**What’s lurking in the water: the chemistry of fear as told by bloom-forming algae, estuarine crabs, and oysters**

Julia Kubanek, School of Biological Sciences and School of Chemistry & Biochemistry, Georgia Institute of Technology

Organisms sense each other and their environments in many ways, including by chemical cues. In the world’s oceans, dissolved chemicals diffuse and are transported by currents away from their source, delivering useful information to marine organisms. When that source is a predator, downstream prey can use their perception of such chemicals to respond to the threat by hiding, growing a thicker shell, or becoming more toxic. For example, urinary metabolites from fish and crabs alert their prey to danger, and the intensity of that danger is reflected in the chemical composition of the urine. Because urine and other exudates of predators are chemically complex, we applied a metabolomics approach, coupling mass spectrometry and NMR spectroscopy with bioassays using prey to unravel the particular combinations of predator metabolites that lead to the greatest prey responses. In doing so, we’ve identified a small number of predator cues that not only alert prey to the presence of danger, but also the magnitude of that danger based on what the predator has most recently eaten. These chemically mediated interactions between predators and prey shape the structure of marine communities in estuarine habitats and the open ocean and inform future conservation strategies.