

Microbial Genome Program

Exploring genomes will reveal how organisms perform functions relevant to DOE missions

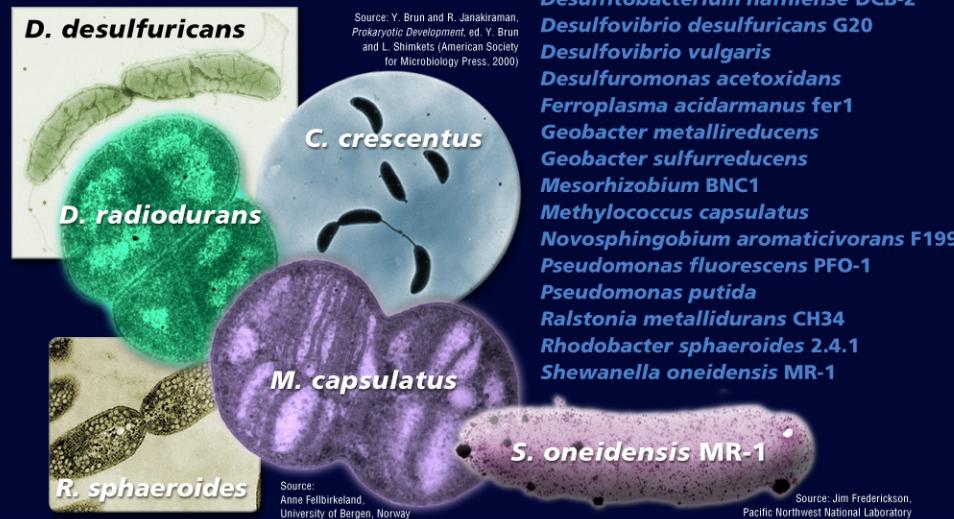


Why Microbes?

Microbes have an enormous range of chemical capabilities, some of which surpass human technologies and have far-reaching implications for addressing DOE mission challenges. Researchers thus far have only scratched the surface of understanding the diversity of microbes, which live in virtually all environments and make up a significant portion of the Earth's biomass.

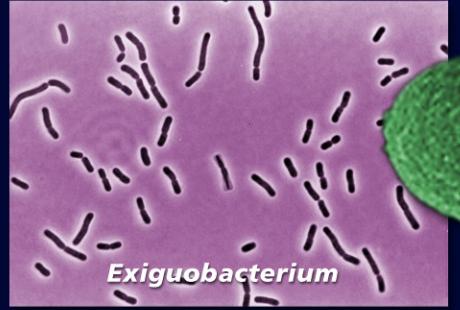
Bioremediation

Cleanup of toxic-waste sites worldwide



Technology Development, Pilot Projects

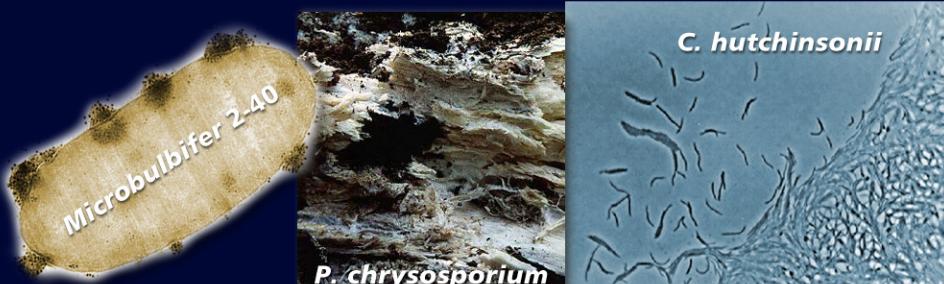
Production and biotechnology



*Borrelia burgdorferi B31
Brucella melitensis 16M
Enterococcus faecium
Exiguobacterium 255-15 (NASA)
Haemophilus somnis 129PT
Mycoplasma genitalium G-37
Psychrobacter 273-4 (NASA)
Streptococcus suis 1591
Xylella fastidiosa Dixon (almond)
Xylella fastidiosa Ann1 (oleander)*

Cellulose Degradation

Efficient conversion of biomass to products such as ethanol, methane, and hydrogen



Innovative, High-Impact Science

In 1994 DOE initiated the Microbial Genome Program as a spinoff of its Human Genome Program. MGP's goal is to generate biological solutions to challenging DOE missions in energy, environmental cleanup, biodefense, and global climate change. Scientists expect to find a vast repertoire of useful functions in the microbial world.

Complementary DOE programs

NABIR (Natural and Accelerated Bioremediation Research) Program

NABIR develops methods based on natural microbial processes for the bioremediation of contaminated soils, sediments, and groundwater.

BI-OMP (Biotechnological Investigations-Ocean Margins Program)

Studies linkages between coastal carbon and nitrogen cycles and the processes affecting global change.

Carbon Sequestration

Explores strategies for sequestration in oceanic and terrestrial environments.

Genomes to Life Program

Combines completed DNA sequence data with advanced high-throughput technologies to develop a fundamental understanding of life processes. Genomes to Life focuses on organisms with capabilities of interest to DOE.

Energy Production

Energy generation and development of renewable energy sources (e.g., methane and hydrogen)

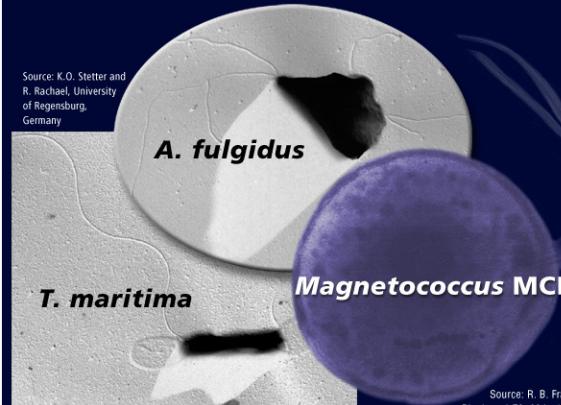


What's a Microbe? What's a Genome?

Microbes are the invisible bacteria, archaeae, protozoa, and fungi that inhabit our environment—our bodies, our food and water and even the air we breathe. A genome is all the DNA in any organism. It contains the information that orchestrates the chemical reactions needed for all life functions.

Biotechnology and Applied Microbiology

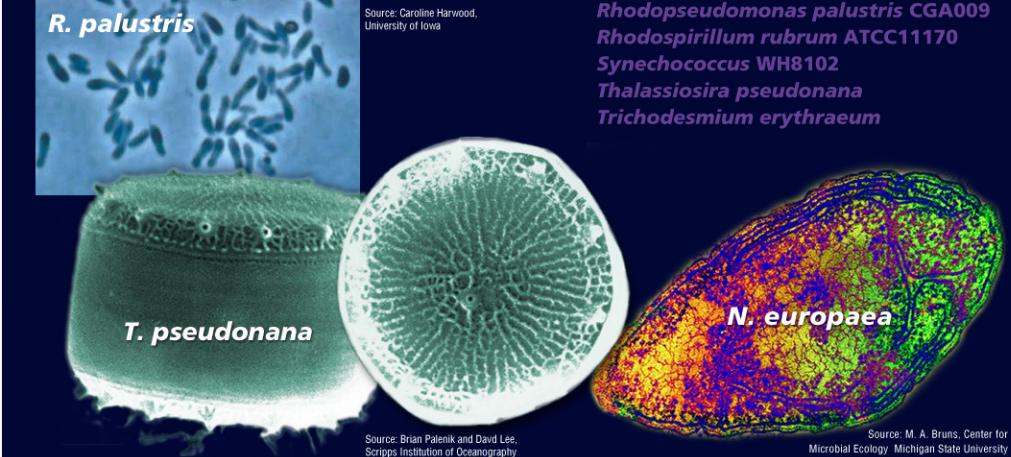
Production of chemicals to improve process efficiency



*Aquifex aeolicus VF5
Archaeoglobus fulgidus DSM4304
Bifidobacterium longum DJO10A
Brevibacterium linens BL2
Clostridium acetobutylicum
Ehrlichia chaffeensis ssp. lata
Ehrlichia canis jake
Halobacterium halobium
Lactobacillus brevis ATCC367
Lactobacillus bulgaricus ATCCBAA-365
Lactobacillus casei ATCC334
Lactobacillus gasseri ATCC33323
Lactococcus lactis cremoris SK11
Leuconostoc mesenteroides
Magnetococcus MC-1
Magnetospirillum magnetotacticum MS-1 ATCC31632
Oenococcus oeni PSU1
Pediococcus pentosaceus ATCC25745
Pseudomonas syringae B728a
Pyrobaculum aerophilum
Pyrococcus furiosus
Streptococcus thermophilus LMD-9
Thermotoga maritima MSB8*

Carbon Sequestration

Management of global carbon to help stabilize climate



Web Sites

Microbial Genome Program: www.ornl.gov/microbialgenomes
Natural and Accelerated Bioremediation Research: www.lbl.gov/NABIR
Human Genome Program: www.ornl.gov/bgmis
Genomes to Life: DOEGenomesToLife.org
DOE Joint Genome Institute: www.jgi.doe.gov
Microbial Genome Channel: genome.ornl.gov/microbial
Comprehensive Microbial Resource: www.tigr.org
Carbon Sequestration Program: cdiac2.esd.pml.gov/index.html
BI-OMP: www.sc.doe.gov/ober/GC/omp.html

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