

Designing Microbes and Nanomaterials for Executive Function

By Dr. William E. Bentley, Fischell Department of Bioengineering Chair and Robert E. Fischell Distinguished Professor, University of Maryland

ABSTRACT: Signal molecules play an important role in determining biological function. Signaling among bacteria is mediated by small molecules that are produced, secreted, perceived and transduced in a variety of manners that span biophysical and genetic regulatory domains. Self-reporting number density referred to as "quorum sensing" is an example. Our studies have contributed to the discovery of QS, its components, and its utility as a source for genetic "cassettes" that can be imparted to cells to reprogram their function. Quorum sensing is also an outstanding "testbed" for connecting biological signaling phenomena with microfabricated devices. The communication systems are divergent: biology "communicates" with small molecules and ions, whereas devices communicate with electrons. Understanding the connectivity and translating the systems for two-way communication will open many new avenues for understanding biological systems and manipulating their function. We apply these concepts to understanding how bacteria in the GI tract signal among themselves and with the epithelia. A second focus of our work is on the "biofabrication" of devices that enable recapitulation and recording of biological signaling events by transducing them to electrical signals read via microfabricated chips. Our presentation will discuss new concepts that build on synthetic biology and biofabrication as a means to interrogate biological function.

BIOGRAPHY: Dr. Bentley is founding chair of the Fischell Department of Bioengineering at the University of Maryland. His research interests are in synthetic biology, metabolic engineering, and bio/device interfaces. He has mentored over 30 PhD's, roughly half are in academic institutions in the US and Asia. His group has published over 250 archival articles, several patents, been the foundation of a startup company. Dr. Bentley is an elected Fellow of the ACS, AAAS, AIMBE and an elected member of the American Academy of Microbiology (ASM).



EVENT DETAILS

DATE:

Wednesday,
May 6, 2015

TIME:

11:00 AM

LOCATION:

Babbio 122
Stevens Institute of Technology

ATTENDANCE:

Public