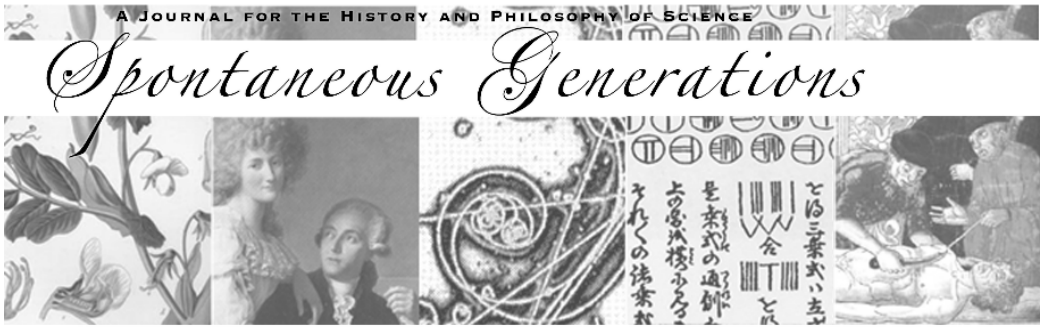

Economic Aspects of Science: Editor's Introduction

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Source: *Spontaneous Generations: A Journal for the History and Philosophy of Science*, Vol. 7, No. 1 (2013) 1-5.

Published by: The University of Toronto
DOI: *10.4245/sponge.v7i1.20379*

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Published online at *jps.library.utoronto.ca/index.php/SpontaneousGenerations*
ISSN 1913 0465

Focused Discussion

Economic Aspects of Science
Editor's Introduction

Mike Thicke*

Science has long been understood as an economic endeavor. As early as 1879, Charles Sanders Peirce applied abstract economic reasoning to model scientific decision-making (Peirce 1967). Beginning in the 1930s, chemist-turned-philosopher Michael Polanyi and physicist-turned-sociologist John Desmond Bernal clashed over whether the science of their time was best organized according to free-market or socialist principles (Polanyi 2000; Bernal 1939). And perhaps most well known to students of science, Vannevar Bush argued in his 1945 report, *Science the Endless Frontier*, that the social and economic benefits of science justified public funding of scientific research.

In recent years, it has only become more clear that science cannot be understood separately from its economic circumstances. During the Cold War, massive government funding for science in the United States and elsewhere created the illusion that science could be understood as a disinterested search for truth insulated from economic concerns (cf. Merton 1942). However, since the early 1980s, science has entered what Philip Mirowski and Esther-Mirjam Sent call a "Globalized Privatization Regime," characterized by increased private funding for research and globalized intellectual property laws (Sent and Mirowski 2008). Even those scientists who still rely on public funding are increasingly being asked to justify their research in economic terms (Brown, this issue). With most scientists no longer protected from market considerations, their activities can no longer be understood as resulting solely from a desire for knowledge and peer recognition. Rather, these scientists must be understood as entrepreneurs in the literal sense: as individuals seeking funding from a variety of sources in order to further enterprises that will yield tangible economic benefits.

Even philosophers, who as a group have been very reluctant to acknowledge that science is undergoing a fundamental restructuring, have recently begun worrying about the new economic circumstances of science. Philosophers have

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Spontaneous Generations **7:1** (2013) ISSN 1913-0465. University of Toronto.

never shied away from employing economic methodology for understanding science (eg. Radnitzky 1987; Kitcher 1993; Goldman and Shaked 1991). However, they have generally viewed science as an abstract economy, where scientists compete not for dollars but for esteem. Now, prompted primarily by troubling developments in the biological sciences, they have begun turning their attention to the concrete economy of science (eg. Radder 2010). The most common concern expressed by philosophers is that the commercialization of scientific research is undermining the Mertonian norms of disinterest and communalism, and as a result, undermining science's objectivity and epistemic authority (eg. Resnik 2007). Consequently, it is now fair to claim that researchers from every discipline of science studies have become interested in science as an economic activity.

The papers in this issue's focused discussion build upon that interdisciplinary interest in science as an economic activity. They include contributions from historians, sociologists, philosophers, and economists.

The first contribution in our focused discussion comes from economist and historian Esther-Mirjam Sent, who follows up on her classic survey of the economics of science with a look at the state of the field today. The main difference between her previous article and this update is that the "new phase of reorganization" (Sent 1999, 95) she observed in 1999 has now been fully realized as a "Globalized Privatization Regime." Sent points to examples of this globalized regime in the European Union's Lisbon objectives, a reorganization of German universities along American lines, and the privatization of universities in Japan. Sent's prior call for integration and synthesis of the various approaches to the economics of science has not, in her view, been met. Accordingly, she renews her call for "a more serious dialogue among scientists, and historians, philosophers and sociologists of science in an atmosphere as free of mutual suspicion as possible" (10).

I have classified the remaining articles in this focused discussion into three main themes: methodology, commodification, and education. However, these contributions resist easy classification, and several contribute to multiple themes. This should be seen as a strength: the connectedness of these articles speaks to a corresponding connectedness in the economic circumstances of science. It is sometimes tempting to see, for instance, the marginalization of contract faculty and the deceptive publication practices of biotechnology corporations as completely separate phenomena. However, the articles in this focused discussion show them to be facets of a wider change in the nature of scientific and academic practice.

Two papers in this issue discuss the first theme, methodological approaches to the economics of science. Philosopher and sociologist of science Marion Blute argues for an evolutionary epistemology of science. An evolutionary approach to science, in contrast to a neoclassical approach, calls attention to the variety of aims possessed by science—a variety that parallels conceptions of evolutionary

fitness—and suggests looking at scientists as groups, or populations, rather than as individuals. Finally, she proposes a view of credit through citation as a multi-generational cycle of reproduction rather than as a single transaction. Kean Birch shares Blute's critical assessment of a neoclassical economics of science, but also warns against the uncritical use of outmoded economic theories such as classical Marxism. Instead, Birch argues that science studies scholars need to engage with contemporary political economy, and he offers several suggestions for doing so along with examples of how some scholars already are.

Our second theme is the commodification of science. The "commodification" of science is often conflated with the "commercialization" of science—subjecting science to market forces. However, these terms have distinct meanings for economists. Marx, for instance, defined commodities as composed of two "values": value-in-use and value-in-exchange. The commodification of science, therefore, implies not only that science is being exposed to the market (being commercialized), but also that it is being packaged and objectified to fulfill a social function. This packaging—Marx might have said alienation—is an essential component of commodification, and one that should not be ignored by those studying science.

Three articles in this issue contribute to a more sophisticated understanding of the commodification of scientific knowledge. First, Steve Fuller argues that the commodification of scientific knowledge is a necessary step on the path towards the socialization of knowledge, just as capitalism was a necessary step on the path towards communism for Marx. Second, David Tyfield argues that the Internet and open access are not solutions to the "crisis of neoliberal science," namely, the twin problems of disappearing academic jobs and dysfunctional intellectual property regimes (31). Finally, Turner, Dallaire-Fortier, and Murtagh argue that the social costs and benefits of biobanking can be better understood by conceiving of biobanks as producers of knowledge commodities, or intellectual property.

Recent years have seen an increasing trend towards the commodification of scientific research. We have also seen dramatic changes in the nature of higher education, our third theme. High-paying tenured positions are being phased out in favor of low-wage adjunct positions. Massive online courses and online universities are competing with traditional institutions. Student tuition is rising in comparison to government funding. However, these changes to education are rarely linked to changes in the organization and funding of research. Three papers in this issue begin to address that gap. First, Mark Brown discusses the rhetorical strategies of public university administrators in the face of a funding crisis in California. Brown argues that the mistaken ideal of value-free science has led academics into political paralysis, wherein they reflexively acquiesce to demands that they not practice "inappropriate political activity" (25) in the classroom. Further, Brown challenges the common

conception that commercialized scientific research funds university teaching, observing that in fact the reverse is generally true: teaching funds research. Mark Tyfield argues that the "Californian ideology" of open access and online education fails to address the economic realities of either teaching or research. Many open access schemes rely on authors to make up for lost revenue from readers. This will likely have the effect, Tyfield argues, of excluding scientific research performed by those not affiliated with major institutions. At the same time, free online education initiatives offer no relief to increasingly marginalized academic workers. Steve Fuller, in turn, argues that "commodification" and "circularisation" are two sides of the same coin. For instance, in order for knowledge of Plato to be distributed to everyone, he claims, the "epistemic costs of acquiring access" (19) must be reduced. It is not realistic for everyone to learn Plato in the original Greek, and so what is useful in Plato for everyone to know must be packaged in such a way that anyone can easily access this knowledge. Similarly, the commodification of scientific knowledge can allow for its socialization, that is, its social redistribution.

The articles in this focused discussion contribute to a gradually emerging interdisciplinary engagement with science as an economic activity. Although we cannot yet claim that Sent's call for a more serious dialogue between all aspects of the economics of science has been met, I believe this issue makes a significant contribution towards that aim. Hopefully such productive collaborations will become more common in the future.

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