

## **BCHM 421/422 – 2018/2019**

**Project #1 Outline:** Many bacteria, including some human pathogens, 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 that we can block infection/colonization with small molecules that occupy the ligand-binding domains. We would like to extend this approach to bacteria 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 (3-5):**

- 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 protein to crystallize and determine its binding ligand and binding affinity.

**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.

**Reference:** 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., Langelan, 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