Handout sent to committee in advance of Claire's next committee meeting, which is the plan-to-defend meeting.

Committee meeting goals

- Agree on a graduation timeline
  - Discuss what is required of me before we can *set a date*
  - Discuss what is required of me before I can *graduate*
- Decide on thesis content and tentative title

Agenda

- Overview of finished and planned work
- Discuss thesis content and title
- Career plan updates

Research update

Published or submitted papers

First author

1. "Meta-analysis of gut microbiome studies identifies disease-specific and shared responses," *Nature Communications* (Dec 2017)
2. "Aerodigestive sampling reveals altered microbial exchange between lung, oropharyngeal, and gastric microbiomes in children with and without impaired swallow function," submitted to *PLoS ONE*
3. (*opinion piece*): "Meta-analysis generates and prioritizes hypotheses for translational microbiome research," *Microbial biotechnology* (Jan 2018)

Second author

4. "Correcting for batch effects in case-control studies," *PLoS Comp Bio* (April 2018)
5. "dbOTU3: A new implementation of distribution-based OTU calling," *PLoS ONE* (May 2017)

Software

6. q2_perc_norm: QIIME 2 plugin for percentile normalization
7. dbotu_q2: QIIME 2 plugin for distribution-based OTU calling

Planned papers

First author

- "Framework for donor selection in fecal microbiota transplant clinical trials" (*hybrid perspective piece*)
  - status: in the process of writing, almost have a first draft

Second author

- "Untargeted detection of human health and activity markers in residential wastewater through microbiome sequencing and metabolomics"
  - status: first draft written, aiming for PNAS
- Multi-location study: residential sewage in the US, Kuwait, and South Korea; antimicrobial resistance and untargeted metabolomics
  - status: active results generation, being led by excellent M.eng student
- Gastric, throat, and lung microbiomes of pediatric lung transplant patients
  - status: data is collected and sequenced, helping a visiting PhD student with this project

Middle author

- "A Practical Guide to Methods Controlling False Discoveries in Computational Biology"
  - status: close to submission, aiming for Genome Biology
- Meta-analysis of human case-control metabolomics studies
  - status: data is downloaded, preliminary analyses are promising. Will be led by a new postdoc and supported by me.
- Environmental AMR in a Nepali water system
  - status: sample collection will likely happen this fall

Thesis

My projects are united by two common themes:

- generating *useful/practical/actionable* knowledge
- mining large biological datasets (16S, metabolomics, metagenomics)

They have applications in the the clinical, research, and public health spaces.

1. Aerodigestive microbiome in aspiration: **clinical** application of microbiome data analysis. (lead author)
2. Meta-analysis of gut microbiome studies: making sense of existing **research**. (lead author)
3. Mining untargeted biological data in sewage: identifying human biomarkers and measuring antimicrobial resistance in sewage [**public health** relevance]. (co-lead of multiple sub-projects, but not necessarily lead author on any one paper)

Are these projects a satisfactory thesis? Is there anything missing, are there projects I shouldn't include in the thesis?

Do you have thoughts on uniting them into a *Thesis*?

Other projects I could include:

- Method development to correct for batch effects (second author)
- Insight derived from meta-analysis can inform clinical trials for FMT (lead author)
- Preliminary work on mining untargeted metabolomics data for blood diagnostics and outcome prediction (supporting author, but co-lead of the overall project)

Post-grad plans

My goal is to apply personalized medicine methods to public health.

- Personalized medicine methods = big data, multi-omics, and fine temporal and/or spatial resolution.
- Public health = infectious disease, antimicrobial resistance, lifestyle-associated diseases.

I would prefer to not do academia, and straight-up public health is not the right fit. Companies (for profit or non-profit) which are socially-minded and which work with government entities are exciting!

- Front runner: Biobot Analytics - tracking opioid epidemic through sewage (broader vision: precision public health by monitoring biomarkers in residential sewage)
- Public health: apply my technical skills in real-life public health contexts?
  - Association of Public Health Laboratories (APHL) fellowships in bioinformatics, antimicrobial resistance, infectious disease, or environmental public health (USA)
  - Epicentre or Global Health Corps (global health)
- Academia?
  - *personalized medicine for public health*: sewage-based analyses give better spatial and temporal resolution. Measure individual communities instead of aggregate cities/states.
  - *improved biomarkers through untargeted data*: find better biomarkers through untargeted analyses integrating multiple 'omics. Look at diseases with public health relevance: antimicrobial resistance, infectious disease, lifestyle-associated conditions. Ideally also look for markers that can be harnessed for preventative interventions.