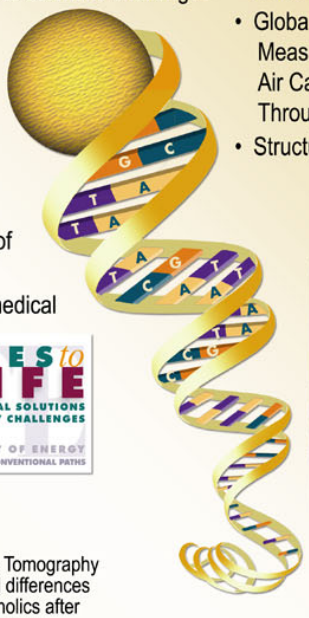
Biological and Environmental Research

Serving Science and Society

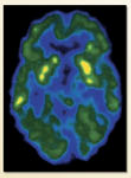
The Biological and Environmental Research (BER) program mission is to advance science in biomedical technology, biologically based energy sources, environmental remediation, and understanding and mitigating human-induced climate change. We support fundamental, peer-reviewed research at our Nation's universities, national laboratories, and private companies at the interface of the computational, physical, and biological sciences generating innovative approaches to scientific challenges along unconventional paths.

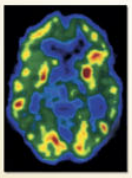
Historic Accomplishments

- Started the Human Genome Project
- Initiated the revolution in microbial genomics
- Began modern ecological research
- Began modern climate change research
- Developed imaging devices that launched the field of nuclear medicine
- Developed radiotracers used in tens of millions of medical scans annually.



GENOMES to LIFE
BIOLOGICAL SOLUTIONS FOR ENERGY CHALLENGES
U.S. DEPARTMENT OF ENERGY
INNOVATIVE APPROACHES ALONG UNCONVENTIONAL PATHS





Positron Emission Tomography brain scans reveal differences in recovering alcoholics after withdrawal from alcohol (left, 10 days, right, 30 days)

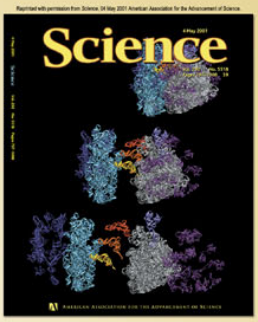
Major User Facilities

BER facilities support research in

- Environmental Science: William R. Wiley Environmental Molecular Sciences Laboratory
- Genomics: Joint Genome Institute
- Global Change: Atmospheric Radiation Measurement, AmeriFlux, Free Air Carbon Dioxide Enrichment, and ThroughFall Displacement sites
- Structural Biology: Resources at DOE synchrotron and neutron facilities

Environmental Molecular Sciences Laboratory's 800-MHz nuclear magnetic resonance spectrometer

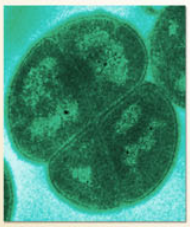
Production Sequencing Facility at DOE's Joint Genome Institute



DOE structural biology facilities are revealing the molecular details of important biomolecules

Recent Scientific Achievements

- Completed DNA sequencing of 3 human chromosomes as part of the international Human Genome Project.
- Completed DNA sequencing of more than 70 microbes and other model organisms important for understanding the human DNA sequence and for applications to DOE missions in energy, environmental cleanup, and global climate change.

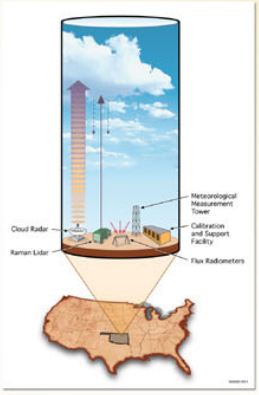


Deinoccocus radiodurans

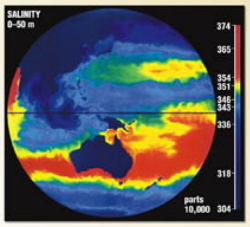
- Developing an artificial retina, based on a current functional prototype, that will eventually enable people with degenerative blindness to see.

Artificial retina

- Completed a 1000-year run of a powerful new climate system model with only 1/2°C drift, a two- to three-fold improvement over previous runs, that will enable scientists to study climate system variability on decade to century time scales, important for detecting climate change and identifying its natural or human causes.
- Demonstrated that a commonly found microbe, *Geobacter sulfurreducens,* can change common DOE contaminants, such as uranium, to an insoluble and immobile form.



Atmospheric Radiation Measurement



Modeling climate change

Science Workforce Development

In FY 2002, the BER program supported fundamental research in climate change, environmental remediation, genomics, proteomics, radiation biology, and medical sciences at 223 public and private research institutions in 43 states and at 16 DOE laboratories in 10 states. This research was conducted in 1020 different research projects by over 2275 researchers and students.

Scientists mentor students and teachers at the national laboratories and user facilities.

Office of Science Grants: *www.sc.doe.gov/grants*

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U.S. DEPARTMENT OF ENERGY

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