

**Case 89**

**Computational Molecular Biology and Professional Science Degrees**

*Alfred P. Sloan Foundation, 1995*

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**Background.** In the mid-1990s, biotechnology as an industry was at a curious juncture. The decoding of the human DNA was imminent, promising rapid growth in the field of biotechnology and research. The demand for trained scientists in the field was high. America’s universities, however, were not producing students with the kind of training the biotechnology sector would demand. Educational institutions with research programs in the field of computational molecular biology had only handfuls of graduate students, and those students were being snatched up quickly by the private sector to pursue commercially viable research. Many of the top university researchers themselves were being recruited to large corporate pharmaceutical research units. Also, students lured by lucrative opportunities in the corporate sector were not inclined to enter rigorous and lengthy Ph.D. programs. Further, the training students were receiving in traditional Ph.D. programs was inconsistent with the needs of emerging biotechnology firms; employees would not need to have completed dissertations but would need more core science training than undergraduate science degrees provided.

Still, universities largely failed to entertain innovations to the traditional degree program offerings. Universities simply were not efficiently equipping their students to serve the demands of the emerging biotechnology industry.

**Strategy.** The Alfred P. Sloan Foundation, created in 1934 by the CEO of General Motors, had long been funding science and technology research. In 1995, the Sloan Foundation, acknowledging the need for more quantitative scientists trained for practical research, initiated a joint program with the U.S. Department of Energy to fund ten post-doctoral fellowships for students in the quantitative sciences to fund their transition into the field of computational molecular biology, or bioinformatics. The program’s aim was to "to produce scientists who can link the powerful theoretical and practical tools of molecular biology with the power of modern computational techniques." The Foundation expected that these fellowship recipients would be able to apply cross-disciplinary skills toward cutting-edge biotechnology problems.

The same year the Foundation began funding individual fellowships in computational molecular biology, Sheila Tobias, a consultant in science education, proposed dramatic changes in the university paradigms of traditional academic disciplines and degree programs. In her book, *Rethinking Science as a Career: Perceptions and Realities in the Physical Sciences,* Tobias suggested that universities create new basic science master’s degree programs modeled after similar degrees that had long been offered in the engineering disciplines. These programs would be short, flexible, and designed to attract students interested in careers in the private sector rather than the academy.

Inspired by Tobias’s idea, the Sloan Foundation opted to embark on a more ambitious strategy than merely funding individual fellowships. In 1997, the Foundation hired Tobias to help coordinate a new program in developing "professional science master’s degrees." The Foundation began by providing grants to universities to develop these new degree programs that would cross traditional disciplinary boundaries to meet the demands of the emerging technological trends. The Foundation, in its first round of grants, provided start-up funds to five universities to launch eighteen graduate degree programs that would bring science to bear on real world applications and that would merge increased computational capacity with the science disciplines. These programs thrust the Sloan Foundation to the cutting edge of developing degree programs to serve the needs of the corporate science and technology community. Subsequently, the Foundation initiated a program to provide
funding specifically for the creation of new master's degree programs in computational molecular biology. The Foundation adopted the strategy of coordinating a “competitive awards program” in which universities were encouraged to design such programs and to compete for available implementation funds.

To support the momentum the creation of these programs had begun, the Foundation created a website, www.sciencemasters.com, to serve as a clearinghouse for information on all Sloan-supported professional masters programs and as a promotional tool for the programs. The site allows prospective students to research the various professional science master's degree options supported by the Sloan Foundation, and it provides student and alumni testimonials in support of the programs. The Foundation also made a grant in December 2002 to the Commission on Professionals in Science and Technology to collect and compile data on the education, employment, and income of these professional master's degree recipients in an effort to promote wider adoption of such programs.

Impact. Since the beginning of the Foundation's programs in computational molecular biology, it has supported the creation of about ninety professional master's degrees at about forty different universities. The prominence of the programs continues to rise. Some have likened the innovation in the academy represented by the Sloan Foundation's support of new professional science master's degrees to the innovations giving rise to the master of business administration as a new degree in the early 1900s. A group of fifteen business organizations in the United States led by the Business Roundtable and including the U.S. Chamber of Commerce issued a report in 2005 in which it recommended the continued creation and support of professional science master's programs promoted by Sloan to meet the engineering, science, and technology needs of the nation’s economy.

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