.**

*-- Shakespeare, Hamlet*

## **Baptism in the Religion of Science**

When we think of politics, science isn't the first thing that comes to mind. And really, it shouldn't, generally speaking. After all, science is a discipline ruled by logic and systematic testing of ideas and theories, not the sometimes erratic-seeming dance of compromise and diplomacy and arcane rhetorical maneuvers. While politics could certainly benefit from the injection of science – *real* science – science should never be held hostage by the fickle tendencies of politics.

But in the last decade – and most especially since the election of the Bush Administration – the sciences have been under a sustained and not-so-covert assault by the world of politics. We see it in the debate over stem cell research, over the question of whether to teach creationism as a science, the insistence that abstinence from is the only education that prevents teenage pregnancy, the regulation of mercury emissions, the unavailability of emergency contraception, the argument for clearcutting in the interest of “healthy” forests, the skepticism about whether global warming is really happening, and on and on.

The damage done to science and scientific advancement by this Administration cannot be overstated. As Chris Mooney, a leading journalist on science and intersecting politics, makes clear:

The broadest way of stating the problem is that throughout his presidency, Mr .Bush has let politics rule everything and left virtually nothing to dispassionate analysis. Preconceptions, rather than critical thinking, have driven policy. Indeed, the US federal government is staffed with legions of political appointees who think in raw political terms, often with a disregard for the long-standing professionalism of the agencies they find themselves lording it over. As a consequence, the US government has become a place where loyalty and the rewarding of prior supporters wins out again and again over careful analysis and expert judgment.

– Chris Mooney, “Out of the bushes”

<http://www.guardian.co.uk/science/2007/aug/08/mooney>

The fact is that alongside the many egregious crimes – both literal and figurative – committed by this Administration, the assault on science and advancement in this country is damage that will take years, decades, possibly even a generation, to undo. The scientific philosophy – that underlying principle known as the Scientific Method – poses a very real danger to the parochial, small-minded, and backwards thinking of those who currently control Republican Party. Whether conservatism plays a role is debatable, but the conservatism currently exemplified in today's GOP reflects the very antithesis of science. And thus it is threatened by the ideals of science, which, not so coincidentally, share a foundation with progressivism.

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Which isn't to say that progressivism is somehow "right" or scientific fact. Of course it isn't, and believers in a progressive political worldview can be as susceptible to close-mindedness and logical fallacy as our counterparts on the Right. Nonetheless, today's Extreme Right live in an insular world that neither understands nor allows the introduction of uncertainty, the questioning of What Is, the exploration of possibility. To do so is to undermine their carefully crafted illusion of rightness, and that is a threat they will fight to the end.

...the inescapable fact of both science and reality is that that we never know everything, and never will. Yet this pervasive state of uncertainty hardly lessens the moral imperative to take whatever it is that we do know and use it to improve our lives; and if we fail to do so -- because the issues are too politicized, say -- in the end we will have only ourselves to blame.

– Chris Mooney, "The Intersection of Science and Progressive Values"

[http://www.huffingtonpost.com/chris-mooney/report-from-yearly-kos-t\\_b\\_59253.html](http://www.huffingtonpost.com/chris-mooney/report-from-yearly-kos-t_b_59253.html)

One of the many unfortunate side effects of this trumping of politics over all else is that as a nation, our fellow citizens are themselves succumbing to the rising tide of ignorance and superstitious regression. In a country of critical thinkers, whose minds are disciplined by logic, the suggestion that our planet is only 6000 years old, that we all descended from a single man and a single woman, and that dinosaur bones were embedded in layers of rock by the devil would be – and should be – soundly ridiculed and laughed into oblivion. Nonetheless, in the year 2007, we are having serious discussions about whether to teach this mythology as *science*.

Thus the work to be done isn't just in repairing the damage done by this Administration and putting controls in place to ensure that such an egregious crime against human intelligence and knowledge cannot be repeated in this country, but also to undertake educating ourselves and those around us. It means engaging their superstitions – and our own – and taking the time to understand how and why the natural world and the universe works the way it does. To learn to question, to be skeptical, to never be afraid of learning, to be open to possibility, to pursue knowledge.

It means reacquainting ourselves with the wonder and excitement we felt as children when we were overcome with awe at the knowledge that there once walked lizards that were hundreds of feet tall, that creatures more bizarre and fantastic than anything on a movie screen once lived on our planet and live here still, that our highest mountains were once under water, that molten rock regularly spews to the surface from our Earth's deepest core, that there are worlds in our celestial neighborhood covered in gases that turn their alien skies yellow, that rains of hot acid fall from their turbulent clouds, that our Sun hurtles through the heavens at thousands of miles an hour, that stars can end in spectacular explosions that result in a gaping vacuum from which nothing escapes, that there are galaxies colliding and particles so small not even our most powerful microscopes can see them...in short, we must renew our faith in science, be born again in the philosophy of knowledge, and be ever vigilant of the twin temptations of apathy and ignorance.

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## **Space Exploration: Luxury or Necessity?**

With all the need in the world, in our country, and the constant battle over budgets and funding of the many services our government provides, what kind of priority should we make space exploration in our federal budget? After all, shuttle missions are interesting and fun to watch on TV, but how many people might be fed, or diseases cured, or countless other worthy accomplishments might be done with the money spent? A shuttle mission costs approximately 500 million dollars. That's half a billion. Why are we spending that kind of money to send people into space when we have more pressing problems here on Terra Firma? Because the pursuit of knowledge for the sake of knowledge benefits us – all of us.

The greatest explorer today is not even human. It's the Hubble Space Telescope, which for nearly two decades has offered us all a mind-expanding window to the cosmos. But when the Hubble was launched in 1990, a blunder in the design of its optics generated hopelessly blurred images. Corrective optics were installed during the telescope's first servicing mission in 1993, which enabled the sharp images that we now take for granted. But for three years the images were simply fuzzy. What to do? We kept taking data, hoping some useful science would nonetheless come of it. Eager astrophysicists at Baltimore's Space Telescope Science Institute, the research headquarters for the Hubble, wrote suites of advanced image-processing software to help identify and isolate stars in otherwise crowded, unfocused fields. These novel techniques allowed some science to get done while the repair mission was planned.

Meanwhile, medical researchers at the Lombardi Cancer Research Center at the Georgetown University Medical Center in Washington, D.C., recognized that the challenge faced by astrophysicists was similar to that faced by doctors in their visual search for tumors in mammograms. Using funds granted by the National Science Foundation, the medical community adopted the new techniques being used for the Hubble to assist their early detection of breast cancer. Countless women are alive today because of ideas stimulated by a design flaw in the Hubble Space Telescope.

You cannot script these kinds of outcomes, yet they occur daily. The cross-pollination of disciplines almost always creates innovation and discovery. And nothing accomplishes this like space exploration, which draws from the ranks of astrophysicists, biologists, physiologists, chemists, engineers and planetary geologists. Their collective efforts have the capacity to improve and enhance all that we have come to value as a modern society.

How many times have we heard the mantra: "Why are we spending billions of dollars up there in space when we have pressing problems down here on Earth?" Let's re-ask the question in an illuminating way: "What is the total cost in taxes of all spaceborne telescopes, planetary probes, the rovers on Mars, the space station and shuttle, telescopes yet to orbit and missions yet to fly?" Answer: less than 1% on the tax dollar—7/10ths of a penny, to be exact. I'd prefer that it were more, perhaps 2 cents on the dollar. Even during the storied Apollo era, peak NASA spending amounted to no more than 4 cents on the tax dollar. At that level, NASA's current space-exploration program would reclaim our pre-eminence in a field we pioneered. Right now, the program paddles along slowly, with barely enough support to ever lead the journey.

– Dr. Neil deGrasse Tyson, excerpted from "Why American Needs to Explore Space"

[http://www.parade.com/articles/editions/2007/edition\\_08-05-2007/Space](http://www.parade.com/articles/editions/2007/edition_08-05-2007/Space)

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## **Beware the “skeptic”**

Every scientist – and indeed, every logical person – is and should be a skeptic at heart. The Scientific Method, after all, relies on us as objective observers and rational thinkers in order to yield valid results. But recently, the natural tendency of science to exercise skepticism and rigorous testing before adopting a new theory has been twisted by Republican politicians toward a different end. Indeed, by using science’s own language of hypothesis and theory in the context of their everyday usages instead of their accepted scientific definitions, these politicians have managed to introduce a distrust of science in the electorate, trusting that most citizens do not and will not take the time to investigate further. Thus, in the name of “sound science”, these doubters of truly sound science crown themselves “skeptics” and as such, push forward a distinctly counterproductive agenda in the service of corporate or extreme religious interest groups that *do not* represent mainstream.

These so-called “skeptics” aren’t skeptics in the true, honorable scientific sense. They are contrarians and sleight-of-hand artists, deniers of reality and facts. They have no interest in the pursuit of knowledge for the sake of knowledge itself, but only in twisting the data to their own ends, or seeking out fringe naysayers who dispute an accepted scientific finding, regardless of those naysayers’ own integrity (or lack thereof).

One of the best examples: Senator James Inhofe, Republican of Oklahoma, said in 2006 regarding global warming: “With all of the hysteria, all of the fear, all of the phony science, could it be that manmade global warming is the greatest hoax ever perpetrated on the American people? It sure sounds like it.” That is a *sitting* United States Senator, in the face of the Hurricane Katrina disaster and other growing examples of the effects of global warming. To be sure, scientists don’t know yet that the weather patterns we’ve seen recently, including Katrina, were definitive results of global warming. But whether weather disasters like Katrina are specifically caused by global warming, the scientific community has long since proven and come to the consensus that *global warming is happening* and that *we are causing it*.

Remember that these same contrarians doubted the existence of a hole in the ozone layer, misled the (uninformed) American public that there were more than sixty stem cell lines available for stem cell research when there were in fact less than twenty-five (almost all of which were completely useless for research), that increased mercury levels in water are not a cause for concern, and that cigarettes are neither addictive nor cancer-causing.

Skepticism is a good thing. It helps us discern the expert from the charlatan, protects us from the enticing call of pseudoscience, and exercises our critical thinking skills. But don’t confuse the skeptic with the “skeptic”...do your own research, examine your own processes, challenge your worldview with new findings on old ideas, and learn to differentiate between the true scientist and the contrarian with an agenda.

### **The Scientific Method:**

1. Observe an aspect or phenomena.
2. Make a hypothesis that is consistent with the observation.
3. Use the hypothesis to make a prediction(s).
4. Test the prediction(s) by experiments or further observations and modify the hypothesis in the light of results.
5. Repeat steps 3 and 4 until there are no discrepancies between theory and experiment and/or observation.

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# Mandatory Reading & Other Resources

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## **Reignite your sense of wonder:**

### **Google Sky**

<http://earth.google.com/sky/skyedu.html>

### **HubbleSite**

<http://hubblesite.org/>

### **HubbleSite – Picture Gallery**

<http://hubblesite.org/gallery/>

### **The Elegant Universe**

<http://www.pbs.org/wgbh/nova/elegant/program.html>

## **Links:**

- **The Universe** – a 10-episode series on the History Channel about space, astronomy, and astrophysics ([http://www.history.com/minisite.do?content\\_type=mini\\_home&mini\\_id=54036](http://www.history.com/minisite.do?content_type=mini_home&mini_id=54036))
- **BadAstronomy.com** – blog about astronomy, science, critical thinking, and healthy skepticism of pseudoscience written by an astronomer (<http://www.badastronomy.com/>)
- **Pharyngula** – “Evolution, development, and random biological ejaculations from a godless liberal” (<http://scienceblogs.com/pharyngula/>)
- **ScienceBlogs.com** – a collection of science blogs that cover a plethora of science disciplines (<http://scienceblogs.com/>)
- **Seed Magazine** – subscribe online or in print to one of the leading science magazines available (<http://seedmagazine.com/>)

## **Books:**

- *The Republican War on Science* by Chris Mooney

*The earth is a very small stage in a vast cosmic arena. Think of the rivers of blood spilled by all those generals and emperors so that in glory and in triumph they could become the momentary masters of a fraction of a dot. Think of the endless cruelties visited by the inhabitants of one corner of the dot on scarcely distinguishable inhabitants of some other corner of the dot. How frequent their misunderstandings, how eager they are to kill one another, how fervent their hatreds. Our posturings, our imagined self-importance, the delusion that we have some privileged position in the universe, are challenged by this point of pale light.*

– Carl Sagan, “Reflections on a Mote of Dust”