



Nathan Crook



Engineering Microbial Communities

Research emphasis:

To engineer microbial communities, the Crook Lab develops and applies novel high-throughput forward engineering and genomic analysis methods. We currently study colonization and gene expression in probiotic organisms, and apply this knowledge toward delivery of additional gene functions to the human body. Our interests include engineering both commensal fungi (the “mycobiome”) as well as bacteria. We are also excited to investigate and control the evolutionary forces which shape genomes within microbial communities.

Application:

- Engineering probiotics to sense health and deliver therapeutics
- Studying the mycobiome
- High-throughput microbial engineering

Collaboration potential:

- Microbial genomics
- Germ-free, gnotobiotic, and conventional mice
- Hypothesis testing or disease treatment using engineered microbes
- Studying/Developing probiotics for agri/aquacultural animals.

Selected publications:

Nathan Crook*, Aura Ferreiro*, Andrew Gasparrini, Mitchell Pesesky, Molly Gibson, Bin Wang, Xiaoqing Sun, Zevin Condiotte, Stephen Dobrowolski, Daniel Peterson, and Gautam Dantas. Adaptive strategies of the candidate probiotic *E. coli* Nissle in the mammalian gut. *bioRxiv* 364505.

Aura Ferreiro*, Nathan Crook*, Drew Gasparrini*, and Gautam Dantas, 2018. Multiscale evolutionary dynamics of host-associated microbiomes. *Cell*. 172(6), 1216-1227.

Nathan Crook*, Jie Sun*, Joe Abatemarco*, James Wagner, Alexander Schmitz, and Hal Alper, 2016. *in vivo* continuous evolution of genes and pathways in yeast. *Nature Communications*, 7:13051.

Kate Curran*, Nathan Crook*, Ashty Karim, Akash Gupta, and Hal Alper, 2014. Model-based design of synthetic yeast promoters via tuning of nucleosome architecture. *Nature Communications*, 5:4002.

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