Chapter 12
Nanoscience, Nanoscientists, and Controversy

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12.1 Introduction

Contemporary life sciences and biotechnology research is controversial. Whether the topic is embryos, evolution, genetics, neuroimaging, pharmaceutical discovery, synthetic biology, or xenotransplantation, the research is subject to public, political, legal, regulatory, clinical, and/or scientific controversy. In some cases, the controversy may not be worth engaging, given the credibility (or, rather, lack thereof) of those who would object. Often, though, those who would object must be taken seriously—and even where the objectors lack credibility, any response to them must itself be serious. These are basic elements of civility in a pluralistic society, and yet they are widely ignored when science and scientists are the subjects of controversy.

As a scholar of the life sciences in society, I have tended to pay less attention to the question of generally whether research in chemistry, math, physics, or engineering is as widely deemed to be controversial as is research in biology and biotechnology—except, of course, where that research is oriented toward or undertaken in concert with the life sciences (as with engineering in relation to stem cell biology, or chemistry in relation to directed molecular evolution). But with advances in nanoscale science and engineering (NSE) research, it is hard to miss the fact that NSE is an exemplar of research in the natural and physical sciences that is controversial both in relation to the life sciences (as expected) but also in its own right. Whether because of the spatial or financial scale of the research, or because of the prospects for immense changes—good and bad—in science, industry, medicine, and society, or for a combination of these or other reasons, NSE research is paradigmatically controversial. So what?

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I organize my claims as follows. First, I identify and briefly discuss a number of ethical and societal issues associated with NSE; second, I canvass a variety of scientists’ and engineers’ standard responses to claims that NSE (and science and engineering more generally) is controversial and assess their impropriety (as a cautionary tale, I discuss some recent events in stem cell biology in California and Canada); finally, I propose an alternative response and a strategy for implementing it. Throughout, my aim is to reflect critically on the roles and responsibilities of scientists, engineers, and ethicists in the face of controversial science and technology research and development. While my remarks are often general rather than specific to NSE, I hope to convince the reader that this as a strength rather than a limitation of my approach.

12.2 Societal and Ethical Implications of NSE

NSE research raises a large number of ethical, societal, and policy issues, from agenda-setting and funding through research, development, implementation, and use. As stipulated in the twenty-first Century Nanotechnology R&D Act of 2003 (PL 108–153), the United States Congress intended to ensure that: “ethical, legal, environmental, and other appropriate societal concerns, including the potential use of nanotechnology in enhancing human intelligence and in developing artificial intelligence which exceeds human capacity, are considered during the development of nanotechnology” (Section 2(b)(10)). This goal is to be accomplished by:

- Establishing a societal implications research program;
- Requiring that Nanoscale Science and Engineering Centers (NSECs) address societal implications;
- Integrating societal concerns with nanotechnology research and development for widespread benefit; and
- Providing for public input and engaging in public outreach activities through the National Nanotechnology Coordination Office (NNCO).

These activities are well underway. The NNCO is coordinating a wide range of efforts linking together nanoscale scientists and engineers with ethicists and policy decision-makers (http://www.nano.gov/html/about/nnco.html), NSECs have established Societal and Ethical Implications of Nanotechnology programs (e.g., at the International Institute for Nanotechnology at Northwestern University, http://www.nsec.northwestern.edu/SocialEthical.htm), and the National Science Foundation has funded a Nanoscale Informal Science Education network and two large NSECs focused on Nanotechnology in Society. The latter are based at Arizona State University (http://cns.asu.edu/) and at the University of California at Santa Barbara (http://www.cns.ucsb.edu/home/) and are part of a wider network of funded research centers and programs throughout the United States (http://www.nsf.gov/news/news_summ.jsp?cntn_id=104505&org=olpa&from=news).