

Comment

## It can't happen here - can it?

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If scientific advice is to have any value, it must come from sources that are not under obligation to any organization, public or private. In the United Kingdom, that advice generally comes from the Royal Society of London. In the United States, it comes from the National Academy of Sciences. And in much of the former Soviet Union, it comes from the Russian Academy of Sciences. You wouldn't necessarily think they would have similar ideas about the importance of independence, but they do.

The oldest scientific society still in existence, the Royal Society of London, was founded in 1660. Its permanent Second Charter received the Royal Seal on the 23 April 1663. The motto of the Society, "*Nullius in Verba*" ("On the words of no one"), signifies the Society's commitment to establishing the truth of scientific matters through experiment rather than through the words of any authority. The Society is governed by its Council of Trustees, which is chaired by its President. The members of the Council and the President are elected from its Fellowship, new members of which are in turn elected by vote of the existing Fellows. The Royal Society has never depended on the Crown for either its finances or its governance.

The National Academy of Sciences of the United States was created in 1863 by a congressional charter approved by President Abraham Lincoln. The key part of the charter specifies the relationship between the Academy and the government. The Academy was created to be an adviser on scientific and technological matters, but the Academy and its associated organizations are private, nongovernmental organizations and do not receive direct federal appropriations for any of their work. (Studies undertaken for the government by the National Academies usually are funded out of appropriations made available to federal agencies.) The charter stipulates virtually complete autonomy for the Academy, including freedom to elect its members and officers and establish its own policies and procedures.

I could tell similar stories about the principal scientific organizations in most Western countries. Though the precise relationship between the state and scientific community varies in detail, for the most part there is at least a large measure of autonomy in scientific advice, and considerable nongovernmental scientific input into funding decisions and research directions. In short, the principle of independence from state control has guided the formation and governance of every scientific society in the world whose opinions have any credibility.

If Russian president Vladimir Putin has his way, that principle will no longer apply to the Russian Academy of Sciences. (During the period when Russia was part of the Soviet Union it was known as the Academy of Sciences of the USSR.) The Academy was founded in January 1724 in St. Petersburg by Peter the Great. For most of its existence it was effectively an arm of the government, and in 1917, Lenin decided that the Academy would address questions of state construction, in return for which the Soviet regime would give the Academy financial and political support. Partly to reflect this connectedness, its headquarters were moved to Moscow, the Soviet capital, in 1934.

But a curious thing happened during the post-Stalinist era: despite its close ties with the state, the Russian Academy began to assert its independence in many important matters. It frequently rejected for membership senior Communist Party officials whom it considered unqualified. In 1980, it refused to expel dissident nuclear physicist Andrei Sakharov, despite demands from Moscow that it do so. (Disclosure: much of my knowledge of the inner workings of the Russian Academy and scientific politics in Russia comes from conversations I had over the years with my good friend Vitalii Goldanski, who died in 2001. Vitalii, who was born in Belarus in 1923, was a great chemical and nuclear physicist. In addition to being a member of the Russian Academy, he was also a member of the Supreme Soviet and the Congress

of People's Deputies. In 1991 he was honored by the New York Academy of Sciences for his work on behalf of nuclear disarmament.)

The Russian Academy has also tried to retain at least partial autonomy over what science was funded. Unlike the American and British scientific academies, whose primary functions are honorific and advisory, the Russian Academy effectively controls much of the scientific research in its country. The Academy's senior members oversee a \$1.2 billion budget, 400 research institutes and 200,000 researchers and staff members across Russia. And just like most other Western academies, the institution is self-governing: research funding, as well as who becomes a researcher and who enjoys the prestigious title of full member - 'academician' - is determined by secret ballot among the members. Although over the years, the government has directed the Academy to support a number of specific areas of science, not all of these directives were accepted and the Academy was able to keep many areas of research alive against the wishes of the communist authorities. It is this tradition of political independence that Vladimir Putin is trying to eliminate.

Putin used to be a member of the KGB (Komitet Gosudarstvennoy Bezopasnosti, the Committee for State Security), the notorious combined intelligence and secret police organization that terrorized the Soviet Union for decades under communist rule. Lately he seems to be showing signs of wanting to take up his old hobbies. Last year, at Putin's urging, the Russian Parliament passed a law stipulating that the Academy's top executive must be approved by the president and that its charter must be approved by the government. Shortly thereafter, the Education Ministry, to which the Academy reports, proposed a new charter that would create an advisory council with nine members, only three of whom would be scientists; the other six would be a mixture of government officials, lawmakers, and ministers. This body would oversee all of the operations of the Academy, including the funding of research, and would make all decisions about what areas of science would be pursued. In other words, control of the operation of the Academy would be ceded to the state.

As might be expected, the Academy is fighting this proposal. A few weeks ago its senior members voted unanimously against the proposed charter. Given the tight control that Putin has established over virtually all aspects of Russian life, it remains to be seen if their courageous assertion of independence will prevail. (One thing is certain: they can use all the support they can get from their friends outside Russia.)

Before we in the West congratulate ourselves on being fortunate enough to live in countries where science is independent of state control, maybe we should take a close look at recent developments here. The Bush Administration

hasn't tried to take over the scientific establishment, not because they don't want to (this is an administration that aspires to rule, not govern), but rather because they don't have to - they've simply ignored every objective scientific fact or report that didn't fit their ideologically driven policy goals. Why bother taking over what you can marginalize? True, they have tried staffing some federal scientific administrative posts with people who have minimal - in some cases, nonexistent - scientific credentials. Frequently these appointees appear to have been chosen for their fundamentalist religious, social conservative, or free-market beliefs. It's hard to assess the full measure of harm that has caused (environmental issues seem to have been most affected), but it hasn't had much of a direct impact on the scientific community as a whole, as far as I can tell.

But the independence of American science is being eroded nonetheless. And as is so often the case, this particular road to hell has been paved with the best of intentions, and the street plan was designed, not by our enemies, but by our friends.

It started, as so much has in the past decade, with the Human Genome Initiative. I have said before, and will say to the end of my days, that this project, wonderful and important as it has been, was oversold to the US Congress and the public. By promising that cures for diseases would emerge, as if by magic, from the oceans of data that were generated, the founders of that project and the funding-agency administrators who supported them raised expectations that simply couldn't be met in any reasonable period of time. Out of concern that lawmakers and their constituents would, quite reasonably, soon hold them to account, the administrators in the US National Institutes of Health (NIH) began a campaign to shift some of the science they supported away from basic investigations and towards translational research that was more directly focused on human diseases. That focus became the basis for selling Congress on another, even larger expenditure: a doubling of the NIH budget over about a seven-year period. Congress acquiesced to the doubling, which was completed a few years ago, in large part because it bought the argument that the investment in genomics would only pay off with a concomitant investment in its applications.

During the doubling I think there was a sense that there would be a surplus of money, which led many administrators to conceive of big projects that would give them, and their institutes, the same high-profile success as that enjoyed by the Human Genome Institute. In this, they were abetted by many from our own ranks of independent investigators, who wanted their share of the money and glory that had gone to the Craig Venters, Eric Landers, and Francis Collins' of the genomics projects. What followed was a subtle, but rapid shift in how scientific priorities are set. Instead of research directions arising largely from the open competition of

individual research projects in peer-review, NIH began setting those directions itself through increased numbers of big new programs and specific allocation of large pots of money for certain types of projects - commonly, projects aimed at either exploiting the information from genomics studies or gathering more.

Such projects, consequently, have relatively stable funding, but individual investigator-initiated projects do not. As I've written before (*The System is Broken*, *Genome Biol* 2006, 7:105 and *Instructions for Repair*, *Genome Biol* 2006, 7:106), the result has been a disaster for American science. Funding of regular research grants is so tight that many mid-career investigators are being driven out of research; senior investigators, whose perspective is needed more than ever, are being driven into early retirement; and good young investigators are seeing their careers at the mercy of a process that, quite literally, is no better than a lottery. How have the funding agencies responded to this crisis? I know many administrators who are personally dismayed at the situation, but the culture seems to have developed some huge inertia: ironically, after the doubling of the NIH budget, when the crisis has been made worse by no budget increases for several years, the number of grants funded through government-initiated requests for applications and program announcements has increased even more than they did during the doubling. And the percentage of new awards that go to traditional basic science research projects has continued to fall.

We scientists in the trenches need to reclaim our rightful place as the setters of priorities and directions. One way to do this is to fix the peer-review system, so that once again the most creative and productive investigators are funded, and the importance of the question being addressed, not whether something fits into some preconceived program, largely governs what research gets supported. Another way is to demand - and play - a greater role in determining how big scientific funding decisions are made. To be fair, science administrators often hold workshops designed to give them advice about important areas to support, but many in the research community pay little attention to requests to attend. That needs to change. I also think it's time we started initiating that sort of process ourselves instead of waiting for the NIH to do so. The various scientific societies could take the lead in establishing such a program, with the help of the National Academy and, of course, the various NIH Institutes.

If we allow the top-down approach to determine what science gets done, the combined pressures of human ego and the need to make good on extravagant promises will continue to take science where it's already heading: towards big, flashy, but ultimately conservative, risk-averse, unexciting research. We'll produce a lot more data but fewer discoveries. We'll have predictability instead of surprises. Gone will be the marvelous principle that created perhaps

the most successful scientific enterprise the world has ever seen: that the best path to innovation is that followed by hypothesis-driven, investigator-initiated inquiry. The Bush Administration won't have killed it, nor will any of our national competitors - we will have done it to ourselves. Vladimir Putin may well be jealous. We will have thrown away our own independence out of greed, apathy, timidity, and a failure of vision. And we may not even notice the irony that the Russian Academy of Sciences will have shown more of a commitment to freedom of inquiry than we have.