

WASHINGTON ROUNDTABLE
ON SCIENCE & PUBLIC POLICY

**A Discussion of
*Politicizing Science:
The Alchemy of Policymaking***

with Michael Gough, Roger Bate
& Henry Miller

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Michael Gough, editor, is an adjunct scholar at the CATO Institute and former official with the Office of Technology Assessment. He has chaired government committees on possible health effects of herbicides, Agent Orange and dioxin. He is the author of more than forty papers on environmental and occupational health and is a fellow of the Society for Risk Analysis and was president of the International Society for Regulatory Toxicology and Pharmacology. His Ph.D. is from Brown University.

Roger Bate is the director of the International Policy Network in Washington, D.C. and an adjunct Fellow at the Competitive Enterprise Institute, also in Washington. He was the founder of the Environment Unit at the Institute of Economic Affairs in 1993, and he co-founded the European Science and Environment Forum in 1994. He is a board member of the South African non-governmental organization Africa fighting Malaria. Bate's Ph.D. is from Cambridge University.

Henry Miller, M.D. is a Research Fellow at the Hoover Institution, Stanford University. He was the founding director of the Food and Drug Administration's Office of Biotechnology and represented the U. S. government on various expert and policy panels. He was the Robert Wesson Fellow in Scientific Philosophy and Public Policy at the Hoover Institution and has published numerous monographs on risk assessment and management and regulatory policy and reform. His research articles have appeared in *The Lancet*, *Nature*, *Nature Biotechnology*, *the Journal of the American Medical Association* and *Science*.

A Discussion of
*Politicizing Science:
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July 24, 2003

Jeff Kueter: Welcome everyone. I am Jeff Kueter, Executive Director of the George Marshall Institute, and I am pleased to bring together this excellent group to discuss our new book exploring the relationships between politics and science.

Politicizing Science: The Alchemy of Policy Making details the consequences of political intervention that have produced bad science and public policy. Often in politics, perceptions are reality and facts are negotiable. This is the case because politics is a complex occupation that involves competing interests, conflicting objectives, trade-offs and personal values. In a world where there is more gray than black, it is all too easy to “bend the truth” and “selectively interpret” facts to shape outcomes.

In the book, leading scientists involved in environmental issues share their experiences and observations about the manipulation of science for political ends. The essays describe the misapplication or outright manipulation of the scientific record to advance policy agendas. These actions have consequences which are borne by everyday citizens, not those who politicize science at the expense of objectivity.

Science and politics have always been intertwined. This is natural, since science both strengthens and challenges existing political structures, affects economic outcomes, and changes our understanding of the world around us. The book’s cover, with its image of Galileo Galilei, recalls a significant episode in the long struggle to balance objectivity in pursuit of scientific knowledge with the impact that pursuit has on politics.

Among his numerous inventions, Galileo built a telescope that could magnify objects twenty times. That device allowed him to examine the moon in detail, discover four satellites of Jupiter, observe a supernova, verify the phases of Venus, and discover sunspots. His discoveries confirmed

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the Copernican system, which states that the earth and other planets revolve around the sun. At that time, it was generally held that the universe was geocentric, meaning the sun and planets revolved around the earth. Galileo's belief in the Copernican system eventually got him into trouble with the prevailing scientific orthodoxy of the day. A committee of scientist-theologians declared that belief in the Copernican system was heretical. Because Galileo supported the Copernican system, he was warned by the church that he should not discuss or defend Copernican theories. He refused and was imprisoned for a substantial portion of his life.

Galileo's story is similar in many respects to those told in *Politicizing Science*. While none of our authors has been imprisoned for their beliefs (that I know of), the eleven chapters detail the costs and consequences to individuals and society of the intentional and unintentional manipulation of science for purely political ends. Before I introduce the panel, I want to thank the Hoover Institution for their active participation, advice and support. Without it, this book would not have been produced. At this point I would have turned to my colleague Jeff Bliss from the Hoover Institution for his comments, but unfortunately Jeff had a medical emergency over the weekend and was not able to join us. The Marshall Institute is indebted to all the authors for sharing their insights with us, but we owe a particular debt of gratitude to Dr. Michael Gough, who not only authored a very insightful chapter on Agent Orange, but also had the enormous task of editing the volume, for which I think he did a commendable job.

Mike, now a consultant, directed the Office of Technology Assessment's congressionally mandated oversight of Executive Branch studies of cancer in veterans of atomic bomb tests and the health of Vietnam veterans. He chaired the Department of Veterans' Affairs Advisory Committee about the possible health effects of herbicides used in Vietnam and the Department of Health and Human Services committee that advises the U. S. Air Force study of the health of Air Force personnel who sprayed Agent Orange in Vietnam. He is the author of *Dioxin, Agent Orange* and the co-author with Steve Milloy of *Silencing Science*. The author of more than forty papers about environmental and occupational health, he has testified before Congress about three dozen times. He is a Fellow of the Society for Risk Analysis and was President of the International Society for Regulatory Toxicology and Pharmacology.

Dr. Roger Bate is the director of the International Policy Network and an adjunct fellow at Competitive Enterprise Institute (CEI). He was the founder of the Environment Unit at the Institute of Economic Affairs and

co-founded the European Science and Environment Forum. He is a board member of the South African nongovernmental organization Africa Fighting Malaria. Dr. Bate is the editor of *What Risk?*, a collection of papers that critically assess the way risk is regulated in society, and the author of several scholarly papers about risk and policies in developing countries. In addition, he has published numerous articles about risk and politics in newspapers and magazines around the world. He has a book published in 2000 entitled *Life's Adventure: Virtual Risk in a Real World*.

And finally joining us today from California is Dr. Henry Miller, a Research Fellow at the Hoover Institution. Henry's research focuses on public policy toward science, technology and regulation, especially in the pharmaceutical and new biotechnology areas. Henry joined the Food and Drug Administration in 1979; he was the founding director of the FDA's Office of Biotechnology and he represented the FDA and the US government on various expert and policy panels. After leaving government service, he became a fellow at the Hoover Institution where he authored numerous publications about risk assessment, management and regulatory policy and reform, including *Biotechnology Regulation: The Unacceptable Costs of Excessive Regulation* and *To America's Health: A Model for Reform of the Food and Drug Administration*.

The panel discussion will proceed in the order I introduced them: first Mike, then Roger and then Henry. I have each of them to summarize their chapters, with Mike providing an overview of the book as a whole, and then we will follow that up with some questions.

Michael Gough: Thanks, Jeff, and I thank all of you for coming out here to hear about our new book. The book is a compilation of ten essays on various aspects of politicized science and an introductory overview chapter. I am going to sketch out some of the issues that we illuminate in the book, briefly mention the book's authors and their chapters, and the subjects of their essays, and then sit down so Roger and Henry can tell you about their chapters.

In the first essay in the book, William Happer states "Most Americans want to protect the environment and think of themselves as moderate environmentalists." When he was at the Department of Energy, Happer saw many examples of what he characterized as extreme environmentalism. He was "amazed that the great bulk of federal funds for environmental research from the Department of Energy (DOE), National Aeronautics and Space Administration (NASA), Environmental Protection Agency

(EPA) and other federal agencies flowed into research programs that reinforced the message of imminent doom.” Happer treated this politicized science as part and parcel of politics and said, “There is no surer way to build a powerful bureaucratic empire in a democracy than to promote a supposed peril and then staff up a huge organization to combat it.”

Happer’s comment echoes almost precisely a comment of H. L. Mencken, who years before wrote, “The whole aim of practical politics is to keep the populace alarmed and hence clamoring to be led to safety by menacing it with a series of hobgoblins, all of them imaginary.” I would qualify that; some of the environmental hobgoblins we chase are not imaginary, but many of them are. Two other essays in the book, one by Henry Miller, discuss direct intervention by federal officials in scientific activities; the other chapter that discusses direct intervention of politics into science and science decision-making is by Joseph P. Martino, a retired Air Force colonel and engineer, who writes about some of the most publicized environmental decisions in the last two decades: spotted owls, lynxes, the re-introduction (or perhaps introduction) of wolves into Yellowstone Park and conflicts over water use in Oregon.

Our book is really about a small subsection of science that we can call risk assessment. Risk assessment begins with assertions, an assertion that a substance or a process causes or may cause harm. Assertions are sometimes equated with scientific hypotheses, but hypotheses generate questions while assertions are calls for action. I do not equate those who make assertions with totalitarianism, but their tactics are strikingly similar. Hanna Arendt is cited as the source for the idea that totalitarian rule is predicated on the assumption that proving a thing is true is less effective than acting as though it were true.

Individuals in environmental organizations can bypass the usual norms of scientific publication, review, and criticism, and go directly to the public and Congress with their assertions. Members of Congress typically respond to assertions with “better safe than sorry” statements and actions, bestowing credibility on the assertion in the absence of any newer evidence. The media are conduits and megaphones for assertions. Stories of doom and impending doom make headlines and lure viewers and generate support for Congressional and White House actions.

Three chapters in the book are analyses of the persistence and importance of assertions in risk assessment. In his chapter about the death of nuclear power in the United States, Bernard Cohen documents the role of

the media in keeping assertions alive. Over the course of a few months, the *New York Times* published fourteen articles about excesses of cancers among nuclear shipyard workers. It published a single story, buried on page 36, when the Centers for Disease Control (CDC) found there were *no* excess cancers in the shipyard. It published not a word about a far larger Department of Energy study that found lower cancer rates among the nuclear ship workers than among the non-nuclear ship workers. With this kind of coverage, what chance does the reader have to learn that the excess cancers never existed?

Steven Safe, a very distinguished biochemist, analyzes the evidence that endocrine disruptors in the environment have caused human health effects. He shows that study after study and test after test have failed to support that assertion. No matter – the assertions are still heard and expensive testing programs flourish, generating costs that industry passes on to consumers with no expected health gains. The fact that study after study finds no effects is countered by demands for one more study or for a bigger study.

Bruce Ames and Lois Swirsky Gold argue that the idea that environmental chemicals cause cancer has been a distraction. Not only has it cost money for the government and for private industry, but it has deflected scientists and policy makers from pursuing changes in lifestyle and diet that can profoundly reduce cancer risks and rates in the United States.

When science is incomplete or unclear or unconvincing, as it sometimes is, politicians can call on consensus panels to tell them what the science means. Characteristically some chapters of consensus reports present the conflicting or confounding evidence that caused the foundation of the consensus panel in the first place, but the policy-related chapters split the difference or strive to reach a middle ground. Policymakers who read only those chapters get a far from complete picture of the science and the uncertainties that underlie it.

Patrick Michaels examines the composition and work of a government-sponsored consensus panel that investigated possible effects of climate change. Only two members of the consensus team had the academic training and experience to evaluate and select among the dozens of climate models that the panel might have chosen to use to predict climate change in the 21st century. He demonstrates that the models chosen by the panel were the ones that predicted the most extreme changes in temperature and in rainfall and that those models failed to predict temperature and rainfall

changes in the 20th century when the models were tested against available information. In other words, the models don't appear to be terribly reliable. Michaels urges that a new panel be formed to consider a variety of models and to provide Congress and the White House with a better foundation to understand what may be happening to climate.

Many people have asserted that Agent Orange has caused and is causing diseases and deaths among Vietnam veterans and birth defects among their children or even birth defects among their grandchildren. But studies by the CDC and the Air Force have failed to verify those effects. Congress, many of whose members are convinced about adverse health effects from Agent Orange, turned to the National Academy of Sciences (NAS) for a review of possible health effects and the Academy assigned that responsibility to one of its component organizations, the Institute of Medicine (IOM). Since 1990, an IOM committee has churned out reports about associations between Agent Orange and a number of diseases. The IOM repeatedly says that its reviews fall short of the rigors of usual scientific review. It does not say what standards its reviews *do* meet. I cannot find support for the often-made statement that Congress forced IOM into less than scientific reviews. In any case, whether demanded by Congress or adopted by the IOM as an expedience, the IOM, a part of the National Academy of Sciences, dispenses advice and conclusions that are labeled "less than scientific." This is politicized science writ large.

In the 1970s the German Green Party offered the Precautionary Principle as an alternative to the use of science to decide about environmental risks. The Principle has no definite definition; there are more than twenty in treaties, laws and the policy literature. Nevertheless, the heart of the principle is the idea that nothing should be added to the environment unless we can be absolutely sure it will have no harmful effects. That hurdle is so high that the Principle would hobble innovation and cripple economic growth. Robert Nilsson, who was until recently a senior scientist at the Swedish agency that regulates chemicals, discusses how the Precautionary Principle led Sweden to ban some chemicals that had been approved for use throughout the European Union. Nilsson sees two possible futures for Sweden's regulation of chemicals: Sweden's membership in the EU may force its regulations into line with Europe's or differences about regulations may play a small role in Sweden's deciding to leave the EU.

Roger Bate will talk about the Precautionary Principle and other regulatory principles that have moved from the developed rich world to the less-developed poor world with sometimes devastating consequences.

The desire to discredit those with whom one disagrees appears to be deeply rooted in human nature. In today's world, it is apparently fair to question a scientist's integrity because of the source of his salary or research funds, and to say that he is a hired gun, willing to say anything that those who pay him want. If a person's integrity is doubted, why should anyone listen to him? These attacks are frequently made on industry scientists and people who take money from any part of the industry. A writer in *The Economist* put his finger on the one-sided nature of such attacks: "Environmentalists are quick to accuse their opponents in business of having vested interests. But their own incomes, their fame, and their very existence can depend on supporting the most alarming versions of every environmental scare." I think that is frequently lost in discussions about the sources of money.

In the final chapter of the book, Fred Singer recounts Vice President Gore's following well-worn tracks in calling on Ted Koppel, the TV news anchor, to investigate Singer's funding. The attempt blew up in Mr. Gore's face. On a broadcast in February 1994, Mr. Koppel asked, "Is this a case of industry supporting scientists who happen to hold sympathetic views, or scientists adapting their views to accommodate industry?" Mr. Koppel went on to say, "The measure of good science is neither the politics of the scientist nor the people with whom the scientist associates. It is the immersion of hypotheses into the acid of truth. That's the hard way to do it but it is the only way that works." I think it is remarkable in this day and age and in our country that this ringing endorsement of science came from a TV newsman, not from the president of the National Academy of Sciences and not from the director of a federal research agency.

Politicizing Science contains three recommendations, which I will mention briefly:

- 1) To demand transparency. Congress had mandated that federal agencies provide all information produced under federal awards to interested parties. Such information will be of value to those who want to understand and to support or to challenge the scientific bases for agency decisions. But the power to examine must be used.
- 2) To establish advisory panels and get rid of consensus committees. Congress and the Executive Branch should insist that advisory panels include participants knowledgeable about the issues under review

and that the committees place a high priority on vigorous debate rather than a focus on consensus. Reports should, of course, draw attention to issues where there is agreement, but they should also include minority and divergent views on issues for which there is a range of credible scientific views.

3) To continue U. S. policies about science, risk, and the environment. Improvements in risk assessments and management will not come from policies based on the Precautionary Principle or any general principle that ignores the specifics of risks and benefits.

It is far better to emphasize science and evaluate how well it works than to chase after lofty aspirations embodied in politically derived principles. Thank you.

Roger Bate: Good afternoon. Thank you very much to Jeff and the Marshall Institute and the Hoover Institution for hosting us this afternoon. It's a pleasure to be here to talk to you. I come here wearing several different hats, Africa Fighting Malaria, the International Policy Network, the Competitive Enterprise Institute, the Institute of Economic Affairs, and others. I am a serial think-tanker, if you like. But there is a unifying theme to most of my work and that is the impact of Western policy on poor countries, and particularly how our preoccupations – that is, Western preoccupations – cause problems for the poor.

Michael has already mentioned the Precautionary Principle, and of course there is the old saying “look before you leap.” It has, I suppose, a more sophisticated interpretation in the philosophical literature as “precautionary decision-making under uncertainty,” but it is a very old saying and we all know that since there is never perfect knowledge, most political decisions, in fact most decisions we make every day, occur under uncertainty. Uncertainty and how to deal with it is always part of public policy; assessing the risks, the costs, and the benefits is part of the process. Looking before we leap, the precautionary aspect, is an extremely important component of decision-making. But as many people here know, in the recent past this has been taken to new dimensions. The use of the Precautionary Principle has become very well documented in the philosophical, political and other areas of the academic literature. The problems of the use of the Precautionary Principle are almost as widely discussed. My concern, my chapter in the book, and what I will discuss briefly today, is the impact on the poor, those people that proponents of the Precautionary Principle hope will be helped by it. But unfortunately for the poor, the impact in every case that I

have ever looked at in any detail is negative. The Precautionary Principle costs hundreds, often thousands of lives in different policy areas. I am going today to give two brief examples.

One of the less well-discussed impacts of the European Union ambivalence towards genetically modified (GM) foods is its impact on poor African countries. Balancing potential environmental harms with the benefits of GM food benefits, both in terms of lower cost of food production and directly in other aspects in the environment, is a debatable business. I say it's debatable, but I think the science is fairly conclusive that GM food is safe. Weighing up probable starvation on one hand versus potential harm to human health from genetically modified food on the other is, as far as I am concerned and as far as most government agencies are concerned, a "no-brainer." Southern Africa, where I spent about two and a half years of my life, has been experiencing a drought over the last year and a half. Compared with the terrible drought and famine of the early 1990s, the current drought is far less severe. Yields have only dropped by about 7% on average and the news is nowhere near as bad as it was in the early '90s. However, the news isn't good, because some country's yields have dropped by far more than 7%. In Zimbabwe, there is a drastic reduction of 71%, which has very little to do with the weather and more to do with the despotic policies of President Mugabe.

But in other countries, the crisis is more driven by the weather and food policies. Zambia's yield, for example, was down at the beginning of this year by 35%. If we go back almost a year, Zambia, even with some of its people starving, decided to ban the import and distribution of all genetically modified food aid. This includes corn from the United States that had been accepted for the previous six years. But using the Precautionary Principle, Green politicians and Green pressure groups finally managed to influence local scientific opinion in Zambia. An assessment provided by Dr. Lewanika, who is a senior Zambian scientist, claimed that not enough was known about GM food safety, and invoking the Precautionary Principle, said that Zambians should not consume GM products until he and his government were satisfied that they were safe. The result was less food in the country and starvation in some locations. Dr. Lewanika's report also said (with some validity) that the local farmers would be unable to export their crops to Europe if there was the suspicion that they had become tainted with genetic modification. Of course, he was supported in this assertion by the Zambian Organic Farming Association, which also pressured the government not to allow genetically modified food aid into the country. Facing famine, now about eight months ago, the Zambian president appeared

poised to lift the ban on GM food aid. He had sent Dr. Lewanika and some other experts to Europe and America to analyze GM experimental sites. Unfortunately, the scientists were still being heavily influenced by groups like Friends of the Earth Netherlands, British Action Aid, groups which oppose biotechnology, and the new Zambian report maintained an anti-GM food stance. The final possibility that the president would change his mind was shot down when the opposition leader came out in favor of GM food aid, since of course in any political battle, whatever your opponent does, you have to toe the other side.

Famine in certain parts of Zambia could have been alleviated if not completely stopped, if GM food aid had been accepted. But the invocation of the Precautionary Principle, the Cartagena Protocol on Biosafety, and all manner of other European NGO-driven regulations based on precaution lead to the death of Africans. Of course, the African leaders deserve most of the blame; they should have had the courage to accept what they knew. Over a billion meals, maybe ten billion meals, have been eaten by Americans to no ill effect. They should have accepted that, but the unscientific application of the Precautionary Principle was behind the problem.

The second example, and the one that I concentrate a lot on in the book, is the issue of malaria and the campaign to ban the pesticide DDT. DDT was used most effectively during the Second World War to halt the spread of parasitic diseases, things like typhus, yellow fever, malaria and dengue fever, and the use of it was so successful that the World Health Organization embarked on a big program to try and eradicate malaria from Africa and elsewhere. Within a few years there had been remarkable successes with malaria eradicated from eleven countries and massive reductions elsewhere. The best example is probably India: 75 million cases down to 50,000 within the space of ten years. However, DDT was also widely used in agriculture and that use sparked a long and concerted anti-DDT campaign by environmental groups. But what is important to realize is that controlling lice and mosquitoes for indoor use of DDT has never caused any environmental harm. The US government banned DDT in 1972 using very flimsy evidence (but at least based on some aspects of science) that agricultural use of DDT was harming wildlife. Environmentalists claimed that DDT was causing cancer, the early onset of puberty in young girls, shortening of the lactation period in young mothers, and a panoply of other related effects. But there has never been a replicated peer-reviewed study showing any human harm from DDT.

Although using DDT didn't eradicate malaria, the insecticide remains an important component of nearly all successful malaria control campaigns in southern Africa. South Africa is probably the best example, because in 1996 South Africa continued to use DDT keeping the number of cases of malaria to fewer than 1,000 every year. In 1996, under pressure from Green NGOs, European and American bureaucracies and aid agencies, South Africa stopped using DDT. It used an alternative insecticide sprayed on the inside of buildings to prevent the mosquito from entering. Not surprisingly, malaria rates soared by 1,000% and death rates went up 1,200%. Then in 2000, because resistance was building up to the alternative pesticide, they went back to DDT and malaria rates have plummeted by 80%.

The only reason they were able to do this is that South Africa is a relatively wealthy country. Every other African country is reliant on aid for its malaria-control programs and donor agencies are under pressure too on the Precautionary Principle. The aid agencies are loathe to fund indoor residual spraying with any pesticide, not just DDT. The Swedish International Donor Agency, for example, claims it cannot fund the use of DDT in poor countries because it is banned in Sweden, but I bet if 3% of Swedish babies died from malaria every year, they would change their policy.

Other donor agencies including the US Agency for International Development (AID) say that they can use it in an emergency. Well, frankly I don't know what kind of emergency would warrant USAID sanction of DDT use. Apparently a child dying every twenty seconds obviously isn't an emergency. Until an emergency occurs, the USA will continue to fund the use of bed nets and that's about it. It is becoming increasingly obvious that USAID is conducting a gruesome scientific experiment on African children. NGOs and their media friends applaud the bed net approach. I am not against bed nets; they are extremely useful, but their impact in reducing malaria is not as significant as using insecticides on walls, and it is a lot more expensive.

The DDT issue demonstrates how a precautionary-led Green agenda can lead to international regulation that is extremely harmful for the poor. It will also come back to bite other people, literally. We are going to see more West Nile fever cases in this country. We are already seeing malaria cases which are not just "suitcase" malaria victims coming back from abroad. There are pockets of malaria developing in this country and West Nile virus is going to get worse and worse. It will probably end up being endemic in most of the states.

There are many other examples, some of which I discuss in the book, increasing because of the use of precaution. One of the most dangerous aspects of it, which Robert Nilsson discusses extensively in his chapter, is a kind of self-regulation of business. Concerned that they are continually attacked by a liberal media and environmental pressure groups, they begin a self-regulation. We are increasingly seeing in European chemicals policy today the notion that chemicals used for decades may harbor dangers greater than originally thought. This notion is making it every day harder for the poorest countries in the world to use these chemicals, which are the only ones that they can afford because they have been around for the longest and they are the cheapest to produce. Given the past performances of the European chemical industry, and also unfortunately the American one as well, these companies will come under pressure from legislators domestically and then export that pressure to the rest of the world. They have done it before; they will do it again.

Precaution is an important part of policy decision-making but we should remember that it can and does kill; it especially kills the poorest people in the world. We should always look before we leap but on average, it is only by leaping that we advance and the Precautionary Principle stops us from making that stand. Thank you very much.

Henry Miller: I think it is useful to think of science as consisting of three interrelated components. The first is the paradigm itself, the process by which we test hypotheses and accumulate new knowledge. Most of you are familiar with this; we use appropriate positive and negative controls, we have certain constraints on how data are treated, and so forth. The second component is the actual testing that conforms to the paradigm, what we call research. There are certain ways of randomizing patients or subjects in trials and certain rules in actually performing the research. Finally, there is the body of knowledge that emanates from appropriately conducted experiments, the hypotheses that generalize and organize our data, and the data itself. Mike Gough has alluded to the IOM's studies of Agent Orange in which they acknowledge that their conclusions and studies do not meet usual scientific standards.

This is a kind of pernicious Never-never Land, because when we accept less than the usual, generally recognized standards, eventually we end up in a situation that was characterized by remarks made by former Mayor of Washington Marion Barry at a press conference some years ago. When he was being tenaciously, persistently questioned by a new *Washing-*

ton Post reporter about some facts that he was representing, finally Hizoner stopped his remarks and said to the reporter: “You know, young man, in this town you’re going to have to learn that there are two kinds of facts: real facts and made-up facts.”

We have come to tolerate some of that in politics but it shouldn’t leak over into science. Although science itself is, or should be, value-neutral, inevitably it is subject to political influences. For example, you have heard a little bit about the DDT example. Science can certainly demonstrate that we can control mosquitoes safely and effectively with this chemical and that we can markedly reduce the incidence of mosquito-borne diseases such as malaria and West Nile fever. Science can demonstrate that in animal models, stem cells can be used effectively to treat and reverse the effects of many degenerative diseases, but in the end it is political considerations that will dictate the public policy that governs what choices we make about these possibilities.

The more prominent these political considerations become, the greater potential for abuse. Politicization taken to the extreme can permit governments or powerful advocacy groups to misuse science and scientists in order to serve ideology or simply, as Will Happer pointed out in his chapter, to obtain fame, fortune and power, the usual drivers of politicization. When political fortunes change and a new party comes into power in the Executive branch, one must expect a change in overall philosophy of government and the same is true of the Congress which exerts oversight over Executive department agencies and controls their purse strings. Such changes are part and parcel of the political process and are to be expected. Occasionally, however, we see the imposition of improper coercion and influence on science-related activities that are outside the recognized rules of the game, outside the boundaries. There were many such examples during the Clinton administration; some of those are described in my chapter, but I won’t describe those today. I will only note that in that era, most of the responsibility for science and technology policy was delegated to Vice President Gore, who fancied himself a “policy wonk” in the science and technology area, but many of the policies that he and his staff implemented were in fact ideologically driven and had little scientific justification.

As related throughout the book, radical NGOs (non-governmental organizations) frequently politicize science, often in conjunction with government agencies. A stunning example came to light just this month in the *Letters to the Editor* column of the July 11th 2003 issue of the journal *Science*. Jerry Cayford of Resources for the Future was responding to a

policy forum that had appeared shortly before by Steven Strauss, professor of forest science at Oregon State University. Strauss had called for more science-based regulation, more lenient regulation, of field trials of biotech products in agriculture when those products were of demonstrably obviously negligible risk. Cayford's letter to *Science* says in part, "Steven Strauss makes a plea for less onerous field trials regulations for less radical genetic modifications, thereby helping smaller companies and public sector investigators to be able to afford to try out crops variants." I will digress from the quote for a moment. Now the kinds of candidates for field trials that we are talking about here are plants that can use less water, plants that grow with less agricultural chemicals such as less pesticides – which implies less occupational exposures – less runoff and so on, plants with increased nutritional capabilities, all sorts of things that are very important to public health and to the health of the environment. Now I will continue with Cayford's quote. He says about Strauss's letter, "Unfortunately his plea ignores the *politics* of the genetically modified food debate. Strauss's proposal, reasonable as it may be, asks critics of biotechnology to surrender a major bargaining chip, strict regulation of field trials, but offers them nothing in return." In other words, rational regulatory policy is not a goal in itself because it favors consumers, researchers, commerce, and the public interest generally, but is a bargaining chip to be held or given up in a negotiation between radical groups and the government. This view is not terribly surprising; we have seen it again and again on biotech and other areas that are generally subsumed by the Precautionary Principle, as Roger Bate has discussed. But it is unusual to see it stated so blatantly and so cynically and so publicly.

As disturbing as this attitude may be in politicians and NGOs, I guess, as I said, it should not surprise us terribly. Neither of these groups is well known for its scruples, after all. But it is particularly disturbing when politicization of science occurs in the scientific community itself. You heard Mike's example of the IOM and its continuing reports on Agent Orange, but there are two more recent examples, and I think much more egregious examples, from the National Academy of Sciences' research arm, the National Research Council (NRC), which analyzes a variety of critical subjects for the government that have very wide implications. It is generally assumed that the NRC's analyses are unbiased and are performed by disinterested experts and that they are therefore the benchmark for accuracy and objectivity; and so the Academy's studies are widely cited by the media and relied upon by the Congress and Executive branch agencies, and in fact thereby they have an effect over the allocation and spending of literally hundreds of billions of dollars in the private and public sectors. Although

much of the work of the Academy is highly regarded, two recent, supposedly expert committees working under the auspices of the NRC have been plagued by apparent bias and their analyses have been internally inconsistent and obviously scientifically unsupportable. These two reports, which assess the scientific integrity of governmental regulation of biotechnology at the EPA and the US Department of Agriculture (USDA) respectively, came to conclusions that are at odds with widely held consensus in the scientific community. It appears that in this critical area, the Academy offers scientific advice to government agencies on the same terms that Burger King advertises that it offers hamburgers: you pay your money and “you get it your way.”

I am not terribly optimistic about the likelihood that science policy will become less politicized or more rational and progressive. There are several reasons for this pessimism. Most important, there is really no prominent constituency for sound science policy. On the contrary, politicization often leads to what amounts to pandering to the fears – sometimes verging on superstition – of the science-challenged and statistics-phobic public. Second, it is just too tempting to take facts out of context to make a point, even if it distorts the truth or tortures logic. Third, federal bureaucrats excel at what I call “the emperor’s new clothes” school of policy development. They have learned how to confer legitimacy on almost any policy, no matter how flawed or antithetical to the public interest. We have seen that again and again, in biotech regulation in particular, at USDA, at EPA and at FDA. The technique of the regulatory agencies is to move deliberately from step to bureaucratic step, according to the specified rules, and along the way everyone pretends, everyone embraces the conceit that the policy is plausible. There is a saying here in Washington that something that has been said three times becomes a fact, and federal rule making (publishing appropriate notices in the federal government, soliciting public comment, responding to the public comment, publishing the final rule and so on) is the apotheosis of that idea.

How can we formulate science policy more rationally, more effectively? I think we need to begin by adopting the maxim of DeWitt (Hans) Stetten, an eminent biochemist and long-time and much revered Deputy Director of the National Institutes of Health (NIH) who wrote, “Science cannot tolerate the man who takes lightly his moral obligation to report strictly what is true.” And so, I would say those who misrepresent, those who lie, those who torture the science should become pariahs, shunned by the scientific community, shunned by opinion leaders and stakeholders and excoriated by the media. What I am calling for, then, is accountability and

harsh treatment of those who politicize science in a way that oversteps the bounds. Thank you.

Jeff Kueter: Thank you, gentlemen. Now we will take some questions from the audience. If you would, please identify yourself and your affiliation as you ask your question and then if you want to direct it toward a particular member of the panel, note that as well.

Question: All the speakers have argued quite persuasively that the Precautionary Principle and fear-based reasoning rather than fact-based reasoning are a brake on progress. But I wonder if anyone would say more about where this approach to science comes from. Some have said, “Well, this is just politics as usual; politicians always distort the facts to serve an agenda,” whereas, for instance, Roger Bate noted that the Precautionary Principle has emerged and exploded as a kind of regulatory principle only recently. I wonder if there is something specific to the post-Cold War period or recent history that has made it especially more hostile to science. I was wondering if the speakers could say whether they think the politicization of science has always been there or is there something that has made public more susceptible, or less willing to trust scientific expertise?

Michael Gough: Well, I think that’s a good question. I am going to answer it in bits and pieces and probably won’t answer the question you really asked. There are really two key topics in this book. One of them is environmental risk to human health and the other is risk to the overall climate. Environmental risk to human health, primarily man-made chemicals, is a great boon to everybody concerned. Twenty percent of us will die from cancer. Unless we smoke or unless we work in an asbestos factory, we won’t know what caused that cancer. About twenty-five years ago, people came along and said, “We can tell you what caused that cancer: man-made chemicals in the environment cause cancer. Get rid of man-made chemicals in the environment and cancer rates will plummet.” This was a glorious idea. We would eliminate one of the most dreaded diseases, and it was marvelous because it didn’t place responsibility on the individual; it placed responsibility on society and industry to clean it up. Unfortunately it is not true, but I think that is one of the appeals. When that debate was raging, the environmentalists – I don’t like to use that term, because it is too encompassing – the people who pushed the “chemicals cause cancer” agenda were on one side and industry to a large extent was on the other side and the government was in the middle trying to mediate. I think that set up some battle lines which have persisted. I think that politics have always been involved in science because science is power. It provides weapons, it

provides comfort, it provides everything. Science has become more important in society. We are a science-driven society, so I think it is just natural that politics becomes more interested in science. It's probably always been going on. When I was a laboratory scientist, I received government support so that part of my heart beats rather fondly about the government being involved in science, but I think that the book shows some examples of where citizens should be skeptical and critical of what the government does with science.

Roger Bate: I would say, concurring with Michael, I think it has always been there because it has been very useful to push policies internationally for protectionist reasons - and that's been going on for centuries. But I think it has got worse because of improvements in measurement and because of increases in wealth. Improvements in measurement mean that we actually measure things down to parts per trillion or even more specifically than that, so that you can always find something in the environment that is a unique substance, or it is unique at least in that location, or at least you can make the argument that it is unique in that location because you couldn't measure it before. So I think that helps because you have more data out there. The second reason is that we are wealthier, and wealthier not only means healthier (ironically we are much better off than we've ever been), but it means that we frankly have more time to worry about things. That, at the margins, plays very nicely into the protectionist concerns at the international level so you see a lot of the policies that are being pushed through on their linkage issues of labor rights, environmental standards, whatever, at the World Trade Organization. I think you are seeing that at the international level and also domestically, though I am far less knowledgeable about domestic US policy. I think that is a critical component. It is especially bad in Europe. I am British and Britain has had some genuine food disasters over the last fifteen years and some really good scares, which were based on very poor science. People are more nervous now for a panoply of reasons which I am not going to go into. But the two key points that I would make are measurement and wealth. We can measure things, and we are wealthier and have more time to worry about them.

Henry Miller: I would only add to Roger's comments that as part of this increased wealth, we have also seen increased wealth in NGOs which have promulgated a great deal of junk science in the name of political ideology. Greenpeace alone has allotted something like \$50 million over five years to its anti-biotechnology efforts. We have also seen the NGOs participate, as full participants, in various international negotiations, such as the U.N.'s food standard setting agency, the Codex Alimentarius commission where

the NGOs have been able to exert great influence in radicalizing and promoting the Precautionary Principle.

Michael Gough: I would like to add just one quick point to your question. Coming at this from a different angle, science is a very useful ally for politicians. If a politician can say, “This is a scientific decision made by scientists,” he takes that decision out of the realm of politics with trade-offs and compromise and all that and sets it apart. And that’s a great advantage. I think one of the reasons Congress so frequently asks consensus panels to be formed is that they want a bunch of scientists to tell them what to do.

Jeff Kueter: Just to comment on the recentness of this phenomenon, there is a reason we picked this picture for the cover of the book. The Galileo story is an example of science and politics rubbing up against one another, where science, for a long period of time, was subordinate to political and theological concerns. Only after men such as Galileo and Copernicus stood up against that orthodoxy, challenged it and overcame it, did we see the advances that we have seen today. Had they not done that, the politics of the day would have changed the course of history.

Question: There has also been a lot of argument that science is becoming more politicized, but from the other direction. For example, some stories have been carried in the magazine *Science*, others in the *Washington Post* and elsewhere, that candidates for scientific advisory committees are being screened in a manner that is not typical; they are asked questions on areas of their beliefs, policy beliefs, and who they voted for for president. One scientist being considered for a scientific advisory panel claims that he was asked that, and when he said he had not voted for President Bush, he was asked why not, why he didn’t support the president. There are also allegations that appeared first in the *Letters* column of *Science* from Dana Loomis at the University of North Carolina at Chapel Hill that this same sort of activity was going on in at least some study sections, which are not advisory panels; they simply rule on the merits of submitted proposals. He didn’t claim that it was widespread, but he knew of it in a panel on occupational safety that he headed. He seemed to believe, by the pattern of who was being appointed and who was being rejected, that people who were knowledgeable about the area of carpal tunnel syndrome and workplace ergonomics were not being accepted. There have been instances where there are efforts now not to conduct studies in such social studies areas as sexual behavior and prevention strategies for sexually transmitted diseases. Panels are being “stacked” – I’m using a quoted word – to reflect areas of philosophy or political point of view that are much more compatible with those of

the Bush administration, and some people say this has gone beyond what other administrations have. I mean, there is an understanding that this is not brand-new in Washington. So that could also come under the label of politicization, if that's the case. Would you agree?

Michael Gough: Of course, and it's not from the other side. It's the same side. When you strike a pact with the government, you strike a pact with the devil, and it doesn't make any difference whether the devil is wearing blue or red. I am ambivalent. People like the president, people like the government because it reflects their views. Granted this was a very close election, and we can argue about it. Nevertheless, administrations change and if the taxpayers' money, which goes through these organizations, is supposed to reflect what the taxpayers' will is, I expect we will always see these kinds of influences on what research is done. I don't think the government is saying that research about the sociology of sex workers in San Francisco should not be done; they are just saying we don't want government money spent on it. I think that's probably an appropriate role for government.

Henry Miller: I think that many of those concerns are entirely valid. But interestingly, most of those which you describe, while valid, are relatively low-level appointments and concerns. When you compare that to what in my chapter of the book, on page 54, I call the Gore appointments, they pale, frankly. We had absolutely the sorriest collection of yes-men and ideologues in important science positions in the Clinton administration: Jack Gibbons, the presidential science advisor, one of the least distinguished people to occupy that post in a position known for undistinguished appointments, Carol Browner at E. P. A., Jane Henney at F. D. A., Undersecretary of State Tim Worth and on and on and on. These were high-level ideologues and yes-men in the Clinton administration.

Question: I wonder if I can just respond to that, if you don't mind. Some of these "nobodies" have been presidents of the AAAS; I don't think of them necessarily as nobodies and I don't think they are so considered by other people in the scientific establishment. The point, and you've made it, is that at the higher levels of policy – political appointments, particularly those that go through advise-and-consent processes – we expect presidents to be very political. They are elected with policies in mind and presumably those policies have been reflected in the votes for president. The scientific advisory committees nevertheless, and most particularly the study sections, have an entirely different function than the top scientific aides to the presi-

dent. I would argue those are the places where it is most inappropriate, if “stacking” is going on or political screening is going on, for that to occur.

Jeff Kueter: That is precisely why the recommendations in the book are structured the way they are, particularly on this notion of the advisory committees and the demands for transparency. If these issues are inseparable, which I think the book shows they are, we ought to recognize them in a transparent fashion and operate our advisory committees accordingly.

Question: I want to point out that the people who advocate, the environmentalists, leave out what we know about DDT and what we know about global change. They don't talk about the other greenhouse gases and they don't talk about Bruce Ames's work that shows we have vast numbers of chemicals in natural foods that are far more plentiful than the chemicals supposedly put out by polluting industry. The facts that are against their point of view are suppressed by the environmental groups. But getting to the point of my question, we see all these things on our horizon, Agent Orange, DDT, global warming, and we keep losing. Every time we begin to beat one back, a new one comes up. Would it be useful for a full-court press to bring the public knowledge of DDT and how we should use it? How many millions of children in Africa are dying because we are not using it? Win one. Win one big, and beat down one of these icons. Would that be possible?

Roger Bate: Well, taking the DDT example, there was a push in 1998 through the United Nations Environment Programme's Persistent Organic Pollutants Convention, which was signed last year and is still to be ratified, although I think it is actually going to be soon. That Convention lists twelve chemicals to be banned or heavily restricted, one of which is DDT. You could say that we did have a small victory. DDT was on the table to be heavily restricted or eliminated but because of the scientific community, 400 malaria specialists, including three Nobel Prize-winning doctors, wrote a letter to support DDT use. This was organised by the Malaria Project, which ironically is a Ralph Nader group. In addition the Malaria Foundation International and Africa Fighting Malaria (of which I'm a director) did media work to explain the vital importance of DDT for developing countries. The debate was more heavily framed by the arguments we were putting forward than in many other debates in which I am involved. So for example, rather than it being this chemical or that chemical, it was seven Boeing 747s filled with children crashing into the ground every day, which is the number of children that die of malaria. The argument was “You are trading off hypothetical harms to humans and wildlife in the north versus the one child that

dies every twenty seconds in Africa.” Under those circumstances, we found some of the environmental groups backing down; others actually came aboard in the process. The Endangered Wildlife Trust of South Africa helps train the sprayers to make sure that as little as possible of DDT will escape outside, so you end up getting the more amenable environmentalists to actually sit around the table. So, to a certain extent, we had a victory there. Unfortunately DDT is still listed in the Convention, which will be ratified by the US government shortly. It will be looked at every three years, so at some stage DDT will probably be banned unless we are extremely vigilant. DDT should be there and be used until, and only until, more cost-effective and better alternatives exist. And they do not and they haven’t for the last sixty years. There are alternatives; there are many different ways of controlling malaria, but DDT is the cheapest, and when you are talking about countries that at most spend \$8 a head on their medical facilities, you can’t afford the alternatives. I think that is an example of one where, as I argued before, it’s a bit of a no-brainer. It should be obvious that you should be allowed to use DDT if you are in Botswana or Zambia or wherever it may be.

Question: In the talk about the Precautionary Principle, should more of it be oriented toward getting rid of it completely on the grounds of bad logic, as opposed to changing the definition?

Roger Bate: I recall some advice that if you are talking to someone who’s crazy and says he is Napoleon Bonaparte, the last thing you should be doing is discussing the cavalry positions at the battle of Austerlitz, because you are tacitly assuming he is Napoleon Bonaparte. There is a danger in discussing the minutiae of the Precautionary Principle if you think the entire concept is bogus. Unfortunately, if you are dealing with policy on a day-in-day-out basis, the opposition – and I don’t necessarily mean that they are always wrong – the opposition has been remarkably effective in terms of pushing the Precautionary Principle. You have precautionary language in numerous treaties already; it is certainly within European directives and it is close to becoming part of customary international law (although it is still arguable in its use at the World Trade Organization). Once it gets to that position, you will have cases and precedent and you will never get rid of it. So I am at a loss to know exactly what to do. I think there is good reason to be precautionary, but should it have a principle of its own? Should policy be based around a single conception of safety? No, I don’t think it should. It would be like pointing out that the Napoleon Bonaparte is crazy. You need people who are continuing to point out in the philosophical literature that this principle has serious problems and, at the same time, are

trying to make sure that whenever it is applied, it is done so in the most sensible fashion possible. After all, if you applied this standard to the case of DDT and malaria, you should argue that the precautionary approach would be to use DDT because you have to weigh the life of an African child higher than the potential harm to a bird of prey in America. At least if you try to argue against that position, you are not going to be very successful. So I would argue in a precautionary approach, you should be using DDT. But it depends on how you define it.

Henry Miller: I think that's right. I think it's not the fundamental concept of appropriate caution that's flawed; it's the rigidity and the mindlessness with which it's applied. If, arguing from the Precautionary Principle, you can induce water regulators to remove chlorine from the water because of miniscule risk of cancer that might accrue from byproducts of chlorine, and you cause thousands of cases of gastroenteritis as a result, you clearly have misapplied what could be a useful concept.

Question: You know there's been a change in the philosophy of science from reductionism to complexity, which can change a lot of results of a lot of surveys, especially in ecology. Could you comment on that?

Michael Gough: My daughter is the ecologist in the family. The idea of experimental science is to just have one variable, pull it out, put it back in, and see what happens in the experiment. In fact we can still reach this ideal in a lot of experimental science. In the real world, that is just an impossibility, and if you are studying people or a population of animals, it is an impossibility because they don't behave. We just have to do a better job. I don't have an easy answer for that. It's an excellent question. I think we just have to fight with it.

Question: I think the major flaw in the Precautionary Principle is you cannot prove a negative. That is the same thing as saying nothing is ever going to be completely safe; you are going to have some people who are always going to be affected, who are highly sensitive to particular chemicals. That's where the Precautionary Principle falls down, in my view.

Roger Bate: As a logical extension of where the argument goes, yes, that is correct, but of course the definitions are not as to-the-limit as that. In a situation of uncertainty, lack of full knowledge should not stop you from taking an action. You never are going to have full knowledge and you can't prove a negative. At that extreme, the Precautionary Principle is illogical, but on the other hand, you can make policy decisions under uncertainty in

a precautionary way; therefore, as I say, it is important to make sure that policy decisions take into account the potential dangers. The problem, as Henry highlighted it best, is when it becomes a hard and fast rule that your number one priority when making policy is the question, “could this possibly harm something?” Because then everything stops. Of course policy doesn’t work quite that way because it is always a fight. No country is ever going to stop the development of certain technologies, but you can take the example of Sweden, which is probably the most risk-averse nation. I commend Robert Nilsson’s chapter to everyone. He is a Swedish toxicologist and a senior scientist at the equivalent of the US EPA and he said that basically his country is going crazy. It is banning things and pushing precaution to the limit. He said America, or California at least, could be where Sweden is in five to ten years and that if you want to see how the Precautionary Principle is used at its most extreme, you should look at Swedish policy. It is detrimental to the Swedish chemical industry, but they also get certain economic advantages. It is the same thing with the concerns about acid rain and the advances that the German economy made from investing in gas desulphurization technology. I have absolutely no problem with Germany taking the lead in that technology; the problem arises when German ministers force other countries to follow the same approach, which then means that German businesses are going to make a lot of money on the back of it. And that is the inevitable problem within the political system. I know I am getting a long way away from your question, but I think that that is the danger, when it is a hard-and-fast rule. There is not anything necessarily wrong with the idea of precaution being applied as appropriate, because I think in certain circumstances it is.

Question: It seems to me that the problem with this is fear of the unknown. I mean, let’s look at the dangers of dihydromonoxide (H_2O)! It also seems that none of these studies have ever concluded that any deaths were caused by too much government, which makes me skeptical. They always want new regulations, more government. Could you comment on that?

Michael Gough: That’s a philosophical position, I think.

Henry Miller: There are studies that show that too much government causes deaths. It goes back to Aaron Wildarsky’s idea that there is a correlation between health and wealth. So if you deprive a society or an individual of wealth, you also deprive him of health. We divert resources to unnecessary activities and negligible-risk activities instead of those that can improve the quality and quantity of life. The kinds of things that you alluded to, the lack of science literacy and so on, occur at the level of the in-

dividual, of the public, and that's entirely true. That's all the more reason, given their lack of knowledge and understanding of statistics and science, for us to make sure that they become more knowledgeable but also for us to castigate bad science and junk science, as Steve Milloy, who is here, has done, campaigning against junk science for many years, wherever, whenever, however we can.

Michael Gough: There is a specific answer, too. W. Kip Viscusi, who is an economist at the Harvard School of Law, has actually done calculations: for every additional five to seven million dollars of regulation, we lose one theoretical life. Maybe it's fifty or seventy million dollars, but he has done those calculations.

Jeff Kueter: Thank you all for coming. Please join me in thanking the authors.

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