An Enduring Mandate

Looking to the Future

The DOE's Office of Biological and Environmental Research (OBER) currently supports research at more than 200 institutions around the country—a research portfolio that, for all its diversity, reflects a direct lineage from the earliest charge to the AEC: to exploit the promise of a new age and to safeguard the public health in the face of its uncertainties. And yet, this constancy of purpose has demanded inevitable change, as new ideas have emerged, as tools have evolved, and as the foundation of knowledge has grown. Underscoring this truth is the example of the Human Genome Project, unthinkable little more than a decade ago and yet a direct descendant of the AEC's earliest concerns about radiation's unseen effects. Seen in this light, the birth of the genome project within the Biological and Environmental Research (BER) program is no surprise.

Often characterized as the Holy Grail or the Rosetta Stone of biology, the genome project is more aptly compared to the chemists' periodic table. Just as the periodic table transformed chemistry into a rigorous and quantitative science, so will sequencing the human genome pave the way for a systematic study of biological function and dysfunction—at the same time answering some of the AEC's oldest questions about radiation and genetic damage.

The genome project links past and future in another way, as well. It points to an enduring strength of today's OBER that is again a legacy of the AEC and the national laboratories that were born of the war years: a tradition of multidisciplinary teamwork, historically grounded in daunting scientific challenges. Taking advantage of this unique asset, the BER program is contributing significantly to the nation's genome sequencing effort.

The BER program also pioneered the Microbial Genome Initiative, which, in a few short years, has already delivered news-making discoveries holding great promise for the Department's missions. Deciphering, then perhaps reengineering, the genetic organization of microorganisms opens exciting new prospects for environmental bioremediation and sustainable energy production. The future promises even more exciting developments as the fruits of this Initiative mature.

Two other forward-looking disciplines are structural and computational biology, where advances rely in large part on long-standing BER commitments to synchrotron light sources and neutron sources at our national laboratories—and on the labs' advanced computational resources. Indeed, structural biology is the linchpin in one of modern biology's central research paradigms: *sequence to structure to function.* Using a variety of techniques, most prominently x-ray crystallography, structural biology seeks to determine the structures of key biological macromolecules as clues to biological function. If we can now only learn to deduce the three-dimensional structure of proteins from genomic sequence—a challenge for computational biology—the product of the Human Genome Project will be not just sequence, but insights into countless biological processes pertinent to the future environmental and energy needs of the DOE and the nation.