

Science, Politics and Religion
(or maybe it's really about education)
Christopher R. Bollinger

I love science. I am a scientist myself. I can hear the physics and chemistry guys groaning (economists are clearly suspect). Economics is a science because good economic research follows the scientific method: observation, formation of theory or hypothesis, experiment, and re-evaluation of theory. This cycle repeats ad infinitum: each experiment is a new observation and each re-evaluation is a new formation of theory. Very few things become laws. Most ideas in science remain, like evolution, a "theory."

It seems to me that in politics and in public view, there is now a deep mistrust of this science. I think the reason is that people don't understand, or really appreciate, this method. Most people hate theories. They want an answer: A single answer that they can tout as a "fact" or turn into a "law." (I'm still waiting for some politician to say "we need to codify the laws of thermo-dynamics). They also want it now. Those are the problems with science: science is slow, theorems change and are updated. Nothing is engraved in stone (that's not only a metaphor, but foreshadowing).

That's why people turn to religion. It is engraved in stone. The bible has remained the same for nearly 2000 years (or has it?). The laws of Moses were, according to the tradition, engraved in stone. It gives nice clear answers: if you want to know how things were formed, read Genesis. It's clear, it's simple, and it's understandable even by people 2000 years ago (none of whom had ever even dreamed of deoxyribonucleic acid).

Unfortunately I'm afraid that we, as scientists, have done ourselves, and more importantly society, a great disservice: we have not taught the wonder of the scientific method. Take a look at most science textbooks. Even in middle and high school (where it should start) it gets short shrift: a chapter or less in most books. And, it's not like we really encourage it among most of our students: we expect a single correct answer to each question on the exam, and we take off points when we don't get that.

While there are some laws and simple answers in science, the vast majority of science is a set of very complex systems. At best, we only have a limited understanding of most of these systems. In science, that's OK. But now we are faced with Global Warming. This is a problem that requires the interface of science and politics. In fact it really requires the interface of science and people. A part of the problem is that people don't understand the scientific method. They see things written by scientists that question either the existence of or the cause for global warming. And scientists seldom make concrete statements. If you've read any of the reports, you will quickly see that even the most ardent report couches the conclusions as "theories" (whether they use that term or not). To scientists, that's OK. But people want concrete answers that are either right or wrong.

The problem though, is not the scientific method. Nor is it really the people. It's our poor education coming back to haunt us. It seems to me that we, as scientists, have done a really poor job of teaching people how we learn from our mistakes. Edison tested hundreds of materials for filaments for light bulbs. It took years. When asked if he was upset about these failures, he said something like "no, I learned that these materials did not make good light bulbs." Any good scientist will tell you that they learn more when an experiment goes wrong than when one goes right. We often learn the most when the theory does not quite match some part of the facts. It is by re-evaluating the theory in light of these facts that we learn the most.

Jefferson was a long time and enthusiastic advocate of education. He knew that democracy can only work with a well educated electorate. If we are going to run our society through democracy where the full membership of society gathers to make decisions it is crucial that full membership be able to make informed decisions. I'm not saying that we all need Ph.D.'s (and besides, then what would I do?). What I am saying is that all members of our society need a sound understanding of math and science. A big part of that understanding has to be that science isn't an exact science. It's an ongoing process through which we continue to learn and update our understanding of the world around us.