

Call notes for February 20, 2018 - All things microbiome

In 2016, the White House announced the National Microbiome Initiative (NMI; 2016-2021). Intended to be similar to the Brain Initiative, the goal of the initiative is to foster the integrated study of microbiomes across different ecosystems.

<https://obamawhitehouse.archives.gov/the-press-office/2016/05/12/fact-sheet-announcing-national-microbiome-initiative>

One of the immediate outcomes of the NMI was the conversion and expansion of a small Fast-Track Action Committee (which had formed to inventory Federal investments in microbiome research from FY12-FY14) into the Microbiome Interagency Working Group (MIWG).

https://www.whitehouse.gov/sites/whitehouse.gov/files/ostp/Microbiome_Charter.pdf

The representatives for DOI on the MIWG were Christina Kellogg (USGS Research Microbiologist) and Camille Hopkins (USGS Wildlife Disease Coordinator, Ecosystems Mission Area). The goal of the MIWG was to produce a Federal Strategic Plan for microbiome research. Some of you may remember a Google form survey we sent out to capture the breadth of microbiome projects occurring across USGS, so we could make sure that breadth was represented in this plan. The plan was drafted in November and December 2016 and unfortunately ran up against the departure of most of the Office of Science and Technology Policy staff due to the administration change. Unable to move forward with releasing the document as a formal product of the National Science and Technology Council, the MIWG group decided to move forward with releasing it as an interagency report so that the work would not be lost. The goal was to release it in early January 2018, but it is still working its way through agency clearance (each agency has its own process).

UPDATE: The report was released April 20, 2018 and can be found here: https://science.energy.gov/~media/ber/pdf/workshop%20reports/Interagency_Microbiome_Strategic_Plan_FY2018-2022.pdf

Wanting to take advantage of the NMI and MIWG momentum within USGS, Camille and Chris decided to compile a fact sheet that highlighted examples of USGS microbiome research. This came out in September 2017:

<https://pubs.er.usgs.gov/publication/fs20173074>

The next goal is to establish a USGS microbiome website, along the same lines as the USGS Microbiology website that Kay Briggs put together ~2009-2013: <https://microbiology.usgs.gov/>

Chris and Camille have a call with an Ecosystems Mission Area website specialist on February 22, 2018 to start this process. Anyone with ideas of what they would like to see or projects they would like to highlight on the website should contact Chris (ckellogg@usgs.gov). The 'vision' is to at least have a rotating gallery of current microbiome projects to garner more exposure for our work.

The next stretch goal after a USGS microbiome website is established would be to put together a USGS microbiome workshop/conference, along the same lines as the USGS Interdisciplinary Microbiology Workshop that Kay Briggs organized in 2008:

https://microbiology.usgs.gov/interdisciplinary_microbiology_workshop.html

This meeting brought together USGS microbiologists from different disciplines (now Mission Areas) to meet, learn about each others research, and develop collaborations. Given that we have new microbiome researchers who weren't here back in 2008 and existing people who have changed their research focus, a USGS microbiome workshop would be a great opportunity to bring people together, to highlight how cross-cutting this topical area is across the Mission Areas, share tools and tips for working with sequencing BIG DATA, etc.

Scott Cornman asked if anyone in USGS was doing microbiome research with tools other than amplicon and shot-gun metagenomics to define who's there. While those are definitely the backbone of many USGS microbiome studies, the answer was YES:

E.g., Chris Kellogg is also using functional microarrays to look at carbon, nitrogen, and sulfur cycling genes in coral-associated microbiomes. Denise Akob is using cultivation and functional studies to characterize ecosystem microbiomes. Mary-Cathrine (MC) Lewis is working on plant interactions with mine tailings.

In November 2017, Chris went to a meeting about the formation of a National Microbiome Data Collaborative. The goal is to create infrastructure to support data sharing, best practices, favored pipelines, appropriate controls, etc.

<https://www.asm.org/index.php/asm-news/item/6953-asm-hosts-national-microbiome-data-collaborative-workshop>

<http://www.trelliscience.com/NMDC/>

Importance of using controls (e.g., mock communities) in microbiome studies

Most of us have not been using these controls but it is becoming standard to test extraction efficiency and even more important to standardize across Illumina sequencing runs. Some mock communities are mixtures of pure cultures in known ratios (mainly for extraction tests) or mixtures of DNA from known strains. As recently as a year ago, if a mock community was referenced in a paper, it was either custom made by the research group or had been purchased from the Human Microbiome Project. Now ATCC and Zymo are developing a number of ecosystem specific mock communities for purchase to make it easier for people to include controls in their studies (and for the mock community to better match the topic of the study; i.e., the control for a gut microbiome study isn't the best for a study of ocean microbes).

ATCC: https://www.atcc.org/Products/Microbiome_Standards.aspx

Zymo: <https://www.zymoresearch.com/blog/post/by-zymo-research1>

Potential topic for April 17th call - Chris will ask Bonnie Hurwitz (<http://www.hurwitzlab.org/>) if she would do a demo of iMicrobe, a work environment that utilizes CyVerse infrastructure: <https://www.imicrobe.us/>