Preface

The charge to our Committee was to consider ways to minimize threats from biological warfare and bioterrorism without hindering the progress of biotechnology, which is essential for the health of the nation. This task is complicated because almost all biotechnology in service of human health can be subverted for misuse by hostile individuals or nations. The major vehicles of bioterrorism, at least in the near term, are likely to be based on materials and techniques that are available throughout the world and are easily acquired. Most importantly, a critical element of our defense against bioterrorism is the accelerated development of biotechnology to advance our ability to detect and cure disease. Since the development of biotechnology is facilitated by the sharing of ideas and materials, open communication offers the best security against bioterrorism. The tension between the spread of technologies that protect us and the spread of technologies that threaten us is the crux of the dilemma.

Although the National Academies have had many reports on national security, this is the first to deal specifically with national security and the life sciences. The thoughtful report on *Scientific Communication and National Security* (National Academy Press, 1982) had as its charge "to examine the relation between scientific communication and national security in light of the growing concern that foreign nations are gaining military advantage from such research"; however, it did not deal with the life sciences. Since that report, much has happened to justify an examination of the life sciences in this context—the discovery of nations with clandestine research programs dedicated to the creation of biological weapons, the anthrax attacks of 2001, the rapid pace of progress in biotechnology, and

the accessibility of these new technologies via the Internet. All of these developments have prompted the current report. The goal of this report is to make recommendations that achieve an appropriate balance between the pursuit of scientific advances to improve human health and welfare and national security.

In preparing this report our Committee examined ways by which the spread of technology, methods, materials and information could be limited to constructive activities concerned with medical progress. The dual use nature of these advances strongly argues that any initiative must demonstrably increase our net security. Erring on the side of prudence and favoring the inhibition of information flow could retard the development of successful defenses and seriously compromise our nation's health. Therefore, the challenge is for the scientific community to develop a system that permits fundamental research to proceed unimpeded, while identifying research with great potential for misuse.

The scientific community historically has demonstrated its ability to lead the way in the responsible development of new technologies. After the Asilomar conference in 1975, scientists designed and followed a set of guidelines for work with recombinant DNA, then a novel technology of unexplored potential. These guidelines, keyed to the risk of exposure to genetically modified organisms, have prevented any untoward events, reassured the public, and allowed the rapid and efficient progress of academic and commercial applications of these technologies. The recombinant DNA guidelines were established to prevent unintended creation of harmful recombinant organisms. But now the nation faces a different problem: the intentional use of biotechnology for destructive purposes. This challenge must engage the entire community of biologists nationally and internationally. In a joint statement issued on November 8, 2002, and printed in the journal *Science*, the presidents of the U.S. National Academy of Sciences and the U.K. Royal Society called on scientists to assist their governments in combating the threat of bioterrorism: "Today, researchers in the biological sciences again need to take responsibility for helping to prevent the potential misuses of their work, while being careful to preserve the vitality of their disciplines as required to contribute to human welfare."

To consider ways to balance national security and scientific openness, the Committee had six meetings held in Washington, D.C. between April 1, 2002 and January 29, 2003. Representatives from the National Institutes of Health, the Executive Office of the President, governmental and nongovernmental technical and policy experts, and educators and private consultants briefed the Committee. The Committee also reviewed information available from the open literature as well as new materials prepared by experts (see Appendix C).

During the course of our deliberations, Committee members recommended that scientific, policymaking, and intelligence communities be brought together to focus on the challenges raised by advances in biotechnology. To this end the National Academies and the Center for Strategic and International Studies convened a one-day meeting on "Scientific Openness and National Security" in Washington, D.C., on January 9, 2003. This meeting emphasized the importance of a continuing dialogue between the life sciences and the intelligence communities both nationally and internationally. It is our hope that this report provides the basis for this dialogue.

The Committee wishes to express its sincere appreciation to the devoted project staff. As study director, Eileen Choffnes ensured the success of this project through her expertise, dedication, and creativity. This study would not have been possible without Dr. Choffnes' oversight and coordination of the work of the Committee and her insightful editing of the report. Amy Giamis was outstanding in her great finesse in the organizational work of the Committee, and her numerous contributions to supporting the research and editing of the report. Finally, the Committee wishes to express its appreciation to Jo Husbands, who brought to our deliberations considerable insights from her experience as Director of the NAS Committee on International Security and Arms Control. Throughout the study we were encouraged by the support of NAS President Bruce Alberts. I want to express my personal thanks to the individual members of the Committee for the dedication and energy with which they tackled this difficult problem. The report would not have been possible without the perspectives of these experts, who represented their diverse disciplines so eloquently.

Gerald R. Fink
Chair