SACRED BOVINES

GLOBAL WARMING: SCAM, FRAUD, OR HOAX?

DOUGLAS ALLCHIN, DEPARTMENT EDITOR

Everywhere one looks – newspapers, websites, books, statements by public leaders and nonpartisan organizations – one hears that climate change is a misguided and unsupported conclusion (Inhofe, 2012; Dixon, 2013; Fox News, 2014; see also http://www.climatechangedispatch.com/Sites-of-Interest/; http://appinsys.com/globalwarming/GW_Books.htm; http://www.iloveco2.com/p/resources.html). Even more disturbing, however, are the claims about what Tim Ball (2014) recently called "the deliberate corruption of climate science." For example, one website dedicated to "exposing the truth about global warming hysteria" says global climate change science is a scam (Minnesotans for Global Warming, 2014; see also Rivero, 2009; Pruden, 2013). The Chairman of the U.S. Senate's Environment and Public Works Committee, Jim Inhofe (2003), by contrast, called the threat not a scam, but the "greatest hoax ever perpetrated on the American people," a view echoed by GlobalWarmingHoax.com, "Where Only the Truth Heats Up™" (see also Caruba, 2014; and World Natural Health Organization, http://wnho.net). Or is it fraud, as alleged by Congressman Dana Rohrabacher, a senior member of the House Science Committee (Fang, 2013; see also Ferrara, 2013; Adams, 2014)? Each not only dismisses the claims about global warming and climate change, and the plentiful evidence that supports those claims, but also notes the dangerous erosion of science. But which is it? Scam, hoax, or fraud? It's all quite alarming.

What is alarming, of course, is not that the science is wrong, but that so many people reject the science, typically while appealing to the very principles and banner of science in doing so. Somewhere, science education has failed miserably. But what is the remedy? How do we prepare scientifically literate citizens?

How indeed would the naive student know if global warming science is (or is not) a scam, a fraud, or a hoax? Most would say that you cannot trust what you read. You can only judge the evidence for yourself. And that science education, therefore, is all about developing skills in analyzing arguments, experiments, and data (a view adopted in the new *Next Generation Science Standards*, for example). Here, I take exception to this widespread view, this month's Sacred Bovine. Training students to make scientific judgments on their own is not a solution. Indeed, this approach likely worsens the problem. Rather, students need to appreciate more fully the nature of science, or how science works. They need especially to understand the role of expertise and consensus, as well as the critical role of credibility in scientific communication.

○ "It's the Evidence, Stupid" – Or Is It?

The naysayers on climate change typically begin with appeals to the evidence. Lots of evidence. Ironically, they seem to revel in long lists of obvious counterexamples, "embarrassing predictions" (Newman, 2014), "admissions" of earlier errors (Dixon, 2013), Al Gore's mistakes (Terrell, 2014), simple facts about carbon dioxide (http://www.iloveco2.com/), and graphs, graphs, graphs. The assumptions are that anyone in a democracy is not only entitled to evaluate the data, they are also intellectually equipped to do so. Not so. This takes expertise in climate science. Expertise that even school science teachers, however dedicated, don't have. Herein lies the ironic clue for teachers. Don't bother to "set the record straight" item by item; this has been done ably by Darling and Sisterton (2014) but is largely irrelevant. Don't even focus on the evidence at all. It's of secondary importance, at best.

Consider just the task of interpreting a "simple" graph: for example, the graph presented as Congressional testimony by climatologist (and climate change skeptic) John Christy (2013) and found frequently on websites (Figure 1). It compares atmospheric temperatures for roughly four decades as predicted by various climate models (averaged in the bold red line) versus the actual measurements (lower lines of circles and squares). The discrepancy seems patently obvious. How could climate scientists pretend that their models have any merit? It strains credulity. And that, surely, is the intended impression.

Such presentations of "evidence" exploit a simplistic view of science, of the sort promulgated in textbooks and school science fairs. First, evidence simply presented is itself simple in construction. Second, any shred of evidence allows one to confidently either accept or reject a hypothesis. Third, any counterevidence wholly invalidates, or falsifies, the theory. Every failed prediction thus apparently reflects a monumental failure, discounting claims from any other evidence whatsoever. Of course, real scientists exhibit more nuanced and complex reasoning. They balance the weight of evidence. They try to reconcile conflicting data. They revise their models. Still, the ultrasimplistic views of science support the nonexperts' belief that they can pass meaningful judgment on climate change, even with just one graph. The plain moral for teachers is that we need to help students understand the nature of science, *before* addressing the evidence itself.

Almost anyone can *read* Christy's graph (Figure 1). But that does not make them qualified to fully *interpret* it or *critique* it. One needs to know a great deal more than the graph itself presents. Background knowledge and understanding of context matter. For example, even if the measurements are "correct," are they representative? How were the data chosen? Are the models outdated? Are there data elsewhere that explain the apparent discrepancy? How do we understand the rising trend in temperatures, regardless of the models?

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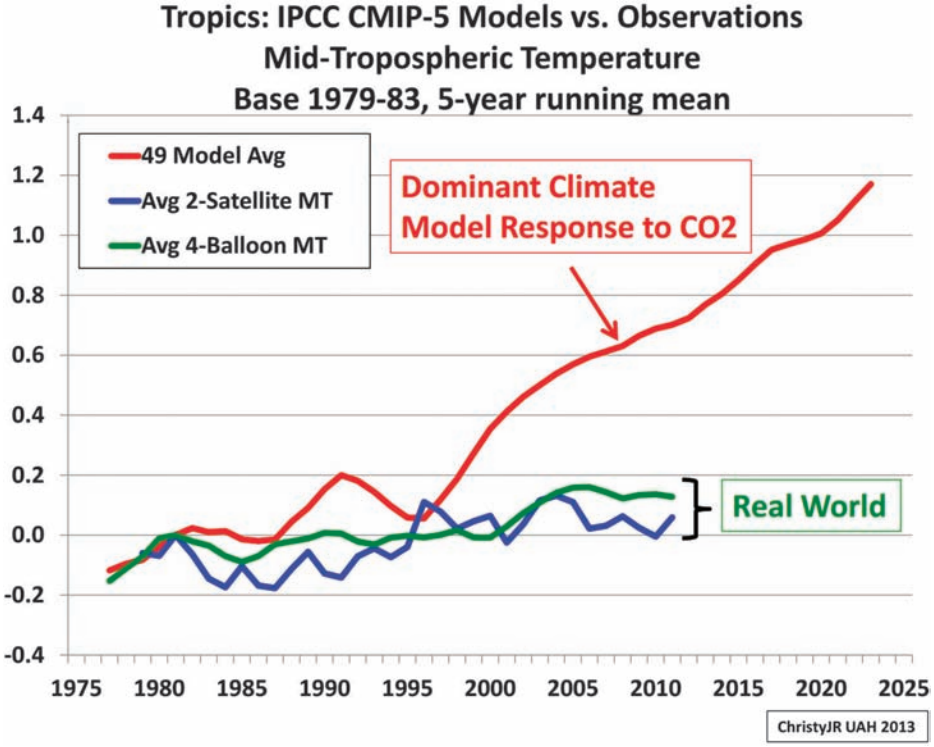

Figure 1. Climate-model-predicted temperatures compared with actual measured temperatures (from hockeyschtick.blogspot.com; adapted from Christy, 2013, p. 6).

This all requires expert knowledge, available to very few researchers working in the field. Specialized knowledge is essential in complex multidisciplinary science. Everyone relies on experts. Even other climate change researchers, when the particular claims are beyond their own area of expertise. The pretense that any ordinary citizen can make scientific judgments from the shards of scientific data that deniers present is a kind of scientific hubris. Teachers need to underscore the importance of expertise *behind* assembling and interpreting the evidence.

The Quest for Expertise

For the person assessing public claims about climate science, evidence matters at another level instead: evidence *about expertise*. Who is qualified to interpret the evidence? And how are nonexperts to know?

One can easily dismiss the entertainment celebrities, of course. Despite their dedication to environmental causes (and their enviable good looks), they are not necessarily trustworthy spokespersons for science. That applies as much to Leonardo DiCaprio in publicizing a new film about global warming (Harris & Carter, 2014) as to celebrity denialist commentator Glenn Beck (Beck & Balfe, 2007). The same applies to physics majors, despite their familiarity with science. They are not experts on climate research (yet that is the chief credential behind the website Climate Research and a recent denialist book; Cotton, 2014). One can equally scrap meteorologists and local weathercasters. Their expertise is in short-term weather patterns, not long-term climate history. A filter for expertise can quickly eliminate most of the junk one hears about climate change. Presentations of "evidence" that bypass experts may simply be set aside.

Some critics of global warming and climate change do indeed have the appropriate credentials. For example, outspoken critic John Christy has 27 years of credible climate research under his belt (Wines, 2014). (Note, however, that his expertise is mostly in measuring temperatures, not interpreting why they might change.) Should we listen to his claims? Yes. Should we (the remote nonexperts) accept them? No. Evidence is not enough. Expertise in contextualizing the evidence is not enough. What matters for scientific conclusions in a cultural setting is general agreement among the relevant experts. What matters is consensus (Oreskes, 2014). One expert's voice is not enough, even if they give testimony to Congress or gain a hearing through prominent news media. Individuals cannot trump the collective wisdom of the crowd, especially when it combines multiple, complementary areas of expertise.

Several studies indicate a roughly 97% consensus – among experts – on the evidence for warming, and slightly less for the significance of humans in causing that trend. Agreement on the anticipated severity of the problem in the next few decades is lower, but still strongly weighted toward taking concerted action now (Wihbey, 2013). Dissenting voices remain, of course. And they participate in the scientific dialogue – among fellow experts. However, when they inappropriately carry the debate out of the realm of experts and into the public sphere, dissenters become denialists (for example, Taylor, 2013; Bast & Spencer, 2014). They try to short-circuit the process of critical appraisal by other experts, so critical to developing reliable conclusions in science.

Denialists sometimes appeal to the role of dissent in the history of science. They cite cases from the past when scientists challenged the consensus and were later proven correct. For example, one pair of climatologists recently observed that some doctors recommended an effective treatment for scurvy well before its acceptance by military leaders. "It was the scientific skeptics who bucked the 'consensus' and said the Earth was round," they say. By analogy, they want us to see their dissent as heroic and thus believable (Solomon, 2008; McNider & Christy, 2014). But if they cannot convince the relevant scientific experts (as our delegated surrogates), we should not be convinced either. The historical fable is misplaced. It is just denialist rhetoric, aimed to circumvent the role of consensus.

Who, then, can the nonexpert trust? Ultimately, lessons about the nature of science need to include an understanding of the institutional structures for establishing credibility and developing consensus. For example, the United States established the National Academy of Sciences as an independent body to inform national policy, outside political influence. Their pronouncements, including those of the National Research Council (NRC), express a trustworthy expert consensus. Likewise, we accept the assessments of the Intergovernmental Panel on Climate Change (IPCC) because they reflect a broader international consensus.

Moreover, their explicit agreements must be negotiated. They are not just crude majority votes. Such views have even more scientific cogency. Teachers should honestly declare, "Don't trust me. I'm not an expert. But I trust the consensus of the IPCC and NRC, who are independent experts. And you should trust them, too." But that may require additional lessons in how expertise and consensus work in science.

○ Con-Artistry

Climate change denialists know that the voice of science matters. Thus, they work hard to cite "evidence," present facades of expertise and credibility, and make the documented consensus seem uncertain. Many are just science con artists. The scientifically literate citizen thus also needs to be aware of some of their tactics (*Sacred Bovines*, Nov. 2012).

Because expertise matters, denialists seem all too willing to present misleading credentials. For example, they may borrow names from recognized authorities. The IPCC is the premier international body able to speak on climate change, now under the auspices of the United Nations. A contrarian project adroitly labeled itself the Nongovernmental International Panel on Climate Change (NIPCC). It has tried to profile itself as a parallel organization of equal status, appealing especially to those who distrust government. However, their work is now managed by a partisan think tank, the Heartland Institute (http://www.nipccreport.org). It is bogus science trying to achieve credibility among ill-informed nonscientists. An alternative strategy is to smear the credentials of researchers whose conclusions about climate change are undesirable to them (for example, Ball, 2014; see also McGarity & Wagner, 2008, on how moneyed interests work to discredit legitimate scientists). To effectively assess whether climate change is a hoax, a scam, or a fraud, citizens often need to focus on the tactics used to imitate (or unjustly malign) the relevant credentials of experts.

Because consensus also matters, denialists endeavor to sow images of disagreement and controversy. For example, they assemble letters or petitions signed by dozens, hundreds, or supposedly thousands of scientists who appear to challenge the consensus (for a sample list, see Credible, 2014). But the signatories of these declarations are rarely experts in the relevant fields. One journalist thoroughly investigated the signers of the 1995 Leipzig Declaration. After excluding television weathermen, a dentist, a medical laboratory researcher, a civil engineer, a nuclear physicist, an amateur meteorologist, an entomologist, and numerous irrelevant others, including some who denied having ever signed the document, the original list of 110 was reduced to 20. The remainder, funded by the oil and fuel industry, exhibited conflicts of interest, indicating the core intent of the document (Rampton & Stauber, 2002, pp. 276–278). Another 2008 "petition" claimed to be endorsed by over 30,000 "scientists." Ultimately, there were only 39 climatologists (Grandia, 2009; Angliss, 2010). The length of the lists and the multiplicity of lists are meaningless if they are just misrepresentations, with no credible expertise behind them.

Again, teachers should not have to address these claims, item by item. One can merely dismiss them, having analyzed the source of the information and identified the conflicts of interest. When dissenting scientific claims are addressed to the public, not to other scientists, they are not even worth entertaining as credible.

○ Teaching Climate Change, Teaching the Nature of Science

Con artists and denialism succeed when science education fails. Some teachers may consider understanding the greenhouse effect to be foundational and primary for understanding climate change politically. Others may highlight the need to profile the evidence for global warming – for example, the Keeling Curve and Mann's "hockey stick" graph. But an awareness of the cultural context might reorient views about what scientific literacy means on this occasion. For the nonexpert, the foremost focus should not be the evidence itself, but who to trust in interpreting evidence and reporting on it honestly. That includes understanding the institutional contexts of scientific credibility and consensus. It also includes science communication, or all the channels by which scientific claims are conveyed, or possibly distorted and misconveyed. For most people, understanding climate change today is, proximally, more about the nature of science than, ultimately, the scientific evidence itself.

The naive citizen is inundated with messages that climate change is all a scam, hoax, or fraud. The importance of these declarations from nonexperts may be reflected in the efforts of the partisan Heartland Institute to shape science education. In 2013 they widely distributed copies of the NIPCC report "Climate Change Reconsidered," full of bogus science, urging teachers to teach the dissenting perspectives: "Will you explain to them that real science is never settled – that the essence of science is skepticism…?" (National Center for Science Education, 2013). Ironically, that very promotion of skepticism and uncertainty is precisely what the denialists seek, to stall political action (Oreskes & Conway, 2010). An informed analysis, by contrast, embodies a deep appreciation of the roles of expertise and international consensus in science. And that defines the current challenge for science teachers.

References

Adams, M. (2014). Global warming data FAKED by government to fit climate change fictions. *Natural News* (June 23). http://www.naturalnews.com/045695_global_warming_fabricated_data_scientific_fraud.html.

Allchin, D. (2012). Science con-artists. *American Biology Teacher, 74,* 661–666.

Angliss, B. (2010). Scrutinising the 31,000 scientists in the OISM Petition Project. Skeptical Science [website]. http://www.skepticalscience.com/scrutinising-31000-scientists-in-the-OISM-Petition-Project.html.

Ball, T. (2014). *The Deliberate Corruption of Climate Science*. Mount Vernon, WA: Stairway Press.

Bast, J. & Spencer, R. (2014). The myth of the climate change "97%." *Wall Street Journal* (May 26). http://online.wsj.com/articles/SB10001424052702303480304579578462813553136.

Beck, G. & Balfe, K. (2007). *An Inconvenient Book: Real Solutions to the World's Biggest Problems.* New York, NY: Threshold Editions.

Caruba, A. (2014). A history of the disastrous global warming hoax. Heartland Institute. March 31. http://blog.heartland.org/2014/03/a-history-of-the-disastrous-global-warming-hoax/.

Christy, J.R. (2013). A factual look at the relationship between climate and weather. [Testimony to the U.S. Senate Subcommittee on Environment Committee on Science, Space and Technology, Dec. 11.] http://docs.

house.gov/meetings/SY/SY18/20131211/101589/HHRG-113-SY18-Wstate-ChristyJ-20131211.pdf.

Cotton, D.J. (2011–2014). Climate Research [website]. http://www.climate-change-theory.com.

Cotton, D.J. (2014). *Why It's Not Carbon Dioxide After All*. Parker, CO: Outskirts Press.

Credible, J. (2014). Resources. ILoveCO2.com [website]. http://www.iloveco2.com/p/resources.html.

Darling, S.B. & Sisterson, D.L. (2014). *How to Change Minds about Our Changing Climate.* New York, NY: The Experiment.

Dixon, H. (2013). Top climate scientists admit global warming forecasts were wrong. *Telegraph* (Sept. 15). http://www.telegraph.co.uk/earth/environment/climatechange/10310712/Top-climate-scientists-admit-global-warming-forecasts-were-wrong.html.

Fang, L. (2013). Member of Congressional science committee: Global warming a "fraud" to "create global government." *Nation* (Aug. 10). http://www.thenation.com/blog/175697/science-committee-congressman-global-warming-fraud-create-global-government.

Ferrara, P. (2013). The coming revelation of the "global warming" fraud resembles the Obamacare lie. *Forbes* (Nov. 12). http://www.forbes.com/sites/peterferrara/2013/11/12/the-coming-revelation-of-the-global-warming-fraud-resembles-the-obamacare-lie/.

Fox News. (2014). 'Bad, bad science': Weather Channel founder says climate change is a myth. (Oct. 27). http://insider.foxnews.com/2014/10/27/weather-channel-co-founder-john-coleman-climate-change-myth. [Video excerpt available at http://www.youtube.com/watch?v=DPtK9tm1kp4.]

Grandia, K. (2009). The 30,000 global warming petition is easily-debunked propaganda [blog]. *Huffington Post* (Aug. 22). http://www.huffingtonpost.com/kevin-grandia/the-30000-global-warming_b_243092.html.

Harris, T. & Carter, B. (2014). Leo vs. science: vanishing evidence for climate change. *New York Post* (Sept. 14). http://nypost.com/2014/09/14/leo-v-science-vanishing-evidence-for-climate-change/.

Inhofe, J. (2003). The science of climate change. [Senate floor statement.] http://www.epw.senate.gov/speechitem.cfm?party=rep&id=230594.

Inhofe, J. (2012). *The Greatest Hoax: How the Global Warming Conspiracy Threatens Your Future.* Washington, DC: WND Books.

McGarity, T.O. & Wagner, W.E. (2008). *Bending Science: How Special Interests Corrupt Public Health Research*. Cambridge, MA: Harvard University Press.

McNider, R. & Christy, J. (2014). Why Kerry is flat wrong on climate change: it was the scientific skeptics who bucked the "consensus" and said the Earth was round. *Wall Street Journal* (Feb. 19). http://online.wsj.com/articles/SB10001424052702303945704579391611041331266.

Minnesotans for Global Warming [Elmer Beauregard] (2013). GlobalClimateScam.com [website].

National Center for Science Education. (2013). Climate change denial supplementary materials. http://ncse.com/climate/denial/climate-change-denial-supplementary-materials.

Newman, A. (2014). Embarrassing predictions haunt the global-warming industry. *New American* (Aug. 12). http://www.thenewamerican.com/tech/environment/item/18888-embarrassing-predictions-haunt-the-global-warming-industry.

Oreskes, N. (2014). Why we should trust scientists [online video]. New York, NY: TED Conferences. http://www.ted.com/talks/naomi_oreskes_why_we_should_believe_in_science/.

Oreskes, N. & Conway, E.M. (2010). *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. New York, NY: Bloomsbury Press.

Pruden, W. (2013). The global warming scam that will not die. *Washington Times* (Dec. 16). http://www.washingtontimes.com/news/2013/dec/16/pruden-the-scam-that-will-not-die/.

Rampton, S. & Stauber, J. (2002). *Trust Us, We're Experts: How Industry Manipulates Science and Gambles with Your Future*. New York, NY: Tarcher/Penguin.

Rivero, M. (2009). The global warming scam. What Really Happened [website]. http://whatreallyhappened.com/WRHARTICLES/globalwarming.html.

Solomon, L. (2008). *The Deniers: The World-Renowned Scientists Who Stood Up against Global Warming Hysteria, Political Persecution, and Fraud* (*And those who are too fearful to do so).* Minneapolis, MN: Richard Vigilante Books.

Taylor, J. (2013). Global warming alarmists caught doctoring "97-percent consensus" claims. *Forbes*. (May 30). http://www.forbes.com/sites/jamestaylor/2013/05/30/global-warming-alarmists-caught-doctoring-97-percent-consensus-claims/.

Terrell, R. (2014). Al Gore's climate calculations prove wrong – again. *New American* (Sept. 6). http://www.thenewamerican.com/tech/environment/item/19069-al-gore-s-climate-calculations-prove-wrong-again.

Wihbey, J. (2013). The 97 percent: three key papers quantifying scientific consensus on climate change. Journalist's Resource [website]. http://journalistsresource.org/studies/environment/climate-change/97-percent-three-key-papers-quantifying-scientific-concensus-global-warming-climate-change#.

Wines, M. (2014). Though scorned by colleagues, a climate-change skeptic is unbowed. *New York Times* (July 15). http://www.nytimes.com/2014/07/16/us/skeptic-of-climate-change-john-christy-finds-himself-a-target-of-suspicion.html.