campuses, hospitals, and other research institutions. Hundreds of OHER-funded scientists hold academic appointments and serve as important resources in the formal education of the Nation's scientists, engineers, and physicians. Many of the research projects supported at the laboratories also serve as vehicles for training predoctoral students, as well as postdoctoral investigators. In addition, opportunities are provided for research collaboration with visiting scientists who stay for extended periods of time.

Throughout its history OHER's philosophy has been to encourage prompt dissemination of research results at scientific meetings and in the scientific literature. Scientists currently supported by the program make nearly 2000 presentations each year at technical meetings and document their work in more than 2000 journal articles that have been peer-reviewed prior to publication.

In addition to the intellectual and scientific resources which have made these advances in knowledge and technologies possible, the National Laboratories possess multiuser facilities that are having a major impact on the rate of progress in elucidating the structure of biological molecules. Such structural determinations are a prerequisite for solving molecular design problems; for example, the modification of proteins so that they have a specified type of activity. Moreover, the unparalleled computational resources available at the laboratories and the broad capability to exploit them fully also provide the environment necessary for major advances in predicting small molecule structure and activity, which are central to identifying mutagens and carcinogens and designing drugs and vaccines. Together, these structural biology activities will provide the firm foundation crucial to maintaining America's competitive advantage in private sector biotechnology during the coming decades.

The funding for the Biological and Environmental Research Program is shown in Table 2, which also defines extensively the organizational structure of OHER. As in any large-scale research program, activities being conducted vary from year to year as existing projects are completed and new projects or lines of investigation open up. A synopsis of the principal research activities currently under way is presented in the Appendix.

The following descriptions of program accomplishments provide a glimpse of some of the more tangible products of the OHER research process. Having provided the background for the presentation of these products, some caveats are in order.

As in any other research enterprise, there is a continuum of effort, and a "snapshot" of selected OHER Program accomplishments can easily create a distorted view of the overall workings of the program. It has already been noted that while many of the accomplishments described have proved to be of considerable economic importance, that is not necessarily a measure of the effectiveness of the research within the context of the OHER mission, nor is it a factor in shaping its research agenda. The course of research is complex and can lead to a number of "dead ends," as well as to successes and breakthroughs. A seemingly fruitless effort can sometimes be useful by virtue of its indication of more productive pathways, and one of the accomplishments described, which eventually ended in a treatment for Parkinson's disease, provides a case in point. Basic research, a key part of the program, is long-term and often not immediately and measurably beneficial. Yet even in the event of no immediate product, the insights gained into the operation of biological processes improve our capability to anticipate or predict how the system will respond to new or untested events for which data are sparse or unavailable. The bone-marrow transplantation work undertaken early in the program is an example of basic research that ultimately provided much of the information that supports the current state-of-the-art for organ transplantation work in medicine.

Thus, in summarizing the accomplishments of a research program designed for a mission as far-reaching as that of OHER, its worth should not be judged solely on the basis of economic benefit or immediate applicability. The result of research may be a tangible product (e.g., a nuclear scanner or radiopharmaceutical) of readily calculable value. But the "product" may also be the answer to the riddle of self-repair to cell injury, the mechanism by which a particle is transported, or the definition of the risk of bone cancer from radiostrontium. Thus, it is equally valid to judge the benefit of a research contribution in terms of its reduction of uncertainty or its description of a previously unknown mechanism. These criteria have been in consonance with the energy development missions of OHER's parent agencies (AEC, ERDA, and DOE), which, in an anticipatory manner, have made use of its research to prevent, modify, or mitigate potential health and environmental effects before an emerging technology reaches maturity. The contrast between the anticipatory nature of OHER research and that which is conducted by the regulatory agencies is readily apparent from the differing content and objectives of their respective research programs. The ultimate goal of the research program is, therefore, not so much to find effects as it is to aid in their prevention. The extent to which that goal is realized is the true measure of its benefit to the Nation.

The following sections contain descriptions of selected, definitive research contributions resulting from the program—accomplishments of the many individuals in National Laboratories, universities, and research institutes who conduct this work under contract to OHER. In some instances the research has been cofunded or is now pursued under auspices other than OHER.