
The Human Cost of Ideology as Science

When David Orr asked if I would write a comment on “The Corruption [and Redemption] of Science,” I thought immediately of the collection of articles and papers I had filed under the topic: “US Ideological Science Policy: Lysenko Again?” As a plant developmental biologist, I had heard of Trofim Lysenko, the scantily schooled Ukrainian who championed the phenomenon of vernalization to remove genetics from Soviet biology. Assaults on science have, of course, been common over the past several hundred years. But the Bush Administration’s pervasive, ideologically based science policy—which appears to be unprecedented in the United States—motivated me to learn more about Lysenko (Soyfer 1994).

Born in 1898 to a peasant family, Lysenko had strong motivation to acquire a university degree and in 1925 earned a certificate in agronomy from Kiev Agricultural Institute. He became a junior specialist at the new plant breeding station in the city of Gandzha (Azerbaijan) that was part of the All-Union Institute of Plant Industry (VIR). The director of VIR was the internationally respected botanist Nikolai Vavilov, whose research established the origins of many of the world’s crop plants.

Lysenko’s first assignment was to investigate the possibility of growing leguminous cover crops to provide feed for livestock and to act as green manure. The winter of 1925–1926 was mild, and Lysenko’s peas survived. An established journalist wrote a major article in *Pravda* that praised the accomplishments of this modestly educated peasant and dramatically overstated the project’s results: “Lysenko is solving (and has

solved) the problem of enriching the soil... [so that] livestock need not perish for want of fodder... The barefoot professor Lysenko now has... luminaries of agronomy visit... and gratefully shake his hand.”

Lysenko did not follow up his work on peas but turned to investigating the influence of cold temperatures on wheat, cotton, rye, oats, and barley. In a monograph published by the Gandzha station in 1928, he concluded that, by manipulating the temperature during early growth periods, spring and winter varieties were interconvertible and therefore not different. He called this discovery “winterism” and declared that “there are neither winter nor spring varieties; there are only grains and grasses with varying degrees of ‘winterism’... and we can artificially overcome ‘winterism.’” What Lysenko described was the phenomenon of vernalization, which had been known since the mid-nineteenth century and studied by others, including Soviet scientists. Although Lysenko knew about some of this work, he claimed he had discovered vernalization.

Many biennial plants remain vegetative until their second year because they require a cold period, or vernalization, before they will flower. Winter wheat is such a plant. To obtain a crop of winter wheat in one growing season, farmers plant it late in the fall so it will germinate but not grow much until spring; however, harsh or unusual winter and spring weather conditions can result in crop loss. In 1928 Lysenko proposed that yields of winter wheat could be increased by germinating seeds and then storing them in the cold until

spring when they could be planted. In the spring of 1929, after talking with his son, Lysenko’s father planted wheat he had germinated in hot water and stored under the snow. Substantial yield increases were reported in two *Pravda* articles that praised Lysenko’s discovery: “The prospects opened up by this extraordinary discovery of agronomist Lysenko, corroborated by such outstanding experimental data, are so great that they are beyond immediate calculation” (July 1929) and “. . . Lysenko’s discovery will lead our agriculture onto a high road of vast possibilities and extraordinary achievements and greatly increase the tempo of our socialist construction” (October 1929). The July *Pravda* article stated a yield of 3 tons per hectare, compared with 1 ton per hectare; however, the numbers stated by Lysenko at different times were inconsistent, and no scientifically collected data were ever published because the procedure really did not increase yields.

Lysenko was given his own journal, *Vernalization*, and was embraced by the Communist Party, eventually becoming a major advisor to Stalin. The VIR director Vavilov initially supported Lysenko’s work because he saw vernalization as a tool that might enable him to grow in the Soviet Union the numerous agronomically important plants he had collected throughout the world. But in the mid 1930s Lysenko stated that genes did not exist. He argued that “geneticists were enemies of socialism” and turned on Vavilov, who was removed from his position as director. Eventually Vavilov was arrested, and he died in prison in 1943. Geneticists and other biologists who opposed

Lysenko were likewise purged. In 1948 Stalin outlawed genetics as “bourgeois science” and “alien to the principles of socialism.”

Lysenko's belief that environmental manipulations could quickly change any plant's fundamental character fit well with the ideology of the Soviet Union. Like plants, people were a product of their environment, not their genes. Genes did not exist. In the early 1930s, Lysenko promised and was given the authority to obtain, through dubious environmental manipulations, exceptional yields of wheat and potatoes. It did not work, but to establish that expectations were being met, Lysenko had masses of questionable survey data collected from farmers. He then proposed, contrary to well-established and successful agronomic practices, that varieties deteriorated year after year and that vigor could be increased by crossbreeding with other varieties. It did not work. Ill-conceived project upon ill-conceived project failed to increase yields, but Lysenko bluffed his way through. Soviet farms barely fed their people in the late 1920s; with an agriculture based on pseudoscience, the situation got much worse. The cost of Lysenkoism in terms of human suffering and lives lost is unknowable but undoubtedly immense.

Lysenkoism's grip on Soviet biology eased in the 1950s. Genetics was officially recognized in the mid 1960s, but at the time of his death in 1976 Lysenko remained a member of three academies. He still had a salary, country cottage, car and driver, and a staff of 150 at the Lenin Hills Agricultural Experiment Station of the USSR Academy of Sciences. Today the consequences of basing national policies on pseudoscience and ideology haunt the former Soviet Union.

Politically motivated, ideologically based policies are not new to the United States. In the last decade, however, they have grown pervasive. Now the agenda of whatever it takes to win and to remain in power has jeopardized the critical role that

sound science has played in improving public health, addressing environmental deterioration, improving workplace safety, and sustaining credible government.

The Bush Administration has delayed and weakened the U.S. Forest Service's 2001 Roadless Area Conservation Rule that prohibited logging and road building in some 58 million acres of national forest (Jehl 2003; Kerasote 2003). Decades of science and over 2 million public comments led to a consensus and a conservation rule: these areas had to remain unfragmented to preserve the health of major watersheds, to protect habitat for 25% of our endangered species, to provide clean drinking water for millions of people, and to maintain unmatched recreational opportunities.

Although numerous scientific studies have established that education and access to modern methods of family planning enable couples to have the number of children they desire, reduce abortions, and lower population growth, President Bush effectively eliminated U.S. funds for family planning in developing countries.

In March 2001 Bush reneged on a campaign promise to regulate carbon dioxide emissions from power plants. Several days later he withdrew the United States from the Kyoto treaty on global warming. The scientific evidence for global warming, and for the fact that human activities contribute substantially to this warming, is overwhelming.

The ensuing 3 years have been filled with similar actions that ignore or obfuscate scientific input. As documented by the report of the Union of Concerned Scientists (2004. UCS, Cambridge, Massachusetts), however, the situation is even more disturbing. Soon after coming to office, the Bush Administration asked the National Academy of Sciences (NAS) to assess the work of the Intergovernmental Panel on Climate Change (IPCC). The NAS strongly affirmed the findings of the IPCC, yet

the administration maintained that action was not called for because of uncertainties about fossil-fuel emissions and climate predictions. In 2002 the administration deleted the part on climate change from the Environmental Protection Agency's (EPA) annual air pollution report and in 2003 demanded changes to the EPA's draft Report on the Environment. The result was a report released for public comment that contained nothing on climate change.

For almost a year the administration suppressed an EPA report that contained information on the extent of mercury from coal-fired power plants and the health of children. The report was released only after it had been leaked by an EPA official.

The Bush Administration has altered scientific protocols and data provided by the Centers for Disease Control (CDC). In collecting data to establish the effectiveness of abstinence-only, pregnancy-reduction programs, the CDC was told by the administration to stop charting pregnancies of participants and to record only the attendance and attitudes of participants. The CDC was likewise forced to terminate a program titled “Programs that Work.” All five of the programs so classified in 2002 provided comprehensive sex education. No abstinence-only program was identified in 2002 as working.

The government's scientific advisory system is also being manipulated to affirm the administration's political agenda. In 2002 the CDC Advisory Committee on Childhood Lead Poisoning Prevention was about to revise down, on the basis of a decade's research, the standard of acceptable lead in children's blood. A few weeks before the committee was to meet, the Secretary of Health and Human Services rejected nominations to the Advisory Committee by CDC staff scientists (the heretofore standard method of appointment) and appointed five people likely to oppose more stringent standards, two of whom had financial ties

to the lead industry. This spring Elizabeth H. Blackburn, a cell biologist, and William May, a theologian and medical ethicist, were dropped from the President's Council on Bioethics (Blackburn 2004). The 18-member council was considering the ethics of therapeutic cloning and reproductive cloning. Blackburn and May, who both voted against a ban on therapeutic cloning because of its potential benefits to human health, were replaced by nonscientists whose views were closer to the those of the chair of the committee, who voted for the ban.

Science as a way of knowing has been in the making for more than 2000 years, but the last few hundred years, especially the past century, have seen spectacular advances in our understanding of how the world works and our relations to the rest of life. So it is expected that many aspects of our long-established, belief-based culture have lagged behind in accepting what science has

established over the last century. For example, acceptance of evolution as a sufficient explanation for the diversity of life, including human life, is far from universal, even though we know more about the mechanism of evolution than we do about the workings of gravity, a phenomenon no one questions. As a result, society struggles with what science discovers and often rallies around existing beliefs before accepting and then believing what science has revealed.

Changing cultural beliefs is a lengthy and tumultuous process. It requires societal and individual openness to persuasion by evidence and argument so that people can change what they think and what they believe. Societies that restrict information and strive to eliminate dissent court an unpleasant future. The current situation in the United States requires all citizens, scientists and nonscientists alike, to demand from government officials, elected and otherwise, policies based on authen-

tic science. To ignore what science tells us is to risk the tragedy of Lysenkoism and the disastrous consequences of pseudoscience.

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