



SCIENCE EDUCATION

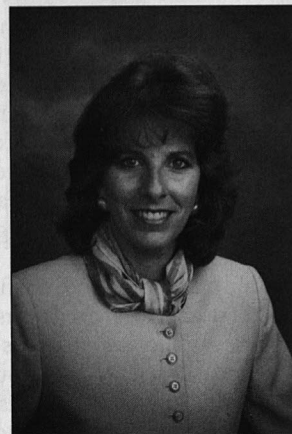
Dear AWIS Members:

The contributor to this issue's education column is Professor Jane Maienschein, from Arizona State University. For the past two years she has played a unique role in academia and in the political process as science advisor to her Congressperson. In this article, Professor Maienschein offers a birds-eye view of the role that scientists and science educators play, and can play, on Capitol Hill. The challenge she poses to the scientific community is whether or not we can be politically literate. Below is some food for thought.

Donna Gerardi
Science Education Editor

Science, Political Literacy and the 105th Congress

by Jane Maienschein, PhD



We regularly lament the lack of scientific literacy among politicians. Congressman Vernon Ehlers is fond of pointing out that he is the only PhD physicist in Congress—ever. But this is a story about the reverse, advocating political literacy among scientists.

Science and politics are often portrayed as opponents. After all, the traditional story goes, science is about observing the world and pursuing "objective," "pure," and "true" interpretations of nature. Of course, at some level we realize that at best we can pursue the most nearly possible objective, pure, and true interpretation within the particular context of the particular time. Still, the common perception is that science brings us ever closer to the "real truth."

In contrast, according to this view, politicians are inevitably tainted. They necessarily dwell in a world of special interests and compromise. They have to make decisions quickly, on the basis of limited knowledge, and with little apparent concern for the "facts." Even though by some counts fully half the votes before Congress relate to scientific issues, there are few scientists in Congress or even on the Congressional staffs. And little scientific literacy. Or so scientists believe. And many politicians regard

scientists as advocates working in their own self-interest rather than for any public good. Conflicts seem inevitable, and the battle lines seem clear.

I deny that this is necessarily so. Indeed, scientists are quite capable of acting politically even when they do not realize that they are doing so. And politicians are quite capable of weighing scientific evidence and taking scientific claims and claims for the reliability of science very seriously—they just may need a little help.

My academic work exploring the history and philosophy of science, with a focus on the last one hundred years of developmental biology and genetics, already calls this stark dichotomy into question. And during the 105th Congress I had the great fortune to serve as science advisor to my Congressman Matt Salmon (AZ-1st District), thereby providing an up-close look at the interactions of science and politics. Arizona State University assigned me to serve as science advisor to the Congressman and to increase communication between ASU and Washington. I started in January 1997 with suspicions that the situation was pretty bad. Congressman Robert Walker, as head of the House Science Committee during the 104th Congress, had made it clear that he had low regard for the social sciences and little re-

spect for the authority of science generally. Some early statements by the 105th Congress's Science Committee chair, James Sensenbrenner, did not inspire confidence either. Though apparently positive about science, he readily admitted that he had not done well in science in school—a popular admission among political leaders, I have since discovered. Fortunately, my conservative Republican Congressman is a smart and good man, ready to listen and eager to learn. He gave me hope, and the situation is much different than I feared.

We began last year with his explanation that he seriously wants to be environmentally-friendly, but that the confusion of what is offered as fact and information makes it difficult to know how. He explained that when he entered Congress in 1995, he was given Dixie Lee Ray's *Trashing the Planet* as a guide to environmental thinking. He asked my view of that work and what he should look to instead if that was not reliable. On the advice of a colleague, I suggested Paul and Anne Ehrlich's *Betrayal of Science and Reason*, which provides a direct response to Ray's book. Our discussion of those two books and what they show about how science plays out in the political arena began a good relationship of developing trust and open-minded learning by both of us. The

process of learning to communicate across many boundaries has made it clear to me how often scientists actually engage in political behavior, even without realizing it, and how often politicians try to be scientifically grounded, even when that may not be apparent.

I contend that it is much wiser to recognize what we are really doing, to embrace the political world, and to work within it to maximal effect. Rather than pretend that science is pure, let us make it as informed and as effective in the public arena as we possibly can. This endorses but goes beyond Science Advisor to the President Neal Lane's call, in his previous role as Director of the National Science Foundation (NSF), that scientists should become public citizens: not just becoming public in the sense of being willing to talk about science in public that we need. We also need scientists who are prepared to work effectively in the political context—not as lobbyists but as interpreters.

In particular, we need three clear messages:

(1) science changes over time, such that what is the best science one day may no longer be the best at a later time.

(2) science thrives on discussion and competing ideas, such that at any given time apparently conflicting conclusions can both result from "sound science." It just takes time to sort things out.

(3) science operates in society and for society, not in a vacuum, even while the epistemological standards of knowledge and evidence are determined by convention within the scientific community.

An Example

Let's look at HR 3007, the 105th Congress's attempt at legislation concerning Women in Science. The bill was introduced by Representative Constance Morella, a great supporter of science and of women in science. She had introduced similar legislation in earlier sessions, to no effect, but this one has some differences. Let's look at some of the differences first and then consider their implications.

The bill, as amended in the subcommittee on technology, was called the "Commission on the Advancement of Women in Science, Engineering, and Technology Development Act," whereas previous bills were labeled the "Commission on the Advancement of Women in the Science and Engineering Work Forces Act." A subtle and minor difference, it seems, but this does two things. It shifts the focus from work

force to more general considerations, therefore diverting the wrath of those opposed to what they see as unacceptable attempts to establish quotas. Second, focusing on science, engineering, and technology allows the bill to be referred to the Science Committee, and including technology allows a focus on the current uncontested shortage of computer scientists. This strategy garners greater support for the bill from a wider range of supporters. The bill was signed into law by President Clinton on October 14, 1998.

This all makes good sense and so far represents both good politics and good science. Nothing is lost by expanding the scope and revising the emphasis and much is gained. But here comes the problem. In order to fit appropriately in the Science Committee's mandate, the bill needs a solid science component. In order to fit in the Technology Subcommittee (of which Representative Morella is chair), it needs a clear technology component. So, the Congresswoman and her staff added a section to the bill in the 105th Congress. Section 11 of the bill as originally proposed called for "(a) STUDY.—The National Science Foundation shall conduct a study of the educational opportunities available to women who desire to enter the fields of science, engineering, and technology."

This version of the bill was vetted through a number of groups, including leading women's groups, and it was the version introduced for consideration at a hearing before the subcommittee. The witnesses, leaders of major women's groups, each spoke to the value of the proposed legislation, citing the importance of effective mentoring in attracting and retaining women in science and technology. They spoke enthusiastically, and the tone of the hearing remained informal and friendly. There was relatively little presentation of detailed statistics or acknowledgment that we already know a lot about what works and what does not.

At the time, I wondered why these leading women in science took this approach. They told anecdotes in the questioning period, presented individual stories, and all supported the bill without suggesting revisions—even though they surely all knew that the sort of study the bill would mandate is already carried out by the National Science Foundation as Women, Minorities, and Persons with Disabilities in Science and Engineering (most recently, 1996). Staff members for the minority told me that several leading women had acknowledged the

bill's flaws but that they regarded it as a good thing anyway. Indeed, a number had admitted that they were eager to be selected to serve on the Commission. Majority staff members also reported strong support from prominent women's groups and no serious concerns, except from one Member of Congress who rejected anything that might look like it supported quotas. He was assured that this was not the intention and supported the bill.

The Moral

But wait. This is good politics, but is it good science? Is this intellectually honest? Though the initial proposal had some problems in the proposed size and membership of the commission, that was easily corrected before the bill went to mark-up in the committee. But nobody said anything about the fact that the NSF already does just the study that the bill would have required in that section 11. The leading women's groups, and surely all the distinguished witnesses, know perfectly well that a 1980 law requires the NSF to produce a biannual report on "Women, Minorities, and Persons with Disabilities in Science and Engineering," rich with data and discussion. It seems like bad science, in the sense of not being true to available data, to ignore the existence of this report.

Yet herein lies a dilemma for scientists working with Congress. Is it better to ignore weaknesses on the grounds that they aren't *that* important and it is better to have a flawed law than none at all? Or is it better to try to fight for something stronger and to respond more fully to what we really need, even realizing that we might lose? How should scientists act when the politics is good but the science is bad? We found that when we raised this concern and several others, the staff and Representative Morella were quite willing to revise the bill, and the language about the "study" was struck out. Instead, the Commission would examine what we know from existing data. In the end, at least in this case, it turned out to have been much better to speak up and to work for a better bill since it actually gained more support without the problems. But such decisions must be context-based and must respond to the circumstances at hand. I believe that since scientists do act politically in such cases, that we must be more politically literate that most of us currently are, and that we must also adhere to the highest scientific values at all times. We will have to learn how to do this.