

The Clash of Markets and Commons

-- and How It Affects Science, Economic Performance and Democracy

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Most of the controversies spawned by the molecular revolution are tremendously complex, so I waded into this territory with some trepidation. I am not a scientist or lawyer, nor even a biotech policy expert. Yet the history of taming dangerous technologies – nuclear power, synthetic chemicals, automobiles – shows that outsiders often offer valuable, catalytic perspectives.

With that conceit, I enter this dialogue as an informed citizen irregular and non-scientist whose expertise lies in a meta-realm: how shall we *talk about* the ethical, social and democratic implications of genetic technologies? I believe the framing of the issues is at least as important as the so-called facts, because the questions we ask will determine what we regard as relevant facts. The significance of our answers will depend on how we frame our discussion in the first place.

I believe that many of the quandaries wrought by the molecular revolution can be seen as a clash between two distinct but interdependent realms, the market and the commons. While there are obviously many other important perspectives, I believe these two axes can help us understand many of the deep principles at stake – and point the way to some provisional resolutions.

The conflict between the market and commons – and the government's intermediary role – plays out in many different permutations and with tricky factual twists. But the general template of this clash can help us see some common denominators in diverse debates – debates about corporate

sponsorship of scientific research; the commercialization of academia more generally; the morality of patenting life; the effectiveness of patents in stimulating innovation; and the legitimacy of corporations patenting indigenous knowledge.

At the risk of over-simplifying, I'd like to explore what a "commons perspective" looks like. I take a cue from the Nobel Laureate physicist Murray Gell-Mann, who once called for a new transdisciplinary study that he calls *plectics* – the study of how simplicity is braided together with complexity.¹ By providing a "crude look at the whole" and an interpretive context, it is possible to see how a universe of phenomena that seem confusing and complex may in fact contain patterns of order.

That is what I hope to do by talking about the commons. The commons is an emerging "meta-discourse" that can bring disparate, isolated issues into a new focus.² The commons helps reveal new patterns of order and clarity. For me, the clash of markets and commons is a golden thread that runs through the diverse controversies spawned by biotechnology.

The drive to propertize, own and sell scientific knowledge and its lucrative fruits repeatedly runs up against an elemental human desire to insulate certain values, institutions and practices from the market matrix. The market perspective celebrates property rights, material gain and technological innovation as preeminent values, and declares them to be "progress."

Proponents of the commons do not deny or condemn these values, but they do propose a very different vision of the public good. The commons is about the independence of academic science, the preservation of community ethics, the social control of certain resources, and democratic participation in policymaking. To commoners, the vision of "progress" offered by the market is not necessarily progress at all, but rather an erosion of cherished institutions and values.

At bottom, we are talking about *competing metrics of valuation*. Everyone is quite familiar with the value proposition that proponents of property rights and markets put forward. I believe we are much less

¹ Murray Gell-Mann, "Let's Call it Plectics," *Complexity* Vol. 1, No. 5, 1995-1996, available at <http://www.santafe.edu/sfi/People/mgm/plectics.html>

² See, e.g., David Bollier, *Silent Theft: The Private Plunder of Our Common Wealth* (Routledge, 2002), and Friends of the Commons, "The State of the Commons 2003/2004" [report], available at <http://www.friendsofthecommons.org>.

knowledgeable about the value proposition of the commons, in part because the language of the commons is so under-developed. A storyline that makes the case for preserving the integrity of natural processes, protecting academic independence, and defending community interests – the story of the commons – has lots of fuzzy edges. The forces being defended are subtle, complicated and long-term, and therefore more vulnerable. Market metrics, by contrast, consist of “hard numbers” such as bottom lines.

Why Talk About the Commons?

Why talk about the commons? Because it gives us a coherent vocabulary for talking about vital interests that are otherwise vague or ignored. It articulates a neglected value proposition.

Politicians and economists have long assumed that there are really only two sectors for governing things – markets and the state. Markets are supposed to be the vehicle for economic progress while government is supposed to take care of everything else. Increasingly, however, it is becoming clear that there is another sector – the commons – that is at least as important to our well-being.

The commons is a generic term that refers to a wide array of creations of nature and society that we inherit freely, share and hold in trust for future generations. Nature is comprised of countless physical commons – the atmosphere, the human genome, agricultural seeds, fresh water supplies, wildlife and ecosystems. Some commons are social creations, like libraries, national parks and public spaces. Other commons are intangible, like information and creative works.

A commons is “owned” by a defined community. It is managed over the long term for the good of all. Because a resource in a commons is not necessarily commodified, the members of a commons are not divided into “producers” and “consumers”; everyone shares rights and responsibilities, and everyone both uses and conserves. In a well-ordered commons, social equity matters. Over-exploitation generally does not occur.

Contrary to popular mythology, a commons does not inexorably lead to a tragedy. Ecologist Garrett Hardin got it wrong in his famous 1968 essay.³ A commons does not necessarily result in a tragedy. A commons is entirely sustainable – provided there are boundaries to the community of users; rules for managing the resource; and enough transparency so that free riders can be identified and sanctioned; among other conditions. Hardin’s essay was really about an open-access regime, not a commons.

A commons based on *information* is precisely the opposite of what Hardin postulated. An information resource does not get used up and it can be freely replicated. More to the point: information becomes more valuable the more that people use it! Property law scholar Carol Rose calls it a “comedy of the commons”; software program Dan Bricklin has called it a “cornucopia of the commons.”⁴

Science, the Internet, the Linux operating system and democratic culture are all examples of this dynamic. Greater value is generated as more people use the resource. The operative principle is “the more, the merrier.”

Talking about the commons helps us validate the fact that *there are important non-market social systems that are rich sources of value to human communities*. The market is not the only coherent system for creating wealth. A commons generates wealth, too, albeit in different ways and by blending in social and moral values.

Economists don’t understand this; that’s why so many of them patronize or ignore the commons. Economists believe that no significant wealth-creation can occur without the assigning of private property rights and the exchange of money. Thus copyright lawyers tend to regard the public domain as a junkyard of useless works. Natural resources that are not developed are seen as non-productive. Scientific knowledge that is not patented and sold is regarded as failing to live up to its full potential. This is an arrogant mistake – a point to which I return later.

Another reason that commons has been ignored or misunderstood for so long is because it represents a sovereign body of power *separate* from the market or the state. To talk about the commons is to assert that power. It is to assert

³ Garrett Hardin, “The Tragedy of the Commons,” 162 *Science*, December 13, 1968, pp. 1243-1248.

⁴ Carol Rose, “The Comedy of the Commons: Custom, Commerce and Inherently Public Property,” 53 *University of Chicago Law Review* 711-781 (1986), and Dan Bricklin, quoted in Eric Raymond, “The Cathedral and the Bazaar,” available at <http://www.tuxedo.org/~esr/writings/cathedral-bazaar>.

that certain resources belong to we the people, or to a specific community, and not to investors or politicians or government agencies. This is a highly unsettling proposition for those who dominate mainstream discourse.

Talking about the commons underscores the fact that the government is a *trustee* for our common resources; it is not the owner. The government may operate the national parks, for example, but it does not “own” them. Those resources belong to the people. This is not merely a rhetorical distinction, but an important legal and moral one, because as a trustee the government cannot do whatever it wants with *our* resources. Like any trustee, it must act in the best interests of its beneficiary, the people. A trustee must take care to preserve the capital stock for future generations, for example. It cannot give private parties preferential access to a common resource, or give it away for free.

Yet that is essentially what is happening today. Governments throughout the world are conspiring with – or acquiescing in – the market’s plunder of our common wealth. They are allowing private companies to take valuable resources from the commons and privatize them. Biotech companies are patenting genes, gene fragments and even actual life forms.⁵ Multinational companies are acquiring contracts for freshwater supplies in Canada and other northern countries so that they can privatize water and sell it around the globe like any other commodity.⁶ In the United States, the airwaves are worth billions of dollars and legally belong to the American people – yet broadcasters use them for free.⁷ They have essentially appropriated commons as a public subsidy.

The Rise of Market Enclosure

I will explain what all this has to do with biotechnology and ethics in a moment. But first let me explain the idea of *market enclosure*.

The term “enclosure” was used in 18th and 19th Century England to describe the landed gentry’s seizure of huge tracts of unfenced, commonly used

⁵ An excellent overview is *The Ethics of Patenting DNA: A Discussion Paper*, Nuffield Council on Bioethics, July 2002, available at <http://www.nuffieldbioethics.org/filelibrary/pdf/theethicsofpatentingdna.pdf>

⁶ Maude Barlow, *Blue Gold: The Global Water Crisis and the Commodification of the World’s Water Supply* [report] (San Francisco: International Forum on Globalization, June 1999).

⁷ Robert W. McChesney, *Rich Media, Poor Democracy: Communication Politics in Dubious Times* (Urbana, Illinois: University of Illinois Press, 1999); and Joel Brinkley, *Defining Vision: The Battle for the Future of Television* (New York: Harvest Books, 1998).

meadows, orchards and forests. Villagers depended upon these commons for food and firewood and lots of other household needs. The resources were typically managed through social custom and informal understandings. But with the enclosure of the commons – fencing them into private property – suddenly these resources were stolen from the commoners and commodified in order to make money for the few.

Some anonymous poet of the time wrote a folk protest about enclosure. The first verse goes like this:

They hang the man and flog the woman
Who steal the goose from off the common.
But let the greater villain loose,
Who steals the common from the goose.

Enclosure shifts ownership and control from the community-at-large to private companies. This, in turn, changes the *management* and *character* of the resource, because a market has very different standards of accountability and transparency than a commons. Enclosure also changes the way in which a resource is used; there is a premium on maximum, even ruinous, exploitation of resources. The freedom of the individual, rather than the stability of the community, is seen as trumping most other values.

Participants in the market are eager to transform resources into money, and money into capital. Money becomes the gatekeeper for controlling access and use. Dominant players in markets like to regularize their profit-making activity, which transforms the natural diversity of the commons into a more homogeneous, marketable array of products. Think commercial radio and music, Microsoft and software, or Monsanto and agricultural seeds. The goal of dominant market players is to domesticate a rich natural diversity by regimenting it. Everything gets reduced to fungible, marketable units.

By contrast, a commons recognizes the need to protect a certain “white space” of freedom and non-commodification. A commons does not compulsively declare all resources to be private property, for example, or obsessively monetize everything so it can be traded in the marketplace.⁸ A commons does not simply cede the governance of resources to impersonal

⁸ To determine how far to regulate environmental risks, the U.S. Environmental Protection Agency has officially declared the value of a life – presumably an American life – to be \$6.1 million in 2000, a sum that inexplicably dropped to \$3.7 million in 2002. Jim Holt, “The Way We Live Now: The Human Factor,” *The New York Times*, March 28, 2004.

market transactions, which may be rational on the individual level but chaotic and disastrous on the macro-level.

A commons uses and shares a resource according to social protocols and community needs. In a commons, individual freedom is put in the context of community needs. Specific histories, moral values, social relationships, and long-term commitments *matter*.

Science as a Commons

Now that I have introduced the commons and enclosure, I'd like to explore how these concepts apply to science and to biotechnology in particular. It should be easy to see why science and academia are commons. No one owns the Einstein's equations or Plato's writings. We all do. They are part of the public domain, available to everyone. When Jonas Salk invented the polio vaccine, Edward R. Murrow asked him, "Who owns the patent on this vaccine?" he replied, "Well, the people, I would say. There is no patent. Could you patent the sun?"

This was in the 1950s, when academics regarded the patenting of their discoveries as an unseemly, contemptible affront to the basic mission of science. Even in the early 1970s, when Stanford University's Stanley Cohen and Herbert Boyer developed gene-splicing techniques, they gave little thought to patenting them. Perhaps they realized how much they had drawn upon the freely given research of their peers and collaborations with them.

Science has been described as a "gift economy," a special kind of commons, because its members generate a community wealth of knowledge by giving their knowledge freely. This is not altruism but rather a different way of pursuing one's self-interest. By giving to one's community, one becomes a member in good standing entitled to the benefits of membership. Research papers are "contributions" to the community, for example, and over time contributors are rewarded with the recognition and respect of their peers and with access to the community's knowledge.

The gift economy of science has been a remarkably productive engine of knowledge. This is largely because a gift economy is very effective in cultivating deep and unswerving values. Participating in a scientific commons helps cultivate a sense of mutual obligation and restraint, something that is notably missing when working under a market regime. The moral and social protocols of a scientific discipline help its members to internalize important values, such as striving to be objective and open-minded in assessing evidence.

Members of a commons learn to respect the collective body of research upon which everyone depends – by crediting noteworthy predecessors, for example, and by not “polluting” the common pool of knowledge with phony or skewed research. The long-term integrity and creative power of scientific inquiry depends upon preserving these shared values.⁹

Openness makes scientific inquiry more creative and productive. Anyone is able to evaluate test data and replicate experiments. Secrecy is condemned because it prevents the rooting out of error and contributes to the degradation of the body of scientific knowledge. Privatizing knowledge also stymies innovation by artificially restricting who can have access to scientific knowledge.

These basic dynamics of science are also exemplified by the Internet and by free software such as Linux. Eben Moglen, the counsel for the Free Software Foundation, has explained why openness is such an important value proposition:

Ensuring free access and enabling modification at each stage in the process [of free software development] means that the evolution of software occurs in the fast Lamarckian mode: each favorable acquired characteristic of others’ work can be directly inherited. Hence the speed with which the Linux kernel, for example, outgrew all of its proprietary predecessors.¹⁰

Science is as robustly innovative as Linux for precisely the same reason: Free and open exchange in a community of peers is a tremendously efficient incubator of trustworthy innovation.¹¹

⁹ See Warren O. Hagstrom, “Gift Giving as an Organizing Principle in Science,” in Barry Barnes and David Edge, editors, *Science in the Context: Readings in the Sociology of Science* (Cambridge, MA: MIT Press, 1992), p. 28.

¹⁰ Eben Moglen, “Anarchism Triumphant: Free Software and the Death of Copyright,” *First Monday*, vol. 4, no. 8 (August 2, 1999), available at http://www.firstmonday.org/issues/issue4_8/moglen.

¹¹ The proliferation of online commons testifies to their remarkable efficiencies and power, especially compared to market-based analogues. For an economic/theoretical assessment of this fact, see Yochai Benkler, “Coase’s Penguin,” *Yale Law Review* 112 *Yale Law Journal* (Winter 2002-2003).

See, e.g., Nancy Kranich, “The Information Commons: A Public Policy Report,” Brennan Center for Justice, New York University Law School, Free Expression Policy Project, 2004, available at <http://www.brennancenter.org>. See also David Bollier and Tim Watts, “Saving the Information Commons: A New Public Interest Agenda in Digital Media,” [report] New America Foundation and Public Knowledge, 2002.

The Enclosure of the Scientific Commons

One of the most serious problems today in science, and especially biotechnology, is the intrusion of market norms into scientific research. The scientific commons is being enclosed. There is a growing concern about this topic, as reflected in a spate of recent books documenting and assessing the scope of the problem.¹² Professor Sheldon Krimsky of Tufts University sums up the gist of what is happening in academic research universities: “Secrecy has replaced openness, privatization of knowledge has replaced communitarian values; and commodification of discovery has replaced the idea that university-generated knowledge is a free good, a part of the social commons.”¹³

If there is an identifiable starting point to this problem, at least in the United States, it was in 1980 when the U.S. Congress enacted the Bayh-Dole Act, authorizing universities to patent the fruits of federally funded research.

For decades earlier, there had been a broad consensus that the intellectual property rights of federal research should stay in the public domain, or at least be licensed on a nonexclusive basis. That way, the American people could reap the full measure of value from their collective investments. In the late 1970s, however, large pharmaceutical, electronics and chemical companies mounted a bold lobbying campaign to reverse the presumption of public ownership of federal research. Since enactment of Bayh-Dole, we have seen a land rush to propertize and sell academic research that was once freely available to all.

Of course, there have been benefits. The flowering of biotechnology parks and silicon corridors in university towns – Austin, Cambridge, Palo Alto, Raleigh-Durham – has been built on the commercial success of dozens of important new drugs and medical technologies. Between 1980 and 2000, the

¹² Noteworthy books include Derek Bok, *Universities in the Marketplace: The Commercialization of Higher Education* (Princeton, N.J.: Princeton University Press, 2003); Sheldon Krimsky, *Science in the Private Interest: Has the Lure of Profits Corrupted Biomedical Research?* (New York: Rowman & Littlefield, 2003); Donald G. Stein, editor, *Buying In or Selling Out? The Commercialization of the American Research University* (Rutgers, N.J.: Rutgers University Press, 2004); and Corynne McSherry, *Who Owns Academic Work? Battling for Control of Intellectual Property* (Cambridge, Mass.: Harvard University Press, 2001).

See also a report by Seth Shulman, *Trouble on the Endless Frontier* [report], New America Foundation and Public Knowledge, May 2002; a keynote speech by David Bollier, “Preserving the Academic Commons,” American Association of University Professors, June 13, 2003, available at <http://www.aaup.org/events/archived/2003/03Bollier.htm>; and conference proceedings from “Conflicted Science: Corporate Influence on Scientific Research and Science-Based Policy,” Center for Science in the Public Interest, July 2003.

¹³ Krimsky, *Science in the Private Interest*, p. 7.

number of patents secured by universities grew ten-fold, bringing in more than \$1 billion in royalties and licensing fees.¹⁴

The undeniable economic gains have come at long-term costs and inequities that many universities prefer not to confront. These include a sweeping privatization of publicly funded knowledge; an explosion of institutional and personal conflicts-of-interest; shifts in research priorities to commercial goals at the expense of public-interest needs; and an erosion of public confidence in the independence of university research. These are all symptoms of the enclosure of the biotechnology commons.

I cannot begin to discuss this exhaustively here; the books mentioned in note 12 do that quite well. But I do wish to explain how many of the ethical quandaries affecting biotechnology today can be seen as enclosures of the commons. As market forces insinuate themselves more deeply into scientific enterprises, we are seeing enclosures of:

- the public's investments in science;
- scientific knowledge itself;
- the gift economies of scientific communities; and
- the university as a public institution.

Enclosures of the public's contributions to biotechnology. Even though the public pays for the lion's share of investment in risky basic research for new drugs, the long-term equity returns increasingly go to drug companies and universities. In the United States, we have seen this with the cancer drug Taxol; the anti-depressant Prozac; the hypertension drug Capoten; and a number of HIV and AIDS therapies.¹⁵ The government often gives exclusive licenses in patentable research even though the need for such incentives is dubious.

The upshot is that citizens often have to pay twice for pharmaceuticals and other medical treatments – first, as taxpayers who finance the research, and

¹⁴ North Carolina State University, "University Licensing Revenues and Patent Activity for Fiscal 2001," 2002, available at http://www2.acs.ncsu.edu/upa/peers/current/research_intensive/lice_pant_res.htm.

¹⁵ A leading activist and policy expert on this topic is James Love, director of the Consumer Project on Technology, at <http://www.cptech.org>.

second, as consumers who pay monopoly prices for drugs. This is just one way in which the market exploits the commons as a hidden subsidy.

Trade treaties and intellectual property rights are often used by multinational corporations to claim ownership in indigenous knowledge and plants, a practice known as bioprospecting or biopiracy.¹⁶ The life sciences industries – pharmaceuticals, agricultural and biotechnology fields – have realized that the biodiversity of nature in the developing world represents a rich raw resource of new medicines, genetically engineered plants and other products. But as Seth Shulman writes in his book, *Owning the Future*, “Who, if anyone, should be able to claim ownership rights to the globe’s genetic and cultural inheritance?”¹⁷

Sir John Sulston answers this question eloquently in his book, *The Common Thread* – or more accurately, his leadership with the Human Genome Project answered this question.¹⁸ All of humanity owns the human genome. This story may be the ultimate case of the public – constituted as the human race – contributing to biotechnology, which some private parties then sought to own and control. Sir John answers, quite rightly, that the human genome is properly the “common heritage of humankind.”

Yet this controversy did not come out of thin air. It is the logical culmination of a path first opened by the U.S. Supreme Court’s *Diamond v. Chakrabarty* ruling in 1980, which authorized the patenting of live, genetically altered microorganisms. Seven years later, Harvard University researchers won a patent on a transgenic mouse injected with a cancer gene. This new frontier, the patenting of living organisms, has opened the way for an ecologically and ethically dubious future – the ownership of life forms that are part of the sacred web of life.

A second form of enclosure that is occurring is the *enclosure of scientific knowledge itself*. Over the past twenty years, the American courts have also lowered other standards for obtaining patents and therefore the ability to own scientific knowledge. The courts’ interpretations of the so-called utility

¹⁶ See, .e.g., Vandana Shiva, *Protect or Plunder: Understanding Intellectual Property Rights* (New York: Zed Books, 2001), and Michael F. Brown, *Who Owns Native Culture?* (Cambridge, Mass.: Harvard University Press, 2003).

¹⁷ Seth Shulman, *Owning the Future*, ((Boston, Mass.: Houghton Mifflin, 1999), pp. 127-152.

¹⁸ John Sulston and Georgina Ferry, *The Common Thread: A Story of Science, Politics, Ethics and the Human Genome* (Washington, D.C.: John Henry Press, 2002).

standard and non-obviousness standard have been lowered, so that much more is considered patentable than ever before. Meanwhile, the scope of patents on information technologies has expanded, which affects biotechnology because the field is so integrated with computer technology.

Patents are increasingly being granted for “upstream” research, which means that basic knowledge that everyone else must use for the field to advance is becoming proprietary. Harvard, MIT and the Whitehead Institute, for example, have a patent on all drugs that inhibit something known as NF-kB cell signaling. Since this physiological process is believed to have something to do with many diseases such as cancer and osteoporosis, the patent deters others from pursuing their own scientific investigations in this area.¹⁹ If these sorts of patents were in place in the 1950s and 1960s, one could be sure that the biotech revolution would never have occurred in the first place. Too much basic scientific knowledge would have been proprietary.

The over-patenting of knowledge sometimes results in what is called an “anti-commons” problem, in which property rights are so numerous and fragmented in a given area that it becomes very difficult for research to proceed.²⁰ Moreover, the transaction costs for clearing rights are too numerous and costly. For example, there are thirty-four “patent families” for a single malarial antigen, and those rights, applying to different pieces of the research agenda, are owned by different parties in many different countries.²¹ One reason that a malaria vaccine has been so elusive is because the patent rights are so numerous and dispersed.

Private ownership of scientific knowledge has gotten so extreme that some scientists feel compelled to engage in “defensive publishing” – preemptive publishing of research so that it will remain in the public domain and not be

¹⁹ Arti Rai, “The Increasingly Proprietary Nature of Publicly Funded Biomedical Research: Benefits and Threats,” in Donald G. Stein, *Buying In or Selling Out? The Commercialization of the American Research University* (New Brunswick, N.J.: Rutgers University Press, 2004), pp. 117-126.

²⁰ The classic treatments of this problem are Michael A. Heller and Rebecca S. Eisenberg, “Can Patents Deter Innovation? The Anticommons in Biomedical Research,” *Science*, May 1, 1998, pp. 698-701; and Michael A. Heller, “The Tragedy of the Anti-Commons,” *Harvard Law Review*, vol. 111 (1998), p. 621.

²¹ Melinda Moree, Malaria Vaccine Initiative, Program for Appropriate Technology in Health, at conference, “Collective Management of Intellectual Property: Tackling the Anti-Commons,” Bellagio, Italy, November 2-25, 2002.

claimed as proprietary.²² Indeed, this was a big motivation for public-science researchers in the race to sequence the human genome. They wanted to get it into the public domain before it could be claimed as proprietary.

A third enclosure affecting biotechnology is the *enclosure of the gift economies that constitute scientific communities*. When companies convert a commons into a market, they typically damage the dense web of social relationships and shared history that makes up that community. Instead of honoring those relationships and the values and knowledge that they give rise to, some scientists begin to honor market rewards. The integrity and independence of the community is at risk.

When academic research is oriented toward entrepreneurial goals, the gift economy begins to fall apart. Scientists will refuse to share unpatented research tools and data. They will sign non-disclosure agreements with sponsoring companies and contracts that require delays in publishing research results. There will be less sharing and collaboration, and as a result, an impoverishment of scientific knowledge. A researcher who has financial ties to a company – through a research grant, consultancy, board membership or stock holdings – is more likely to cut ethical corners on research and make business-friendly interpretations of results.

For those researchers who think corporate restrictions are ultimately benign, consider what happens to those researchers who insist upon telling truths that might jeopardize corporate investments. When a UC San Francisco researcher, Betty Dong, found that a popular thyroid drug performed about as well as three cheaper medicines, the company that sponsored her research sought to discredit her work and suppress her research. Another notable case was that of Nancy Olivieri, who was threatened with a lawsuit for breach of contract if she disclosed that a liver drug had dangerous side effects. Brown University researcher David Kern was pressured not to publicize evidence of a potentially fatal lung disease that he had discovered at a local manufacturing plant.

Such behaviors point up the affirmative value of the gift economy of science and its endangerment by commercial forces. Markets tend to erode gift economies by substituting cash-based relationships for ones based on collegiality and shared professional commitment. A flood of industry sponsorships,

²² Stephen Adams and Victoria Henson-Apollonio, "Defensive Publishing: A Strategy for Maintaining Intellectual Property as Public Goods," International Service for National Agricultural Research, Briefing Paper 53, September 2002.

consultancies, junkets, stock options and other forms of influence-peddling is causing widespread damage to the independence and credibility of academic research.

A recent article in the *Washington Monthly* recently explored “why you can’t trust medical journals anymore.”²³ Marcia Angell, when she was editor of the *New England Journal of Medicine*, once wrote a lead editorial, “Is Academic Medicine for Sale?”²⁴ She considers many corporate/university partnerships to be bad bargains, period. They may be useful to companies in exploiting the talent and prestige of universities, but they have limited value for advancing technology transfer or the public good.

Finally, we are also seeing the *enclosure of the university as a public institution*. This is a profound loss that is barely recognized. As Ralph Nader has written: “Academic science, with its custom of open exchange, its gift relationships, its willingness to provide expert testimony that speaks truth to power, its serendipitous curiosity and its nonproprietary legacy to the next generation of student-scientists, differs significantly from corporate science, which is ridden with trade secrets, profit-determined selection of research and awesome political power to get its way....”

As universities become more attentive to their revenue-generating potential, they are assuming the mentality of corporate science and shouldering new structural conflicts-of-interest. Should they serve the public good or their parochial market interests? There are those who say that serving one’s market interests *is* the public good, and that may be so in certain cases. But ultimately, it is very difficult for a university to serve two masters.²⁵

For example, Yale University and the University of Minnesota each hold patents on HIV and AIDS drugs developed with public funds. This means they must decide whether to extract the maximum revenues from their patents, along with Big Pharma, and charge top dollar for AIDS drugs in the midst of the African pandemic – or decide to honor their historic role as public-spirited institutions dedicated to serving needs that the market won’t.

²³ Shannon Brownlee, “Doctors Without Borders: Why You Can’t Trust Medical Journals Anymore,” *Washington Monthly*, April 2004, available at <http://www.washingtonmonthly.com/features/2004/0404.brownlee.html>.

²⁴ Marcia Angell, “Is Academic Medicine for Sale?” *New England Journal of Medicine*, May 18, 2000, pp. 1516-1518.

²⁵ See David Bollier, “Preserving the Academic Commons,” keynote speech to American Association of University Professors, June 13, 2003, available at <http://www.aaup.org/events/archived/2003/03Bollier.htm>.

One of the more insidious effects of corporate sponsorship of university research is a shift of research priorities. Instead of pursuing basic R&D, or issues that may not be receiving much attention like sustainable agriculture, there is a greater premium to pursue applied research that serves the strategic needs of sponsoring companies. This, truly, is one of the more invisible but profound effects of the enclosure of the university. Professor Krinsky calls it the “demise of public-interest science.”

Reclaiming the Scientific Commons

The challenge facing us – it should be clear by now – is how we can begin to reclaim the scientific commons. I must stress that this is not an anti-market, anti-capitalist agenda. It is an agenda to restore a more sensible, sustainable balance between the market and the commons.

This project has direct implications for the future of science, democracy and economic performance. Science cannot be a reliable engine of trustworthy knowledge if market imperatives dominate. Democratic policymaking will suffer if market priorities trump all else, and if money is allowed to out-muscle citizen opinion and scientific fact. And finally, economic performance itself will suffer if an unfettered market is allowed to cannibalize the commons upon which markets depend for new ideas, diversity and serendipity.

Let me offer several broad recommendations. First, the national policies to promote technology transfer and the commercialization of academic research must be revisited and reformed. In the United States, reform of the Bayh-Dole Act should be a priority. Those countries that have not gone down this path as far as the U.S. should stop short and reflect. Is the price really worth it?

A basic question of social equity must also be confronted. Why should taxpayers subsidize the R&D budgets of private corporations through their funding of federal research at public universities? Not only does the public get shortchanged, the integrity and independence of academic science is compromised in the process.

Universities must begin to wake up to the serious hidden costs of corporate partnerships. They must begin to require not just full disclosure of financial conflicts of interest, but inaugurate new systems to fortify scientific independence. For example, one proposal suggests that universities establish the

equivalent of a “blind trust” to manage any equity that they hold in companies that fund basic or applied research at their institution.²⁶

Patents policy must also be revisited. Since patents are, after all, a monopoly grant, we should be far more circumspect in doling them out, especially when they lock up scientific knowledge. Are patents always needed? In many instances, academic researchers do not really need patent incentives to pursue their research, nor do companies necessarily need exclusive rights to the knowledge in order to develop new products. In the same vein, patents should be calibrated so they do not enclose the scientific commons. Any patents for upstream research should be as narrow as possible, while broader patents for downstream research are more appropriate.

What I find especially exciting is how many scientific disciplines are developing their own tools to protect the commons. The rise of open-access journals such as the Public Library of Science and Biomed Central are showing that online commons are economically efficient, academically reputable vehicles to reclaim the scientific commons.

There is even a new movement of “open source biotech” that draws inspiration from open source software.²⁷ Especially as biotech and computer science grow together, the appeal of open source software tools has grown. BioBricks, for example, is a Cambridge, Massachusetts, company that is attempting to create a standardized, non-proprietary set of tools for assembling genetic sequences. The Open Bioinformatics Foundation is developing open-source computer languages for life sciences research. Such innovations will help scientists bypass the proprietary web that is enclosing knowledge in the life sciences, and keep research in the public domain.

In this regard, I am eager to see what develops at a conference to be held at Columbia University in three weeks. Entitled “Technology Development in the Life Sciences: Intellectual Property and Public Investment for Pharmaceuticals and Agriculture,” the conference will explore a number of innovative new ideas for enhancing the public domain of biotech research.²⁸

²⁶ Hamilton Moses III and Joseph B. Martin, “Academic Relationships with Industry: A New Model for Biomedical Research,” *Journal of the American Medical Association*, February 21, 2001, pp. 933-935.

²⁷ Kenneth Neil Cukier, “Open Source Biotech,” *The Acumen Journal of Life Sciences*, vol. 1, issue 3, September/October 2003, available at <http://acumenjournal.com>, and <http://www.cukier.com/writings/opensourcebiotech.html>.

²⁸ Details on the conference can be found at <http://www.cptech.org/events/columbia05202004.pdf>.

They include pre-commitments for vaccine purchases; differential enforcement of patent rights; compulsory licenses; an international treaty for pharmaceutical R&D; and prize mechanisms to encourage specific types of research.

When I look at the varieties of creative solutions being explored, I find it useful talking about the commons because the term helps show how the diverse initiatives are conceptually related. Initiatives to reclaim the commons seek to give the public a fair reward for its investments and greater access to the fruits of science. Initiatives to reclaim the commons seek to use science for the betterment of society, not just for the investors in private companies. They seek to fortify the gift economy of scientific disciplines. They reassert certain core principles endangered by market discourse.

The commons is a rich source of value creation, as I said earlier. But unless we can articulate this truth in deeper empirical and analytic ways, we are not likely to be able to defend the commons from the relentless march of enclosure. Nor will we be able to devise the necessary institutional and legal innovations to protect the commons.

We have a lot to do. But I am optimistic if only because more and more people are realizing that the commons is a vital part of our human identity. This fact grows more obvious and compelling as the Internet and globalization continue to knit the human species into a single community.²⁹ But that's another, much longer story.

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²⁹ John Clippinger and David Bollier, "A Renaissance of the Commons," available at <http://www.bollier.org/pdf/RenaissanceofCommonsessay.pdf>.