By Carolyn Raffensperger

Funding Research For The Common Good

A recent television program documented how rapidly bacteria are evolving, and consequently the diminishing usefulness of existing antibiotics. But pharmaceutical companies aren't developing new antibiotics. They don't make money from drugs used for short-term problems. They profit from the drugs used over a lifetime: antidepressants and cholesterol-lowering drugs — even Viagra. The program explored the novel notion of having taxpayers fund drug companies to create new antibiotics.

That may sound far-fetched, but two experiments are already underway that have ramifications for how the public funds research that affects the public interest, including not only pharmaceutical research but research important to public health and the environment.

Privatization is by far the best known of the two. It began in the 1980s as a response to the observation that the federal government held title to 28,000 patents but only a few were licensed to industry. Many had been developed in the science gold rush following World War II. Up until the 1980s, the government kept the title to technologies that it had developed under the public aegis, but provided non-exclusive licenses to anyone who wanted to use the technology commercially. According to the Council on Governmental Relations, "Although taxpayers were supporting the federal research enterprise, they were not benefiting from useful products or the economic development that would have occurred with the manufacture and sale of those products."

Operating on the theory that privatizing and patenting increases innovation, Congress passed the Bayh-Dole Technology Transfer Act in 1980 to transfer licenses to the private sector. This worked remarkably well for commercializing new technologies, particularly biomedical and agricultural materials. However, it has had a downside. According to Christian Neumann, writing in the periodical of EPA's Office of Science and Technology Policy, there are four major concerns. First, the impact on academic values, which she analogizes "to the corruption of scholarly standards created by pressures to recruit and retain student-athletes." Second, removing "basic research platforms from the public domain." Third, a major increase in conflicts of interest in the academy. And, fourth, "the fact that the funding for new technologies is supported by taxpayers, but the government gives away the rights to the inventions."

As Neumann points out, the primary goal of the public research agenda is to benefit the economy, while other goals, such as basic research into how the world works, are lost in the tidal wave of money. The way that we framed the antibiotic resistance question was around what products can be developed and by whom. But perhaps there are other questions and other approaches neglected by the myopic focus on product development and commercialization — questions of great importance to society, as traditionally addressed by scholars. In addition, Bayh-Dole corrupts a basic assumption of capitalism: the person or entity who invests the capital should get a return on that investment. Under Bayh-Dole the public invests its capital into R&D, but private firms get the returns.

In 1998, Jane Lubchenco, former president of the American Association for the Advancement of Science, called for a new social contract for science. She argued that we now live on a human-dominated planet and the research needs are fundamentally different from a post-World War II era. If Lubchenco's premise is correct, appropriate research questions on antibiotic resistance will include ecological, public health, pharmaceutical, and even agricultural matters. Antibiotics are over-used as growth promoters in animal production, particularly factory farmed meat, leading to antibiotic resistance in the human population. The agenda and research questions come first under Lubchenco's proposal and then an appropriate funding structure will follow.

An alternative to the Bayh-Dole privatization model is open-source science. Open-source began at universities that were developing computer code in the 1970s and '80s. The code was developed and freely shared within the hacker community. According to the website of the Open Source Initiative, "The basic idea behind open source is very simple: When programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, people fix bugs. And this can happen at a speed that, if one is used to the slow pace of conventional software development, seems astonishing."

The open source computer code development is a model for open source biology. There are a number of groups pursuing open source biology for research into new technologies. For instance, the Northern Plains Sustainable Agriculture Society has developed a seed-breeding club. University scientists are partnering with farmers to develop seeds adapted to the peculiar ecological niche of the Great Plains. In contrast to the genetically engineered seeds patented by companies like Monsanto, these seeds are developed by and for experienced biologists and farmers and made available to the public without patents or strictures on seed saving.

Open source science promises much quicker technology development at far cheaper costs — key needs when it comes to antibiotic resistance and the health care system. But it also assures fundamental fairness: if the public has paid for the research, it should benefit from it financially, as well as having ready access to the drug.

Open source biology is an experiment worth taking seriously. It's time that we reevaluated our research needs. And it's time we reevaluated our funding mechanisms. Bayh-Dole may have outlived its usefulness.

Carolyn Raffensperger is Executive Director of the Science and Environmental Health Network in Ames, Iowa. She can be reached at raffenspergerc@cs.com.