The Corruption (and Redemption) of Science

A recent investigation into the use of science by the Bush Administration alleges a systematic pattern of suppressing or distorting scientific evidence across a wide range of issues (Union of Concerned Scientists 2004). The authors of the report further charge that the appointment of scientific advisors and members of advisory panels now serves interests other than the search for truth. Specifically, the report charges that there is

- a well-established pattern of suppression and distortion of scientific findings by high-ranking Bush Administration political appointees in many federal agencies;
- a wide-ranging effort to manipulate the government's scientific advisory system; and
- censorship on topics deemed sensitive to the administration's political "base."

Such manipulation of science, the authors say, is "unprecedented." In short, "objective knowledge is being distorted for political ends by the Bush Administration, and misrepresented or even withheld from Congress and the public at large."

To those paying attention, findings such as these will come as no surprise. They fit a larger pattern that ranges from the misuse of intelligence information to justify the war in Iraq, to deception about the budget, the economy, and the effects of tax cuts, to . . . well the list goes on, and in its length and scope it, too, is unprecedented. Some may object that such information is partisan and has no place in this journal and no bearing on its mission of bringing authentic science to bear on the problems of conservation. On the other hand, whatever one's politics, the corruption of science and public information for political ends ought to be deeply offensive to scientists and citizens alike. Allowed to continue it will, like Lysenkoism in the Soviet Union, demoralize scientists, degrade the reputation of science, and discredit the information necessary to a free society. And, specifically for those working in conservation biology, it means that research, whatever its merit or import, will be discounted or disregarded by federal agencies, the Congress, and the White House.

As bad as the recent corruption of U.S. science by right-wing ideologues for political purposes may be, there is a deeper pattern of corruption described recently by *Manchester Guardian* columnist George Monbiot (2004). The problems cited by Monbiot include the following:

- 34% percent of the lead authors of articles in scientific journals are compromised by their sources of funding;
- only 16% of scientific journals have a policy on conflicts of interest, and only 0.5% of the papers published have authors who disclose such conflicts;
- British and U.S. scientists are putting their names to papers they have not written, which are instead ghosted by writers working for various companies; and
- 87% of the scientists writing clinical guidelines have financial ties to drug companies.

Monbiot, in short, charges that some branches of university science are systematically corrupted by corporate money. In recent decades there has been a veritable flood of corporation funding to major universities, and we may reasonably assume that the corruption is roughly proportional to the volume of funding, which is not, however, to say that all research so funded is thereby corrupted.

Corruption comes in varying degrees. The Union of Concerned Scientists and George Monbiot are concerned about the effects of political zealotry, greed, and the desire for renown on the accuracy of scientific information. But there is a more subtle kind of corruption by which commercial funding and private ownership of knowledge cuts off the free flow of ideas in science and deflects entire fields of knowledge. Some branches of science simply would not have flourished without the promise of great pecuniary reward both for researchers and institutions able to patent the results. And some fields, of considerable importance to the larger human prospect, have languished because they offer no such potential. As a result, textbooks, curricula, research agendas, tenure decisions, and employment opportunities come to reflect the pattern of grant and gift money, not the freely chosen search for truth. There is no conspiracy here of the sort described by the Union of Concerned Scientists or George Monbiot. Instead, there is the power of money to do what money has always done, which is to get its way—in this case by harnessing much of science to the purposes of commerce and power and thereby to determine the directions of entire fields of knowledge.

Defenders of the system argue that the funds so acquired by universities are necessary to make up the difference between rising budgets

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and decreasing public support. But poverty—a relative thing—is not a good argument for compromising institutional integrity, the public trust, or the search for truth. Others argue that the knowledge gained in these fields, however funded, represents a process akin to evolution in which only the hardy survive. That leaves unexplained why we know so much about some things, often trivial or even deleterious to human well-being, and so little about other things, such as the full extent of life on Earth, the biology of conservation, women's health, chemical-free farming, or the creation of livable cities.

There is a third and deeper source of corruption beyond the power of ideology and money: the failure of scientific skepticism among scientists themselves. Robert Sinsheimer, in a remarkable article published in *Daedalus* in 1978, asked, "Could there be knowledge, the possession of which, at a given time and stage of social development, would be inimical to human welfare—and even fatal to the further accumulation of knowledge?" His answer was affirmative. His point was simply that the right of free inquiry should not be used to trump larger values, including those of freedom, public safety, environmental quality, and even human survival. There is, he asserted, scientific knowledge that we could not control and which could, one way or another, jeopardize human survival. Twenty-three years later, Bill Joy said much the same thing, calling for a moratorium on research into devices capable of self-replication and inherently beyond human control. Both were widely ignored or dismissed as alarmist. But if the essence of science is skepticism, then the lack of skepticism about science itself and the wider context in which it is conducted is unscientific. Although neither Sinsheimer nor Joy offered easy answers, a scientific response would have resulted in a wide debate about the larger implications of scientific inquiry and its relation to human welfare.

The corruption of science did not begin with right-wing ideologues in the Bush Administration, or with corporate funding, or even with the failure of scientists to think about science skeptically. The roots of the problem go far back to Francis Bacon's (1627) proposal to join science and government and to his aim of harnessing science to the goal of "effecting all things possible." That union and its attendant possibilities lay dormant until World War II and the systematic use and misuse of science and scientists by Allied and Axis governments alike. German science was corrupted to the ends of murder and militarization. But science in Allied countries can claim no innocence. Witness the legacy of the Manhattan Project: Hiroshima, Nagasaki, a half-century arms race, radioactive landscapes, and systematic government secrecy. Bacon could not have foreseen the extent and scope of the scientific revolution or the possibilities for governments to corrupt knowledge by applying it to the development of horrendous weapons and the surveillance and manipulation of its own citizens.

An even starker picture emerges in the science that used citizens as guinea pigs for research reminiscent of Nazi science: the Tuskegee Syphilis Experiment between 1932 and 1972; experiments carried out between 1950 and 1969 in which the government tested drugs, chemical, biological, and radioactive materials on unsuspecting U.S. citizens; and the deliberate contamination of 8000 square miles around Hanford, Washington, to assess the effects of dispersed plutonium (Cornwell 2003). And there has been a century or more of persistent corporate secrecy about the health and ecological effects of pollution and any number of products and industrial processes. We learn of such things, to the extent that we learn of them at all, long afterward and mostly by some accidental breach in the wall of secrecy.

Looking ahead, the advance of science will increase the temptations for secrecy and the further misuse of knowledge. Progress in many fields is creating ethical dilemmas for which we are intellectually, morally, and institutionally ill equipped, as Robert Sinsheimer feared. And the advance of knowledge in some fields will multiply possibilities for terrorists of all sorts, including those acting in the name of our government while increasing the possibilities of human errors of great consequence. The Bush Administration's "war on terror" is creating new pressures to militarize science and industry under a dense shroud of secrecy. The Pentagon already controls roughly half the annual $75 billion federal research and development budget, a fraction that will certainly increase under the claim of national security and the drive to militarize space and thereby further extend U.S. hegemony.

Science is the most powerful and problematic of human endeavors. In the past, we have focused mostly on its power and promise, not on its perils. And in the golden age of science, from Galileo to the onset of Nazi science, this was understandable, perhaps justifiable. But we live now in changed circumstances foreseen in Mary Shelley's *Dr. Frankenstein* or Herman Melville's Ahab in *Moby Dick*. Science has grown in power and scope without a commensurate refinement in our collective judgment about its proper uses or limits, hence with little improvement in our capacity to foresee and forestall knowledge deleterious to humankind and even to science. But we ought now to reckon seriously with the responsible acquisition and use of knowledge for reasons Shelley portrayed and because of our capacity for collective obsessions of the sort Melville described. Doing so would require us to think more deeply about science and to question the relationships between science and democracy, law, and accountability. To this end I offer the following observations.

First, the relationship between knowledge and ignorance is not zero sum. The faith in the power of reason

that we inherited from the Enlightenment carries with it an increasing burden of irony. The fact is that the advance of science, conducted in the faith that reason would render cause and effect transparent and the world more controllable, has in fact created a vastly complicated world of things, materials, systems, ecological effects, and feedback loops at different scales and time horizons in which cause and effect are becoming harder to discern and the possibilities of control (at least on a large scale) ever more remote. Every scientific discovery expands the domain of knowledge but also expands the interface of the known with the unknown, which is to say it generates yet more questions, some of which we will fail to ask or to ask in time to avoid serious problems (e.g., the effects of chlorofluorocarbons on the ozone layer).

Second, science is neutral only at the level of methods and not at the higher level at which problems are selected and fields defined. That higher level is determined by values, politics, funding, and what Thomas Kuhn once described as paradigms—agreed-upon methods of research, problems, and frameworks—which in turn are products of culture, psychology, and political power.

Third, from the public's view, the actual practice of science is increasingly remote and esoteric, yet its effects are increasingly pervasive and intrusive. Its relation to the public resembles in some ways the relation of theology delivered by the Papacy in Latin to the illiterate masses of the Middle Ages.

Fourth, in matters of knowledge, motive counts. The difference between research carried out in the spirit of, say, Barbara McClintock's "feeling for the organism" and that motivated by commercially driven curiosity is not trivial. One may lead to reverence, the other more likely to the clever manipulation of nature or even to sacrilege.

Finally, the unintended ecological, social, and economic consequences of the advance of science increasingly set the rights of free inquiry against those of the public and future generations to safety, health, security, well-being, dignity, and to a full and unmutilated humanity. Much as Sinsheimer feared, the results of unfettered inquiry may lead to increasingly consequential and irreversible results. It would be foolish, I think, to assume otherwise.

From this perspective, what can be done to redeem the potential of science for human betterment as once envisioned in the Enlightenment? One response is to insist on "principled vigilance" by scientists. British historian John Cornwell (2003:462), for example, describes the "good scientist" in these terms: He (or she) "does not place dangerous knowledge or techniques into the hands of the untrustworthy . . . attempts to publicize by any means possible the social and environmental consequences of potentially dangerous knowledge . . . [and] rejects the use of people as instruments." At the same time he notes forces that work at cross-purposes, such as "The Faustian bargains [that] lurk within routine grant applications, the pressure to publish for the sake of tenure and the department's budget, the treatment of knowledge and discovery as a commodity that can be owned, bought, and sold."

There can be no good argument against the importance of sound judgment and robust ethical sensitivity exercised by individual scientists. Although necessary, however, such qualities are insufficient given the limits of human nature and individual perception and the magnitude of the problem.

A second response is to improve science education in schools and colleges in order to create a scientifically literate public. Seldom do such admonitions go beyond proposing more basic science in the curriculum to the larger goal of equipping the public to think rationally and skeptically about the directions of science itself or the uses to which it is put. The result is often a kind of gee-whiz level of knowledge aimed to create broad but uncritical support for big science and a deeper state of public torpor without empowering people to ask serious questions. In matters of education, scientific literacy ought to be regarded as a means of equipping the public with the capacity to think critically about science itself.

A third, and related, response requires creating mechanisms that enable a scientifically literate public to participate in setting priorities for publicly funded research and development. Would a discerning public, for instance, agree to pay for the science necessary to militarize space or that necessary to pursue adventures on the planet Mars, or even the Human Genome Project? To pose such questions highlights the fact that we presently have few good mechanisms by which to connect civic life and public debate with choices about research goals. This disconnection can only undermine democracy and eventually public support for science itself. The counterargument that the public can never know enough to make good choices about complex scientific issues is both self-serving and dubious in light of the many examples from our own and European experience in which the public has participated constructively in making choices about the directions of science and its application (Sclove 1995:197–328). The problem is not public stupidity, lack of interest, or even the difficulty of the problem, so much as a failure of the political imagination required to forge innovative democratic institutions for changed circumstances.

This leads to a fourth response. There is a widening gulf between what is deemed "cutting edge" science and real human needs. We know enough to say with assurance that the intersection of climate change, biotic impoverishment, ecosystem decline, and poverty are sweeping us toward what is at best a highly undesirable future. We know, too, that the escalating dynamic among a fossil fuel–driven U.S. economic hegemony,

terrorism, and militarization is diverting attention and critical resources from the effort to deal with the causes of our problems. We also know enough to say that the powers of science accordingly ought to be redirected with all deliberate speed from the trivial and even dangerous toward the knowledge necessary to

- make a rapid transition from fossil fuels to solar energy;
- provide healthcare for everyone on Earth;
- establish sustainable agriculture systems;
- build low-cost, high-performance shelter;
- restore degraded ecosystems;
- preserve species and ecologies; and
- develop economies that work with, not against, natural systems.

The original promise of science was to harness the power of reason and knowledge to the improvement of the human condition and to progress broadly defined. That noble vision has been whittled down to fit ignoble ends and, worse, corrupted to purposes that undermine human dignity and the human prospect. The redemption of science is nothing less than the effort to reclaim a human future directed by a more rational rationality, a more scientific science, and a vision that we are indeed capable of rising above illusion, ill will, and greed.

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Literature Cited

Cornwell, J. 2003. Hitler's scientists. Viking, New York.

Monbiot, G. 2004. The corporate stooges who nobble serious science. Manchester Guardian **24 February** (available from http://www.guardian.co.uk/comment/story/0,3604,1154585,00.html) (accessed May 2004).

Sclove, R., 1995. Democracy and technology. Guilford Press, New York.

Sinsheimer, R. 1978. The presumptions of science. Daedalus **107 (2):**23–36.

Union of Concerned Scientists (UCS). 2004. Scientific integrity in policymaking. UCS, Cambridge, Massachusetts.