Tri-Institutional Partnership Microbiome Initiative

UC San Francisco (UCSF), UC Davis (UCD), and Lawrence Berkeley National Laboratory (LBNL) have formed a new partnership to encourage research collaboration among the three institutions focused broadly on understanding microbiomes. **The aim of the Tri-Institutional Partnership on Microbiome Research is to catalyze bold, synergistic, and potentially transformative collaborative research through joint seed grants and position the institutions favorably for follow-on extramural funding.**

The Tri-Institutional Partnership on Microbiome Research is modeled after the 2014 Bay Area Brain Initiative (BayBRAIN), which was formed by UCSF, UC Berkeley, and LBNL in response to President Obama's BRAIN Initiative. This successful partnership harnessed the collective strengths of these three institutions to launch a $1.5 million joint institution-funded seed grant program and funded 6 cross-institutional neurotechnology projects in 2015. Collectively, the projects have already yielded conservatively $27 million in extramural funding from NIH and NSF as well as $34 million in funding from the DARPA Systems-Based Neurotechnology for Emerging Therapies (SUBNETS) program. BayBRAIN also provided a foundation for the 2015 establishment of the Kavli Institute for Fundamental Neuroscience, supported by a $20 million endowment from the Kavli Foundation and UCSF to continue to support cross-disciplinary teams of scientists across UCSF and Bay Area National Labs. The Tri-Institutional Partnership on Microbiome Research will adopt a similar model to tackle major gaps in knowledge and technology that have been identified by the OSTI Microbiome Interagency Working Group's (MIWG) FY2018-2022 Strategic Plan for Microbiome Research (an output of the 2016 National Microbiome Initiative, see link below) and advance the role of the microbiome in addressing grand challenges in environmental sciences and mammalian health.

Microbiomes are integral to all life, from human health and food security to ecosystem processes and global nutrient cycling. Recent technological advances have deepened our appreciation for the complexities of microbiome function and its role in the health of humans and the environment, but the controlling mechanisms and inter-kingdom dependencies are not yet well understood. As laid out in the MIWG Strategic Plan, collaborative research is key to developing a predictive understanding of microbiome function and could lead to advancements in areas such as antimicrobial resistance, food production, and biosafety. Furthermore, the malleability of microbial communities represents an opportunity to improve human health, food and biofuel production, and bioremediation through purposeful engineering of microbiomes. Such advancements will require integrative microbiome studies involving a diverse community of scientists, including microbiologists, computational scientists, geneticists, epidemiologists, and animal, plant and soil scientists.

The Tri-Institutional Partnership and seed funding will harness the collective strengths of these three outstanding institutions in medicine, agriculture, engineering, computational science, and high performance computing, to inspire synergies (current and potential) across partner institutions. The three institutions in this partnership bring to the partnership their individual significant investments in microbiome research:

UCSF: The Benioff Center for Microbiome Medicine was established in August 2019 by a $25 million gift from Marc and Lynne Benioff to UCSF to support a network of multi-disciplinary investigators exploring the human microbiome's potential to predict, prevent, and treat a wide range of diseases, with a particular emphasis on childhood diseases. The center will support integrative studies and translational collaborations between microbiome and clinical researchers across the university in order to accelerate our capacity to develop precision microbiome interventions.

UC Davis: The UC Davis Microbiome Special Research Program was launched in 2017 to facilitate interdisciplinary and innovative research in microbiome science at UCD by fostering collaborations and communications between the over 100 laboratories at UCD pursuing microbial science research projects across a variety of disciplines, including biological sciences, engineering, agriculture, medicine, veterinary medicine, food science and soil science. The program focuses on four areas: interdisciplinary innovation, training and education, infrastructure and resources, and community building, and operates its own seed funding program to leverage and build upon the broad expertise in microbiome science across the university.

LBNL: In July 2019, LBNL received $10 million from DOE to lead the development of the National Microbiome Data Collaborative (NMDC), a new federal asset built by a consortium of national labs for use by all microbiome researchers. Leveraging the high performance computing capabilities and data science assets of the national lab complex, the NMDC is developing a framework to facilitate efficient use of microbiome data for applications in energy, environment, health, and agriculture. The development of platform technologies was a key strategic area outlined in the MIWG Strategic Plan as the sheer amount of available microbiome data presents significant challenges for analysis and interpretation. The NMDC aims to make these data findable, accessible, interoperable, and reusable (FAIR) by providing comprehensive access to multidisciplinary microbiome data and an initial suite of bioinformatics tools for reproducible, cross-study advanced analyses.

Since the announcement of the National Microbiome Initiative in 2016, many microbiome initiatives have emerged at universities across the US. A unique aspect of the Tri-Institutional Partnership Microbiome Initiative is its data-driven focus. With data scientists and biological researchers working together from the beginning to co-design experiments, the Tri-Institutional Partnership Microbiome Initiative promises novel, collaborative, and structured data that will enable additional discoveries and insights through advanced computational approaches and high performance computing resources. With the knowledge gained of each institution's capabilities and strategic interests from active networking and coordination, the Partners will actively foster complementarity in opportunity development wherever possible. These activities will identify research areas of mutual benefit, facilitate the exploration of innovative approaches and ideas, and target significant gaps in current knowledge.

This Tri-Institutional Partnership Microbiome Initiative is built upon years of experience in developing and managing broad-based institution-specific programs that foster and nurture seed-funding proposals that are too bold, too preliminary, or too transformative to immediately

attract federal support. Accordingly, the associated funding program will select from among team-based multi-institutional cross-cutting microbiome research proposals that are similarly powerful and innovative, with comparable potential for leveraged follow-on support, and for transformative impact in addressing critical conceptual and technological gaps.

Successful proposals will address hypothesis-driven biological questions with a significant computational component. Proposals that broadly concern human health, environment and host interactions, and food production and safety will be accepted. Areas of special interest for funding include proposals that link descriptive microbiome studies with mechanistic investigations.

The recommended focus areas outlined in the MIWG Strategic Plan were to support interdisciplinary and collaborative research, develop platform technologies, and expand the microbiome workforce. The Tri-institutional Partnership will be strategically positioned to address all three of these areas. To qualify for seed funding, a project must include researchers from all three institutions. LBNL scientists should contribute to the initial study design, data processing, and data analysis to provide an opportunity for funded projects to both utilize and contribute to the development of the NMDC's capacity and resources. Involvement of each of the collaborative partners is expected to be substantive and necessary for the successful completion of the project and research teams will be encouraged to include trainees as integral team members. Each institution will commit to contributing $200,000 for at least the initial year to support their own researchers on funded teams. Funding program details will be jointly decided and codified in an official Request for Applications (RFA). Preliminarily, the awards will be for an 18-month project period. The Partnership will host a networking kick-off event on February 5, 2020 to facilitate team formation and formally announce the funding program and RFA.

More background information may be found here:

National Microbiome Initiative, 2016:
https://obamawhitehouse.archives.gov/blog/2016/05/13/announcing-national-microbiome-initiative

OSTI Interagency Strategic Plan for Microbiome Research FY 2018-2022:
https://www.osti.gov/servlets/purl/1471707/

The Benioff Center for Microbiome Medicine: https://microbiome.ucsf.edu/ and UCSF Precision Medicine: https://precisionmedicine.ucsf.edu/

UC Davis Microbiome Special Research Program: https://microbiome.ucdavis.edu/ and UC Davis Center for Precision Medicine: https://health.ucdavis.edu/precision-medicine/index.html

National Microbiome Data Collaborative (NMDC): https://microbiomedata.org