

DOE Microbiome Research

Joseph Graber, Ph.D.

Genomic Science Program Team Lead / Program Manager

BERAC Meeting

March 23rd, 2016



U.S. DEPARTMENT OF
ENERGY

Office
of Science

Office of Biological
and Environmental Research



U.S. DEPARTMENT OF
ENERGY

Office of Science

NSTC Fast Track Action Committee: Mapping the Microbiome

“The purpose of the FTAC-MM is to identify areas of current Federal investment, research needs, and resource gaps for the development of an integrated Federal plan for microbiome research, and to identify priority areas for Federal agency coordination and cooperation on achieving a predictive understanding of microbiomes and their functions.”

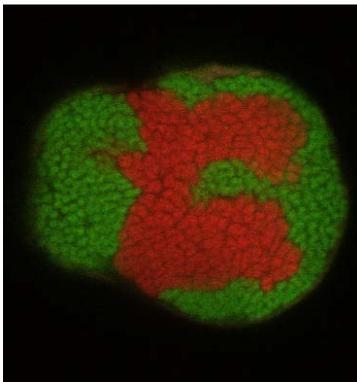
- Describe existing federally supported research and development activities in microbiome research;
- Identify and prioritize technology needs and cross-cutting challenges common to all microbiome research, with a specific focus on enabling predictive understanding and modeling of microbiomes;

Represented Federal Agencies: USDA, NIH, DOE, NSF, DOD, NOAA, NASA, EPA, USGS, NIST



Microbiomes: What Are They?

Any multispecies assemblage of microorganisms existing in association with a plant, animal, or environment

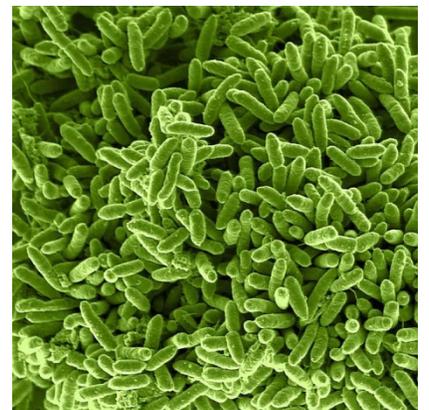
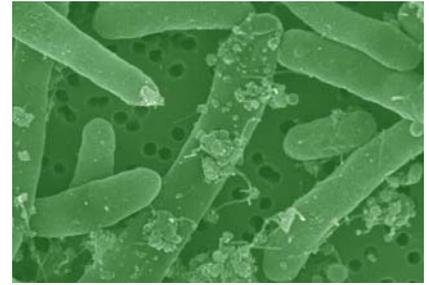


DOE Genomic Science Program

DOE mission driven fundamental research aimed at identifying the foundational systems biology properties of microbes, plants, and complex communities.

The major objectives of the Genomic Science program are to:

- Determine the molecular components, regulatory elements, and integrated networks needed to understand genome-scale functional properties
- Develop “-omics” experimental capabilities and enabling technologies needed to achieve dynamic, systems-level understanding of organism and/or community function
- Develop the computational capabilities, and modeling capacity, and integrated knowledgebase to advance predictive understanding and manipulation of biological systems



DOE-BER Support of Microbiome Research

- Sustainable Bioenergy Production
 - Plant – Microbe – Soil Interactions
 - Biomass Deconstructing Associations
 - Phototrophic Ecosystems
- Environmental Process Understanding
 - Soils, sediments, subsurface aquifers, etc.
 - Roles of microbial communities in biogeochemical processes and contaminant fate/transport
- DOE User Facilities & Resources
 - Joint Genome Institute (JGI)
 - Environmental Molecular Science Lab (EMSL)
 - DOE Systems Biology Knowledgebase (KBase)





NSTC Report on Mapping The Microbiome

REPORT OF THE FAST-TRACK ACTION
COMMITTEE ON MAPPING THE MICROBIOME

PRODUCT OF THE
Life Sciences Subcommittee
OF THE NATIONAL SCIENCE AND TECHNOLOGY COUNCIL



November 2015

Major Needs and Priorities:

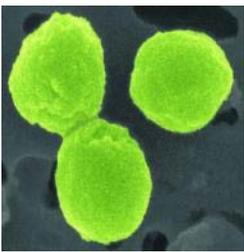
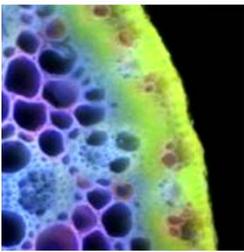
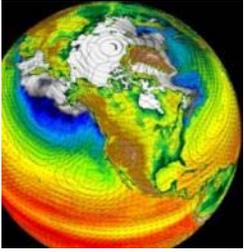
- Improved high-resolution analytical technologies for probing functional processes in microbiomes
- High performance computational resources, predictive modeling capabilities, and systems biology oriented databases
- Consideration of possible standard protocols, shared reference materials, and data formats
- Increased understanding of the roles of viruses in both host-associated and environmental microbiomes

www.whitehouse.gov/blog/2015/11/20/mapping-earths-microbiomes



Next Steps

- NSTC Microbiome Interagency Working Group (MIWG)
 - Co-Chaired by DOE & USDA
 - Develop a Federal Strategic Plan for coordinating research to advance understanding of microbiomes and microbiome function
- Continue current efforts in DOE microbiome research
- FY17 Budget request for \$10 million in additional funding for microbiome focused research



Thank you!

Joseph Graber
Joseph.Grabber@science.doe.gov
<http://science.energy.gov/ber>



U.S. DEPARTMENT OF
ENERGY

Office
of Science

Office of Biological
and Environmental Research