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ESSAY REVIEW

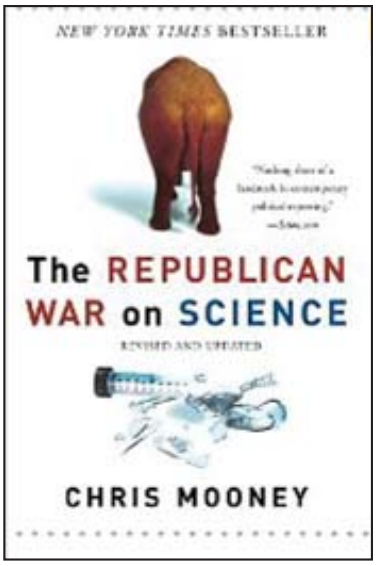
Not Even Wrong about Science and Politics

The Republican War on Science by Chris Mooney. Basic Books, 2005. 342 pp. $14.96 (paperback), $9.66 (Kindle). ISBN 978-0465046751.

Science Left Behind: Feel-Good Fallacies and the Rise of the Anti-Scientific Left by Alex B. Berezow and Hank Campbell. Public Affairs, 2012. 303 pp. $26.99 (hardcover), $12.99 (Kindle). ISBN 978-1610391641.

"Not even wrong" is the oft-quoted designation by Wolfgang Pauli[1] of something that is not interesting in any way because it is simply beside any substantive point (whereas wrong statements can stimulate fruitful discussion). These books are not even wrong in Pauli's sense. They purport to discuss the politically motivated distortion and abuse of science, respectively, by right-oriented and by left-oriented people and organizations, yet they fail to demonstrate any distortion or abuse of science because they ignore the science altogether. These are political rants which simply accept that any deviation from a mainstream consensus constitutes distortion of science or an attack on science or the purveying of pseudo-science or the practice of "denialism," a term that is superseding "pseudo-science" as the preferred pejorative used by devoted disciples of scientism.

The 2005 book (*The Republican War on Science*) is included here not only because it has the same sort of basic, logical, and substantive flaws as *Science Left Behind* but also because the latter is an explicitly intended counter to it. *Science Left Behind* argues that "progressives" on the Political Left distort and abuse science at least as much as do conservatives or Republicans, who were accused in *The Republican War on Science* of distorting and abusing science to a far greater degree than "liberals" or Democrats. As I wax highly critical of both books, readers should know that (as of this writing) Amazon reports a 4½-star positive response to *The Republican War on Science* (some years ago, the *Journal of Scientific Exploration* [*19* (2005), 641–647] also published a favorable review of it) while *Science Left Behind* has received only a 3-star response. Take those for what they're worth—in my view, primarily an insight into who the readers are who bother to post opinions on amazon.com. Substantively, both



books are equally "not even wrong," but I agree with the amazon.com consensus to the extent that *The Republican War on Science* is distinctly better-written; *Science Left Behind* is notably sloppy and unfocused, and it is replete with cheap *ad hominem* remarks such as "unless we are filthy rich, like Al Gore, who can afford to plaster his house with inefficient solar panels" (*Science Left Behind*:19).

That politics and not science is the agenda is illustrated as Mooney admits that "in politicized fights over science, it is rare to find liberals entirely innocent of abuses. But they are almost never as guilty as the Right" (*War on Science*:9); and he amplifies the comparison by asserting that no one on the Right should criticize left-leaning distortions of science because of "the Right's . . . systematic, and often far cruder, war on science" (*War on Science*:10). If the distortion of science were the issue, it would be irrelevant whether Right or Left is the more guilty; the point would be to criticize *all* distortions, topic by topic. Berezow and Campbell also reveal their political views early: "We love conservatives because of their adherence to tradition and to the principles that have made the United States the most successful country on earth" (*Science Left Behind*:4). Now *there's* a feel-good sentiment if ever there was one. Whether it is fallacious of course depends on what "success" means here: happiness or contentment scores are higher in other countries, as are life-spans and health coverage and unemployment insurance and other social-safety-net programs. In what ways is the United States more successful than Norway or Switzerland, say?

Science Left Behind further reveals its political focus in its Introduction: "The conservative 'sins' against science (e.g., ethical concerns about human embryonic stem cell research, skepticism about climate science, and fringe religious opposition to evolution) are widely reported and well-known" so the book will focus on the sins of "progressives" (*Science Left Behind*:6). In other words, this book too is about who is worse, who is less bad than the other: "If conservatives have declared a war on science, then progressives have declared Armageddon" (*Science Left Behind*:10). All that is far from examining whether any given view is or is not a distortion of science.

But even on politics, Berezow and Campbell can be either out of their

depth or deliberately misleading: Obama is personally faulted for quite a number of things, for instance a statement that the science about a possible vaccination–autism link is unclear: "For someone with such enormous influence over public health policy to be ignorant of basic medical facts is frightening indeed" (*Science Left Behind*:27). This is absurd. The leaders of much smaller organizations than the United States Government have to rely on staff for guidance on all sorts of factual matters. No President can be expected to be familiar with the facts on all the matters over which he has "enormous influence." In any case, it isn't a basic medical fact that vaccines have no relation to autism; at best, one can say that attempts to find a link have been inconclusive, but it *is* a basic medical, scientific, statistical fact that the failure to find evidence for a link cannot exclude that some specific sector of the population—characterized by genetics, or age, or sex, or some combination of those and other variables—might actually experience such a link. Obama is also blamed for a shortage of vaccine during the swine flu pandemic—which wasn't even an actual pandemic. Chapter 2 in *Science Left Behind* is simply an exercise in overt Obama-bashing, about the BP oil spill and nuclear waste disposal and the environment generally as well as vaccines.

One could legitimately say that nowadays and increasingly, political discussions and decisions have been influenced almost not at all by scientific evidence; further proof is hardly needed for this judgment than that Congress abolished the Office of Technology Assessment in 1995. Matters on which science is relevant are dealt with politically in the same way as are matters on which economics is relevant: Each partisan bloc cites its own experts whose views are politically congenial, no matter how contrary to good evidence or plain common sense. Rare indeed are those who attempt to form their views on the basis of the evidence on each topic, and they are frequently in a tiny minority within their own political bloc. Science is ignored more than distorted, and on different topics it is ignored by progressives, conservatives, and any other social sector or vested interest one cares to look at—not excluding scientists themselves.

Stereotyping

Common to both books is inveterate stereotyping and over-generalizing. Every mention of "conservative," "progressive," Republican, Democrat, or similar ilk badly needed the universally missing modifiers: "some," "a few," "not all," and the like. *Science Left Behind* at least begins by acknowledging that sweeping generalities are unwarranted, that all of humanity cannot be neatly divided into liberals and conservatives, but then it proceeds to do little better by dividing humankind into just four categories, one of them the "progressives" who are the villains of this piece.

A fundamental error in such labeling is the confusion of correlation with causation. That there is a statistical correlation between expressed disbelief in "evolution" and right-wing political views does not certify a causative relationship, a *necessary* relationship, that right-wing politics somehow predisposes to disbelief in evolution. It is equally unjustified to regard as characteristic of politically left-inclined individuals a high concern for preserving environments as unchanged as possible. Yet both books make sweeping connections of this sort everywhere.

Berezow and Campbell illustrate who their "progressive" villains are with multiple generalizations:

> the kind of people who think that overpriced granola from Whole Foods is healthier and tastier. . . . who buy "Terra Pass" bumper stickers to offset their cars' carbon emissions. . . . [W]hose beliefs allow them to feel morally superior to everybody else who disagrees. (*Science Left Behind*:9)

Moreover, since "progressives . . . as we know them today . . . [are] unscientific, while claiming the mantle of modernity, [they are] denizens of a world where science is replaced by feel-good fallacies" (*Science Left Behind*:16). Apparently there are four root sources of wrong-headed progressive ideas: "Everything natural is good. . . . Everything *un*natural is bad. . . . Unchecked science and progress will destroy us. . . . Science is only relative anyway." Thus, "homeopathy and herbs are as good as actual medicine" (*Science Left Behind*:17).

The intellectually vacuous, sloppy tone of *Science Left Behind* is illustrated here by the logical fallacy that "Everything *un*natural is bad" is said to follow easily from "Everything natural is good." It doesn't. For progressives, "science is 'just another opinion'," they "don't entirely buy that science has a unique claim on secular truth . . . or that there are even any natural laws" (*Science Left Behind*:19). Progressives are said to oppose nuclear power and genetically modified food because they believe "technology is inherently dangerous" (*Science Left Behind*:18).

After those descriptions of their enemy, of course, Berezow and Campbell can rest their case without any need to look into the actual science that is supposed to be distorted and abused.

Scientific Illiteracy

As to science, the fundamental error of both books is the presumption that any mainstream consensus represents "science" and is to be taken as correct. Though not an uncommon mistake, this is nevertheless rank scientific illiteracy (Bauer 2012a, 2012b): The most rudimentary acquaintance with

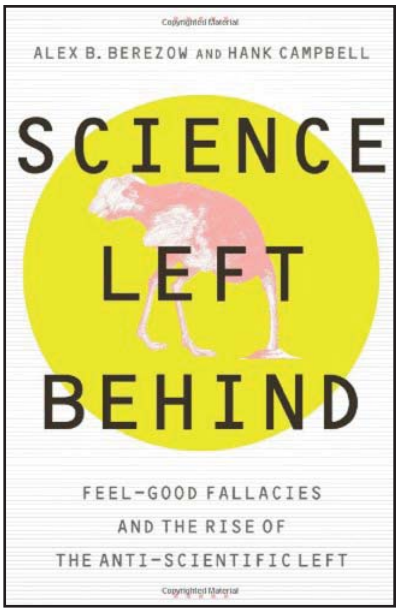
the history of science and the nature of science teaches that the progress of science has come through perpetual superseding of successive mainstream consensuses, modifying them and sometimes overturning them entirely. Therefore, one cannot automatically take dissent from a mainstream consensus as constituting a distortion of science, it might equally be the harbinger of tomorrow's mainstream consensus. On any given topic one must consider what the actual evidence is and how strongly or weakly it supports the contemporary consensus.

According to Mooney, "House Republicans *even* charged that scientists had grown cozy with government regulators, addicted to federal funding, and highly prone to suppress or ignore dissenting views" (*War on Science*:55, emphasis added). Well, the Republicans happen to have been right about that, that is how scientists on the whole behave nowadays (Bauer 2012c, Greenberg 2001, 2007). The Republicans were again right, and Mooney wrong, in preferring "adversarial 'science courts'" to "major peer-reviewed scientific consensus documents" (*War on Science*:55)—no matter that Mooney cites historian of science Naomi Oreskes to the effect that "Scientific knowledge *is* the intellectual and social consensus of affiliated experts"; evidently not all historians of science are scientifically literate. The incoherence of Mooney's views are illustrated when a few paragraphs later he points out that "science isn't a democracy"—in other words, "consensus" *doesn't* equal science? No, instead of "democracy" science uses "quality control—peer review"! As *Lancet* editor Richard Horton has pointed out, "Peer review . . . is simply a way to collect opinions from experts in the field. Peer review tells us about the acceptability, not the credibility, of a new finding" (Horton 2003).

Scientific illiteracy is illustrated also by the assertion that science can provide "rock-solid facts" (*War on Science*:14). To the contrary: "Facts" are influenced by the methods through which they were accessed and by the theories underlying those methods, which is elementary knowledge to STS (Science & Technology Scholars),[2] taught in Philosophy of Science 101 and Science Studies 101. Logically incoherent as well as scientifically illiterate is the claim, parroted by Mooney, that science is so reliable because it is self-correcting: If correction is needed, then obviously what went before was *not* reliable, it was in need of correction; at any given instant, how can anyone know which bits of "reliably self-corrected" science are going to be further self-corrected later, perhaps even in the next instant?

Berezow and Campbell are equally scientifically illiterate, in awe of science because it "rigorously tests hypotheses and theories using well-controlled experiments. . . . Science lets the data speak for itself" (*Science Left Behind*:5). Science Studies 101: Data do not speak for themselves,

they are theory-bound and method-bound; and "the scientific method" of hypothesis testing is a popular myth, not a reality (Bauer 1992).



Mooney acknowledges that philosophy of science has not found "a firm line of demarcation between science and pseudoscience" yet insists that "we can safely use the term 'pseudoscience' as long as we simply define it as bad science taken to an extreme" (*War on Science*:21). But the reason for the failure to find demarcation criteria is the failure to find sound ways of defining what bad science is. Here ignorance and arrogance are both on display by Mooney.

Neither book discusses the actual scientific evidence on the topics they use as exemplars. The excuse given is the standard one: The writers do not have the expertise to understand the technical details and must accept what the experts say. Leave aside that writers who so lack understanding of their subjects have no business writing about them. An obvious clue to the validity of a claimed mainstream consensus is the existence of competent experts who dissent from that consensus. It takes absolutely no technical expertise to find out whether such people exist. Any competent interviewer should be able to go back and forth between representatives of opposing viewpoints and note who is responding and who is evading, who resorts to *ad hominem* instead of giving substantive answers, and so on. Journalists and science writers should be just as capable of evaluating truthfulness and reliability as lawyers and judges learn to be, or for that matter journalists when they interview politicians or celebrity entertainers or sports figures.

At any rate, these books do not even attempt to guide the reader toward substantive understanding of the science and its interpretations. They simply equate "science" with mainstream consensus and then cherry-pick topics to make their opposing cases, finding without any trouble instances where politically right-leaning and left-leaning people, respectively, question or deny a mainstream consensus. Thereby these books also talk past one another. Since *Science Left Behind* was written later than *The Republican War on Science*, surely it ought to have tried to convince readers that the

latter work was wrong in labeling something an attack on science, say, about human-caused global warming; instead, both books swallow the mainstream claim unquestioningly, even though the evidence for it is dubious at best (Bauer 2012c, Bauer 2012d).

Rhetorical Ploys

Mis-Direction

These books, then, are purely about politics and not about science. But this is made less obvious as both books often make a pretense of having a good grasp of the nature of science. A common ploy goes something like this: "Admittedly, science is never 100% certain," followed by "But a well-established soundly based conclusion that something is highly likely," which is clearly intended to inveigle readers into accepting that in this case it actually *is* 100% for all practical purposes. In a similar vein, Mooney (*War on Science*:15) illustrates how reliable scientific conclusions are by citing the roundness of the Earth and that it orbits the Sun. This is classic rhetorical mis-direction, that because science is reliable on absolutely non-controversial matters therefore it should be accepted on all other matters including the controversial ones where qualified experts disagree with the mainstream.

Somewhat similar is the admission that a few radical outliers to one's own camp push scientifically unwarranted arguments, laying the ground for the claim that the *real* non-Right or non-Left is on the side of science. But since neither book is properly grounded in any of the pertinent science, this gambit may backfire. Thus Mooney admits that "more radical groups have occasionally allowed ideology to usurp fact" (*War on Science*:7), e.g., in objecting to genetically modified (GM) foods; and the Institute of Medicine is cited: "to date, no adverse health effects attributed to genetic engineering have been documented in the human population" (*War on Science*:8). That last, though, is typical bureaucratic weasel-wording that should arouse suspicion. "To date" has not been very long; "documented" raises suspicions that there have nevertheless been some reports; and the need to stress "human" might imply that adverse effects have been observed in non-human animals. Google finds many reports of GM foods linked to allergic reactions in humans.

Counter-Examples

Neither book bothers to mention counter-examples to its sweeping generalizations:

1. Mooney attributes Republican anti-science "at its most basic level" (*War on Science*:5) to conservatism "that generally resists change" whereas science is a "constant onslaught on old orthodoxies." The last phrase betrays Mooney's ignorance about the routine resistance by mainstream science to genuine novelties (Barber 1961, Hook 2002, Stent 1972).
2. Mooney's basic assertion ignores the Right's love of commercially profitable scientific advances such as genetically modified crops and foods, marketing of new drugs by pharmaceutical companies, or oil-and-gas recovery by increasingly complex technology.
3. Mooney neglects to mention that for many years, almost the whole scientific community deplored the attacks by progressive Democratic Senator William Proxmire on the funding of basic scientific research for which he personally saw no immediate practical applications.
4. "The Right's oft-expressed disdain for 'liberal' higher education" (*War on Science*:6) is the diametric opposite of the true circumstances. The National Association of Scholars and its colleague-in-arms, the Association of College Trustees and Alumni, were founded by certifiably conservative people who have long waged battles against the dumbing down of higher education and in particular the demise of core curricula and liberal education.
5. Mooney contends that "mainstream science, economics, and political analysis" are countered by right-wing institutions such as the Heritage Foundation or the American Enterprise Institute (AEI). Both of those produce intellectually sound material not obviously inferior to what comes from left-leaning institutes, and it is often not obviously politically partisan, for example in the recent collaboration by Norman Ornstein of AEI with Thomas Mann of the left-leaning Brookings Institution (Mann & Ornstein 2012).

Trivialities and Irrelevancies

Polemics often deteriorate into trivialities and irrelevancies; for instance, who is guilty of a greater number of such technical transgressions as typos or unimportant numerical mistakes (Bauer 1984). Thus Mooney asserts that "Bush's nationally televised claim—that 'more than sixty genetically diverse' embryonic stem cell lines existed at the time of his statement—counts as one of the most flagrant purely scientific deceptions ever perpetrated by a U. S. president on an unsuspecting public" (*War on Science*:2). This was so horrendous because "more than three years later, [there were] only twenty-two available lines . . . and *scientists* consider many of those almost useless" (*War on Science*:4, emphasis added).

Note:

1. Had Bush said 22 originally, that would have carried essentially the same rhetorical weight as 60. Both would seem ample enough to begin research on, so far as the lay public is concerned.
2. It was some set of advisers, probably at several successive administrative levels, who came up with Bush's statement, he did not himself conjure up that 60. If Mooney wanted to criticize it, he should have found out how the number came about.
3. "Scientists" are cited as though this were a unanimous judgment—which it certainly is not. Unnamed sources are not very convincing. "Almost" useless is not useless.
4. Mooney does not delve at all into the scientific aspects of doing research at this stage with human embryonic stem cells. Leaving aside all questions of ethics, morals, or religion, one should surely ask, "What evidence is there that such research would deliver the speculative benefits claimed by would-be researchers, such as curing spinal-cord and brain injuries and diseases, and more?" It would seem obvious to me that one would not begin research with human tissues until it had been shown in several mammalian models that such benefits might be potentially achievable. It is no attack on science to be against human-stem-cell research before comprehensive animal trials have been successful.

Among the outrageous distortions of science uncovered by Berezow and Campbell (*Science Left Behind*:1–3) is the replacement of plastic utensils with compostable ones by a Democratic-controlled Congress. Such mole-hills do not mountains make.

Argument by Implication

Both books make copious use of scare quotes as a substitute for evidence. When the Right argues for sound science, Mooney describes that as "sound science," for instance, without anywhere explaining why the Right's asserted stance on the particular issue was *not* sound. That's what scare quotes are for, trying to make a point while finessing the issue.

Adjectives and adverbs are used to the same end as scare quotes. Mooney's book is chock-a-block full of this: Capitalism is *unrestrained*, conservative tendencies are *marked*, right-favored fringe viewpoints are not just fringe, they're *clear* fringe, and their rhetoric is *irresponsible*. On the other hand, conclusions about human-caused global warming are *robust*: "The conclusion has a fairly high degree of scientific certainty" (*War on Science*:19)—once again the implicit assertion that "highly likely" equals "to be taken as true enough for actions to be based on it." So heavily does

Mooney rely on this device that I thought it warranted formal recognition as *argumentum ad adjectivum*, a tactic that I have not seen described in discussions of philosophy or logic. But, as usual with my most original thoughts, Google revealed that others had earlier been no less original (Anderson 2009, Brooke 2012, Logic Wizard 2007, tsig 2011).

Mentioned Topics

A book review would normally give at least a list of the subjects covered. In the present case, both books are so tendentiously written that the actual topics they focus on are almost beside the point. Readers of both books need to be aware of the political bias, scientific illiteracy, and rhetorical tricks and subterfuges aimed at showing distortion of science without demonstrating distortion of science, because the actual scientific evidence is just not presented or described or discussed. Both books should be read between the lines and with deep skepticism about every assertion.

Among the mishandled topics, where these books themselves distort the science:

Mooney accepts mainstream warnings about second-hand smoke, whereas a politically non-partisan, science-based discussion finds the warnings quite unwarranted (Kabat 2008). He thinks "science" justifies research on human embryonic stem cells, even though the hoped-for benefits are no more than hopes. He accuses many Republican leaders of willingly distorting or even denying "the bedrock scientific theory of evolution" (*War on Science*:36). Here "bedrock" is another instance of *argumentum ad adjectivum*, but more important is that any arguments over creationism, intelligent design, and "the" theory of evolution ought to specify what that theory is taken to be: Is it that the Earth's flora and fauna have evolved through differentiation? From a single ancestor or from several? Did the ancestor(s) arise from inorganic matter? Does evolution proceed purely by "natural selection" from random mutations and accidental environmental changes? "Defenders" of "evolution" (like Richard Dawkins, say) all too often insist on a single origin from inorganic matter, which goes far beyond the "bedrock" evidence. At any rate, in his Chapter 4, "'Creation Science' and Reagan's 'Dream'," Mooney links Republican misdeeds as to evolution with young-Earth extremists. He asserts that "Star Wars" "pitted Ronald Reagan against *the* scientific community" [emphasis added], as though no scientists had favored the project; some did.

On human-caused global warming, Mooney says that dissenters "questioned the models' reliability" whereas "others would merely call their results uncertain—but no reputable scientist ever claimed otherwise" (*War on Science*:63). Perhaps Mooney has missed the statements from

the many non-disreputable mainstream scientists asserting that there is no doubt that human-caused emission of carbon dioxide is contributing to warming. And if results are uncertain, surely they are also unreliable. But *Science Left Behind* agrees that some conservatives "have embraced anti-science positions . . . on . . . climate change" (*Science Left Behind*:10); so Berezow and Campbell haven't really looked at the evidence either, and they even overlooked the ingenious ploy by mainstream "climate scientists" to substitute unfalsifiable "climate change" for falsifiable "global warming" (Bauer 2012c, 2012d).

For Berezow and Campbell, "progressives have a strange fetish with alternative energy" (*Science Left Behind*:4). They "have championed the unscientific anti-vaccine movement" (*Science Left Behind*:7); but many people have questioned a variety of vaccines, for example that Gardasil or Cervarix convey significant benefits without significant risks (Bauer 2008, 2009, 2011). Nevertheless, Berezow and Campbell assert unequivocally that there has never been controversy over vaccination, and that "the medical and scientific communities have always endorsed vaccines as one of the basic foundations of public health" (*Science Left Behind*:26–27); yes, *in general*, but there has been plenty of controversy over specific vaccines like the aforementioned Gardasil.

For Berezow and Campbell, technological progress to be embraced includes genetically modified crops (*Science Left Behind*:7), and they are sloppily and incorrectly disparaging of "Organic Food: The Holy Eucharist of Environmentalism" (Chapter 3). They claim "not even a single documented case of GM food causing . . . any lingering health problems" (*Science Left Behind*:40) despite the many reports of allergies. That the founder of Whole Foods is an Ayn Rand fan who practices yoga, they find ironic (*Science Left Behind*:40) without explaining why that is ironic. They claim that the "science behind GMOs is straightforward: Find a gene that is useful, and insert it into an unsuspecting organism we care about" (*Science Left Behind*:41). To do this so that the desired gene is expressed as desired remains an unsolved problem, because we do not (yet?) understand genomics well enough to place a gene appropriately; quite apart from the basic fact that "genes" are not the simple entities we used to think they were—*bits* of "genes" get activated and re-arranged and coordinated with other bits of other "genes" in the everyday workings of cells (Ast 2005). Genetic modification of crops is a hit-and-miss affair, for the same reason and just like the medical "gene therapy" that was all the rage several decades ago, before trials of it failed to work and killed enough human guinea-pigs that the glamour wore off.

In places, *Science Left Behind* is simply wrong on factual points:

"Europe's precautionary principle" is said to put the burden on corporations to prove that a chemical is 100% safe, when nothing can prove that; as opposed to "the status quo in America, which is that the burden is on the opposition to prove something unsafe" (*Science Left Behind*:18). Bunkum. The Food and Drug Administration is legally charged with approving drugs and food additives only if they have been shown to be both safe and effective; that its practices and criteria often fail to meet that commitment doesn't alter the fact that this is what the law calls for the FDA to do.

In Unhappy Conclusion

These much-hyped books are not even wrong concerning their allegations of political distortion of science, because they do not analyze any of the scientific evidence in order to demonstrate distortion. But both books are also wrong on many aspects of what science is and how it works, and nothing said on any specific topic can safely be taken as authentically reflecting the state of the art in the scientific community as a whole. Both books have clear political agendas, and pursue them with the same rhetorical devices one encounters in any partisan disquisitions.

This review is so negative because the books disappointed me so much, and because the purported theme of political interference with science is so important. I agree with Mooney and other "progressives" that the mainstream Republican agenda has been counterproductive in recent times, and I am dismayed that people agreeing with me on this should be so wrongheaded and ignorant when they bring science into the discussion. When I first heard of *Science Left Behind*, I was delighted that at last the scientifically illiterate bashing of Republicans would be exposed and set right, only to find that it is itself scientifically illiterate and politically motivated.

Notes

[1] Wikipedia is correct in attributing this expression to Pauli but totally wrong in saying it refers to "An argument that appears to be scientific . . . [but] cannot be falsified."

[2] The young discipline of Science & Technology Studies (STS) is an amalgam of history, philosophy, and sociology of science, and of technology, as well as of pertinent bits of other disciplines, e.g., science writing, or public policy—anything and everything that can throw light on the nature of science and of technology and of their place in the wider society.

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