



Does Pruitt Have a Point about Science?

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Scott Pruitt, the Administrator of the U.S. Environmental Protection Agency (EPA), is loathed by most researchers and environmentalists, but he may yet emerge as science's unlikely redeemer.

Pruitt is one of the least popular people in America. Before coming to DC, he was the attorney general of Oklahoma, where he described himself as “a leading advocate against the EPA's activist agenda,”— a claim he made good by suing the Agency no fewer than 14 times.

But Pruitt — who in public appears reasonable, quietly-spoken and polite — denies having declared war on the environment, only on the EPA's scientific protocols. The 1970 Clean Air Act requires the agency, when proposing new regulations, use criteria that “accurately reflect the latest scientific knowledge.”

Governmental skepticism of science has a long pedigree. On launching Medicare on June 15, 1966, LBJ berated the National Institutes of Health for having published lots of papers without their having benefited any patients. Earlier, in his Farewell Address, Eisenhower warned of US public policy becoming “the captive of a scientific-technological elite.” Now Pruitt maintains that skeptical tradition by challenging the EPA's science—and by extension, much of the way research is performed in the U.S. today.

Pruitt has forbidden the EPA from referencing papers that do not allow free access to their underlying data and methods. Non-scientists are often astonished to learn that, in many academic disciplines, there is no obligation on researchers, when submitting papers for publication, to make their original data available.

Non-scientists, moreover, rarely grasp how poor many peer-reviewed papers are. John Ioannidis of Stanford University is, sadly, famous for his 2005 study entitled “Why Most Published Research Results are False,” in which he indeed explained why most published research results are false. Why? Because the authors misused statistics. Consciously.

In a 2016 paper entitled “The Natural Selection of Bad Science”— published in no less a journal than Royal Society Open Science—Paul Smaldino (University of California, Merced) and Richard McElreath (Max Plank Institute, Leipzig, Germany) showed that researchers will select “methods of analysis ... to further publication rather than discovery.” Smaldino and McElreath further chronicled how, over the last half century, lone statisticians have in vain protested the institutional abuse of statistics by entire scientific disciplines. But everybody—authors, editors,

university presidents, funding agencies et alia—has an incentive to maximize publication rates, and if publication has to trump discovery, so be it.

In challenging the way the EPA does science, Pruitt is actually challenging the conflicts of interest now affecting many disciplines. When he discovered that scientists on just three of the EPA's Science Advisory Boards had, over the previous three years, collectively received research grants from the Agency of no less than \$77 million (thus incentivizing them to exaggerate environmental problems) he declared that members of the Science Advisory Boards had to be genuinely independent of the Agency. From the criticism that decision attracted, it is obvious that many researchers cannot see how receiving money can indeed generate a conflict of interest.

The source of many of science's problems today was identified in 2016 by David Sarewitz of Arizona State University who, in an essay entitled "Saving Science," identified peer review as the villain. In the days before science was funded by the federal government (ie, before 1940 in the U.S.) scientists were embedded in the real worlds of industry and of health foundations, where they were judged by discovery—and where, in the process we call technology, their claims of discovery were tested against reality. In Sarewitz's words, it is "technology that keeps science honest."

But scientists' claims of discovery are today increasingly tested not against reality; rather, they are judged by their peers. And peers have their paradigms. And those paradigms can be wrong. So dietary fat, for example, was for decades demonized by the deft application of statistics by researchers anxious to be funded, published and promoted by their peers. And salt was claimed, falsely, to be a major cause of population-level hypertension, while the principal cause of drug overdoses is claimed to prescription opioids rather than policies restricting them.

Pruitt's conduct and ethics at the EPA have been and will be criticized, and his attacks on the Agency's failings in science have been dismissed as the self-serving acts of a Trump partisan. But by highlighting science's systematic shortfalls, Pruitt might be doing it a favor.

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