

A New Biology for the 21st Century: Ensuring that the United States Leads the Coming Biology Revolution [A project of the Division of Earth and Life Studies, National Academy of Sciences]

Project Scope:

An ad hoc committee will examine the current state of biological research in the United States and recommend how best to capitalize on recent technological and scientific advances that have allowed biologists to integrate biological research findings, collect and interpret vastly increased amounts of data, and predict the behavior of complex biological systems. Among the questions the committee may address are:

"What fundamental biological questions are ready for major advances in understanding? What would be the practical result of answering those questions? How could answers to those questions lead to high impact applications in the near future?

"How can a fundamental understanding of living systems reduce uncertainty about the future of life on earth, improve human health and welfare, and lead to the wise stewardship of our planet? Can the consequences of environmental, stochastic or genetic changes be understood in terms of the related properties of robustness and fragility inherent in all biological systems?

"How can federal agencies more effectively leverage their investments in biological research and education to address complex problems across scales of analysis from basic to applied? In what areas would near term investment be most likely to lead to substantial long-term benefit and a strong, competitive advantage for the United States? Are there high-risk, high pay-off areas that deserve serious consideration for seed funding?

"What federal initiatives could be considered to ensure that the US is positioned to take maximum advantage of a vast increase in biological data and understanding, and position itself to be the leader in technologies derived from it? Is the biology research portfolio appropriately balanced among biology subdisciplines and new areas that cross traditional biology subdisciplines? Are new funding mechanisms needed to encourage and support cross-cutting, interdisciplinary or applied biology research?

"What are the major impediments to achieving a newly integrated biology?

"What are the implications of a newly integrated biology on infrastructural needs? How should infrastructural priorities be identified and planned for?

"What are the implications for the life sciences research culture of a newly integrated approach to biology? How can physicists, chemists, mathematicians and engineers be encouraged to help build a wider biological enterprise with the scope and expertise to address a broad range of scientific and societal problems?

"Are changes needed in biology education-- to ensure that biology majors are equipped to work across traditional disciplinary boundaries, to provide biology curricula that equip physical scientists and engineers to take advantage of advances in biological science, and to provide nonscientists with a level of biological understanding that gives them an informed voice regarding relevant

policy proposals? Are alternative degree programs needed or can biology departments be organized to attract and train students able to work comfortably across disciplinary boundaries?

The committee will organize a Biology Summit to garner input from a broad spectrum of stakeholders-government and private agencies that fund biological research, the biotech and pharmaceutical industries, universities and medical schools-to consider barriers to progress and to highlight exciting new areas of research that cross traditional disciplinary boundaries. An individually-authored summary of the Summit's proceedings will be published. Subsequently, in its report to be issued at the end of the study, the committee will recommend actions that federal policy makers can take to ensure that the United States takes the lead in the emergence of a biological science that will support a higher level of confidence in our understanding of living systems, thus reducing uncertainty about the future, contributing to innovative solutions for practical problems, and allowing the development of robust and sustainable new technologies. The committee will not make specific budgetary or government organizational recommendations.

The project is sponsored by:

National Institutes of Health

National Science Foundation

The approximate start date for the project is August 1, 2008.

NOTE 11-17-08: The report is expected to be issued by November 2009.