BCHM 421/422 – 2019/2020

Project Outline: Many bacteria use long protein adhesins to make initial contact with the surface on which they will bind and form biofilms. We have shown in one system the potential to block infection/colonization with antibodies and small molecules that occupy the ligand-binding domains. We would like to extend this approach to other bacteria, including some human pathogens like *Vibrio cholera*. To do so we need to characterize the binding-domains on the adhesins and recognize their ligands.

Supervisor: Peter L. Davies

Project Title: Discovery of new ligand-binding domains in bacterial adhesins

Keywords:

1. Bioinformatics
2. Biofilms
3. Recombinant proteins
4. X-ray crystallography
5. Ligand identification

Project Goals: Produce and purify several novel adhesin ligand-binding domains. Place in crystallization trials. Solve the structure of the first proteins to crystalize and determine their binding ligands and affinities.

Experimental Approaches: Domain mapping using bioinformatics. Design of codon-optimized genes to produce recombinant ligand-binding domains in bacteria. Purification of recombinant proteins for crystallization. 3-D structure determination by X-ray crystallography. Identification of binding partners for the domains using microarrays.

References: Guo, S., Stevens, C.A. Vance, T. D.R., Olijve, L.L.C., Graham, L.A., Campbell, R.L., Yazdi, S.R., Escobedo, C., Bar-Dolev, M. Yashunsky, V., Braslavsky, I., Langelaan, D.N., Smith, S.P., Allingham, J.S., Voets, I. K., Davies P.L. (2017) Structure of a 1.5-MDa adhesin that binds its Antarctic bacterium to diatoms and ice. Sci Adv. 2017 3(8):e1701440. doi: 10.1126/sciadv.1701440 PubMed: 28808685