BIOLOGICAL AND ENVIRONMENTAL RESEARCH

The Biological and Environmental Research (BER) program includes these research areas: life and medical sciences, climate change research, and environmental remediation sciences. Achievements in genomics and biology will spur novel solutions for clean energy, reduce the rate of atmospheric carbon dioxide concentration increase, environmental clean-up, and medicine. Capabilities for predicting global climate change will enable science-based planning for future energy needs. Understanding the fate and transport of environmental contaminants will yield long-term solutions for clean-up and monitoring.

RECENT SCIENTIFIC ACHIEVEMENTS

Mapping and Sequencing the Human Genome
The Department of Energy was the first agency to fund research into genome mapping and sequencing, launching the historic quest to discover the genetic blueprint of human beings.

First DNA Sequence of a Woody Plant
Understanding the genetic regulation of woody biomass from poplar, the first tree to have its genome decoded, may lead to improved feedstock for producing biofuels such as cellulosic ethanol to replace gasoline as a transportation fuel.

Artificial Retina Helps the Blind to See
A microelectrode device implanted into the eye of blind patients has given them rudimentary vision, allowing patients to detect motion and to locate and differentiate simple objects.

Imaging Awake Animals
Medical imaging of animals, infants, or people with movement disorders requires anaesthesia that distorts diagnostic information. New imaging devices allow imaging of awake animals, an advance that may translate to improved human medical diagnosis.

Explaining Ocean Warming
Climate model research shows that the observed warming of the ocean during the past 40 years is related to increases in atmospheric greenhouse gas concentrations. The warming cannot be explained by natural climatic variability and volcanic eruptions.

Effects of Carbon Dioxide and Ozone on Trees
Elevated ozone concentration reduced tree growth whereas elevated carbon dioxide increased growth, but the effect of combining ozone with carbon dioxide could not be predicted from results with each gas alone. It required field experimentation with both gases in combination.

Understanding Plutonium Mobility
Plutonium transport at Rocky Flats occurs by dispersal of particulates and colloids, not by soluble species migration. This understanding facilitated a faster and less expensive closure.

MAJOR USER FACILITIES

Atmospheric Radiation Measurement (ARM)
The largest uncertainty in climate prediction is the role of clouds in controlling solar and thermal radiation of the earth system. The ARM program provides critical data for the models used for climate prediction.

The Environmental Molecular Sciences Laboratory
provides integrated experimental and computational resources for discovery and technological innovation in the environmental molecular sciences. The facility houses leading-edge computational and experimental resources for addressing complex scientific problems of interest to DOE and the nation.

The Joint Genomics Institute's Production Genomics Facility (PGF)
carries out high throughput DNA sequencing to address the DOE mission needs for sequencing microbes and plants that can provide new biofuels and help clean up the environment.

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