

# Book Review

***Science For Sale. The Perils, Rewards, and Delusions of Campus Capitalism, Daniel S. Greenberg (University of Chicago Press, 2007, 2005) 200 pp., ISBN 978-0-226-30625-4; \$25.00 hard cover)***

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“Be careful what you pray for,” the old adage goes, “you may get it.” This applies particularly well to the case of scientific research. The explosive post-World War II growth of American universities, a steadily increasing emphasis on their research mission, and technological advances that have made available (and essential) to researchers a panoply of ever-more sophisticated (and expensive!) instrumentation have also increased budgetary pressures on academic scientists and their institutions. While the great majority of this need continues to be met by funding from federal agencies such as NIH, NSF, and DOE, recent decades have seen universities turning more and more to collaborative agreements with corporations, and to commercialization of discoveries made in their laboratories, to support their research enterprise. More than a few observers have raised questions about the wisdom and appropriateness of such arrangements between institutions with such divergent goals (knowledge versus profit) and attitudes toward information dissemination (“open- source” versus proprietary), and are wondering whether the collaboration will be ultimately salutary or corrosive. Daniel S. Greenberg’s *Science For Sale. The Perils, Rewards and Delusions of Campus Capitalism* is a well-researched, nicely balanced, and accessibly written examination of this question and an interesting companion piece to his earlier *Science, Money and Politics. Political Triumph and Ethical Erosion* (University of Chicago, 2001).

The book is divided into three parts, the first laying out the history of growing university-industry collaborations and chronicling the problems that have resulted and attempts to manage them, the second taking a more personal look through extended conversations with several university faculty deeply enmeshed in collaborative work with industry, and final part offering Greenberg’s prescriptions for corrective action. Chapter 1 sets the stage by pointing out scientists’ familiar refrain that science is chronically short of money, because the increasing cost of equipment and supplies, and the “arms race” among American universities, have created a constantly-increasing appetite for research money. The result has been an ever-decreasing fraction of fundable proposals, an increasing concentration of money in the hands of older investigators, and a corresponding pressure

on young scientists, and their institutions to find alternative sources of support, such as private industry.

In his second chapter, entitled “How Extensive and Influential Is Industrial Funding of Academic Research?” Greenberg makes the argument that industry support for academic research is only a small fraction of total funding and is dwarfed by federal dollars. While true, it seems to gloss over the fact that a relatively small amount of resources, judiciously leveraged, can have an effect on the way in which research is pursued that is out of proportion to its actual amount.

Chapter 3 deals with the Bayh-Dole act, passed in 1980 to facilitate the transfer of technology from university laboratories to the market. By mandating universities to look for patentable discoveries made by their researchers and allowing both universities and researchers to share in licensing royalties, it fundamentally shifted the landscape and created tensions by opposing the historic notion of openness through publication of research results and the secrecy stemming from the requirement that patentable inventions be novel (i.e., previously undisclosed). While Bayh-Dole opened the floodgates, Greenberg points out that industry-academic collaborations had already been going on sporadically for some time. Interestingly, Greenberg’s examples of early agreements do not include the early-seventies arrangement between Monsanto and the laboratories of Bert Vallee and Judah Folkman at Harvard Medical School, which provoked much consternation in the academic community at the time, as it seemed to many to strike at the very ideals of the academic research enterprise. Looking back three decades later (in 2002), Vallee wrote that

“The Monsanto agreement, organized around the theme of angiogenesis as a window on biology for the Monsanto Company, was a landmark. Its consummation brought, in some quarters, dire predictions that it represented the slippery slope to academic perdition. Its execution demonstrated just the opposite, viz., that industry and the academy, under the proper circumstances, could be of enormous help to each other. The Harvard-Monsanto agreement included a construction element, which paid for siting of the Laboratory in the Seeley Mudd Building, where it was located for over 20 years. It also endowed three new professorships in perpetuity. The Harvard-Hoechst agreement and subsequent interactions with Peptech and Promega followed the Harvard-Monsanto agreement. Each of these has brought major resources to the Laboratory and to the School.” (<http://www.hms.harvard.edu/bbsm/history.htm>)

Coming as it did at the beginning of a nearly three-decade long period of conservative dominance in national politics, Bayh-Dole has led to a fundamental shift in attitudes on the part of universities and their science faculty toward entrepreneurship that Greenberg

chronicles next. The most notable casualty was the reputation of the National Institutes of Health, which was tarnished when several senior officers were found to have been serving as consultants for pharmaceutical companies over whose products they had oversight responsibility, an egregious violation that led to the resignation of several of the offenders and, in overreaction, to the imposition of restrictive rules governing conflicts of interest.

Greenberg makes the case in subsequent chapters that local structures, such as university-based Institutional Review Boards (IRB's) created to vet proposals, and national ones, like the Office for the Protection from Research Risks (ORPP), have generally proven to be relatively effective at solving the problem.

The second part of *Science For Sale*, which I found most fascinating, recounts Greenberg's in-depth conversations with several academics involved in industrial collaborations at different levels of complexity and satisfaction. They put a human face on the issues, and clearly illustrate the uneasy tug of war between the siren song of financial gain, whether for research support or personal enrichment (though almost without exception individuals focus heavily on the former and tend to downplay the latter), and the ideals of independence and the openness that draw scientists to academe in the first place. For instance, Robert Holton, whose NIH-funded synthesis of the anticancer drug taxol and numerous analogs have led to personal wealth, huge profits for Bristol-Myers Squibb and over \$200 million of licensing income to Florida State University, is nonetheless generally negative in his opinion of university-industry collaborations. In stark contrast is the interview with Robert Dickson, of the School of Chemistry and Biochemistry at Georgia Tech, where tech transfer is strongly encouraged. Dickson, whose laboratory's development of methods for 3-dimensional imaging of cells and of single molecule orientation have led to significant financial support from NIH, NSF and the private sector, as well as a licensing arrangement with a major biotech firm, is generally positive in his attitude toward such arrangements, seeing no hindrance to the freedom to communicate or share research results, or dangers to intellectual property. The extended interviews in this section make for fascinating reading.

Greenberg concludes with a summary look at what he characterizes as this "troubled but durable relationship", looking ahead to prospects for difficulties beyond the horizon that stem from the consumerization of higher education and the intellectual arms race it has engendered, and pointing to possible approaches to solving, or at least ameliorating, the problems.

It is probably safe to predict that, no matter what structural changes are proposed in an attempt to fix things, the problem will never go away. It seems of little use to bewail the temptations posed by the prospect of large amounts of research support or royalties or

other sources of income. In an entrepreneurial culture like the American university system, money is what makes scientists' work possible. In his conversation with Greenberg, Timothy Mulcahy, then "a senior administrator at the intersection of science and commerce" at University of Wisconsin, Madison, argued that, "it would be a horrendous waste if, at the expense to the public, the research we did did not yield benefits to them in the long run. But, in that transition, I think we always have to be attentive to what are the social costs, what are the ethical costs, and as long as we can...say... we're doing the best to balance that tension. ... it's when we evolve the culture where that's no longer recognized as a potential contrast in culture that we run a problem. And I'm not sure about the new people coming in ... who may not be aware that some of these new issues might raise concerns about some of our core principles in universities." NIH-mandated instruction in the responsible conduct of research should, in principle, help raise awareness of these and similar issues. What might perhaps help even more, though, is for colleges and universities to begin introducing science students to ethical and professional issues from the earliest stages of their undergraduate careers as an essential element of their education, rather than waiting until they are graduate students or postdoctoral fellows.

Greenberg's treatment in *Science For Sale* is (at least in my opinion) even-handed and fairly sympathetic, and one could almost argue that the book might more accurately have been entitled *Science For Sale?* In any case, it made for thought-provoking reading, and would make a welcome addition to any scientist's book list.