

**Testimony Prepared by the American Society for Microbiology
Submitted for the record to the United States House of Representatives
Committee on Appropriations
Subcommittee on Energy and Water Development, and Related Agencies
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The American Society for Microbiology (ASM) appreciates the opportunity to submit outside witness testimony for the Fiscal Year 2022 Energy and Water Development, and Related Agencies appropriations bill in support of increased funding for the Department of Energy Office of Science. The American Society for Microbiology (ASM) is one of the largest professional societies dedicated to the life sciences and is composed of 30,000 scientists and health practitioners. ASM's mission is to promote and advance the microbial sciences.

The Department of Energy (DOE) Office of Science is a leader in advancing critical industries of the future, including quantum information science, artificial intelligence, high performance computing, advanced communications networks, future energy technologies, and engineering biology. As we rise to meet the challenges of the 21st Century, microbial science funded by the DOE Office of Science remains vitally important. **ASM urges Congress to fund the DOE Office of Science at \$7.7 billion in fiscal year (FY) 2022, an increase of 9.6% over FY2021. ASM also encourages Congress to continue to fully fund the Bioenergy Research Centers at \$400 million, and the National Microbiome Database Collaborative (NMDC) at \$10 million in FY2022.**

Funding from the DOE Office of Science through the National Laboratories, universities, and other programs has generated some of our most economically important innovations and is the

primary driver of basic research in the physical sciences, as well as critical areas of genome-scale, quantitative analysis of microbial research. This support has enabled researchers to use microbes to solve energy and environmental problems, and to bring those solutions to scale by developing empirical, computational, and mechanistic modeling tools. Office of Science funding led to the creation of the Bioenergy Research Centers, which support research into viable and sustainable domestic biofuel and bioproducts industries. Each of the four Centers is led by a DOE national laboratory or university, and each take an innovative approach to improving and scaling up advanced biofuel and bioproduct production processes. Recent investments in the National Microbiome Data Collaborative, an open-source database, will lead to more effective analysis of microbiome data and better coordination of multidisciplinary microbiome research across the federal government. In addition, DOE National Laboratories were effectively deployed in the fight against COVID-19, using their supercomputing and modeling capabilities to both understand components of the virus and to find drug compounds to treat it.

Microbial Research is Needed to Face 21st Century Challenges

Our society faces several large, complex, and interconnected challenges, many of which can be addressed through microbial research. Inexpensive renewable sources of energy, fuels, and chemicals are essential for continued economic growth, but the environmental tradeoffs of increased energy production must also be considered. Microbial science funded by DOE Office of Science can lead the way in developing sustainable strategies to feed an ever-growing population by increasing plant and agricultural productivity and quality; by providing strategies to ensure that future US citizens enjoy clean air, water, and a high standard of living; in transforming human health by providing everything from new pharmaceuticals, reagents for

precision medicine, and next generation antibiotics; and by producing cost-competitive fuels, chemicals, and materials from abundant renewable resources. These and other advances in decarbonization, the production of biomaterials or bio-based polymers, and others based on new microbial catalysts will only happen with strong, stable investments in the Office of Science.

Discoveries in targeted areas such as quantum science and technology, genomics, microelectronics, and machine learning have potential far-reaching impacts that spawn the creation of new industries. For example, DOE has also taken the lead on bio-based energy, fuel and chemicals innovation. The Office of Science currently funds four Bioenergy Research Centers (BRC), which support research into viable and sustainable domestic biofuel and bioproducts industries. These four Centers are developing viable and sustainable domestic biofuels and bioproducts derived from non-food plant biomass, such as poplar, switchgrass, and sorghum. This research will lead to lower greenhouse gas emissions, bring jobs to rural areas, and boost our energy security, and **we strongly encourage Congress to continue fully funding the BRCs at \$400 million in FY2022.**

DOE-Funded Microbiome Research Spawns Innovation

In its stewardship of innovation at DOE's National Laboratories, universities, and other programs, the Office of Science is a critical partner in advancing areas of national need, supporting research in key emerging areas including artificial intelligence and microbiome research. Thousands of projects funded by NIH and NSF utilize DOE facilities each year, and more than fifty Fortune 500 companies and many small businesses use these facilities to conduct

the underlying research required to develop new technologies and products that drive the economy, including the growing bioeconomy.

Microbiome science aims to advance understanding of microbial communities (microbiomes) for applications in areas such as health care, food production, and environmental restoration to benefit individuals, communities, and the environment. Understanding of the microbiome has evolved significantly since the concept of the human microbiome emerged roughly two decades ago. Today it is understood that microbial communities exist on, in, and around people, plants, animals, soil, oceans, and the atmosphere, making the microbiome relevant to all living things. The rapid pace of discovery has led to greater technology needs and data sharing infrastructure.

The Interagency Strategic Plan for Microbiome Research, FY2018-2022, developed by the Microbiome Interagency Working Group (MIWG), provides recommendations for improving coordination of microbiome research among Federal agencies and between agencies and non-Federal domestic and international microbiome research efforts. The five-year Strategic Plan coordinates microbiome research activities across 21 government agencies, describing the interagency objectives, structure and operating principles, and research focus areas and provided three recommended areas to transform microbiome discoveries to solutions:

1. Supporting interdisciplinary and collaborative research to enable a predictive understanding of the function of microbiomes in diverse ecosystems to enhance public health, food, and environmental security and grow new bioeconomy product areas.
2. Developing platform technologies to generate critical insights and to improve access to and sharing of microbiome data across ecosystems.

3. Expanding the microbiome workforce through educational opportunities, citizen science, and public engagement.

Recent advances in DNA sequencing technologies have increased our awareness of the complexity and diversity in networks of microorganisms. Yet there remains much to discover regarding how microbiomes function as communities, interact with their hosts and environment, and how they can be leveraged to improve health and ecosystems. As noted in the Interagency Strategic Plan for Microbiome Research, microbiome data is “Big Data”, which requires consistent and reliable database and resource coordination to facilitate data collection, analysis, interoperability, and data sharing. The NMDC is aimed at empowering this type of microbiome research. Spearheaded by Lawrence Berkeley National Laboratory, in partnership with Los Alamos, Oak Ridge, and Pacific Northwest national laboratories, the NMDC is leveraging DOE’s existing data-science resources and high-performance computing systems to develop a framework that facilitates more efficient use of microbiome data for applications in energy, environment, health, and agriculture. **In support of these ongoing efforts, ASM requests continued funding of \$10 million for the National Microbiome Database Collaborative (NMDC) for FY2022.**

Our nation’s ability to make significant advances in solving energy and environmental problems depends on advances in the microbial sciences. This will only be possible if Congress continues its commitment to robust and sustained funding increases for the Department of Energy’s Office of Science.