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DEPARTMENT OF CHEMISTRY

Sticking like barnacles: adhesive properties of sequence patterns inspired from the cement of the barnacle Amphibalanus amphitrite

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Macrofouling organisms have plagued mariners and scientists alike since the sailing of the first ships in the ocean. Even today, combating fouling is a global challenge with great economic burden on the world's navies and maritime operations. Over the last few years, our team has applied modern bioinformatic approaches, in vivo microscopy/chemical spectroscopy, and biochemical analysis to produce a new, more comprehensive picture of the specialized proteins found in the adhesive of one of the most tenacious fouling organisms in the ocean: the acorn barnacle. Direct analysis of the glue has revealed that barnacles use biomaterials and biochemistries to develop the adhesive interface not unlike their insect relatives spiders, moths, and aquatic flies. Proteomic sequencing of the dissolved barnacle glue itself reveals that, like in other fibrous biomaterials such as silks and elastin, compact and flexible protein segments play a large role in shaping fibers. The adhesive properties of these unique sequences and their function in an amyloid-like structure remain unclear.

To mimic the sequence and structure of natural proteins, we use short synthetic peptides derived from conserved segments of cement proteins. Short peptides offer a means to develop and test a materials library to establish the relationship between sequence, hierarchical structure, and adhesion for insights into adaptations of the barnacle adhesive.

Date: Mar. 11, 2020
Time: 4:30-5:30 pm
Location: 208 Clark Hall

Students, meet the speaker over coffee and cookies in the Bennett Conference room at 3:30 pm