

# Northeastern University Distinguished Seminar Series Civil & Environmental Engineering

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### Talking to Genes: Understanding Pollutant Exposures through Gene Expression Analysis in Aquatic and Marine Invertebrates

Exposure assessment is a critical component of the risk assessment process and involves understanding how much and when a pollutant is bioavailable to an organism. Human exposure assessment often involves interviewing individuals who potentially came in contact with the pollutant to better understand their behavior and risk. However, in ecological risk assessment, alternative methods are necessary to understand the risk of pollution to marine and aquatic invertebrates. We have developed methods to “talk to genes” to better understand when organisms are exposed to pollution.

As organisms are exposed to pollutants in their environment, they detect and respond to these chemicals at the transcriptional level by turning on and off genes. Over the past decade we have developed tools to capture the fluctuations in gene expression caused by chemical exposure, which has brought about enhanced understanding of chemical exposure and bioaccumulation. My work concentrates on exposure in invertebrates as these organisms often represent the first level of pollutant exposure where contaminants enter the food web. Invertebrates are also often immersed in the soup of pollutants as sediment dwelling organisms such as the aquatic amphipod *Hyaella azteca* or “breathe” in the toxicants as filter feeders including the aquatic crustacean *Daphnia magna* and marine mussel *Mytilus edulis*. My research has demonstrated the feasibility of applying gene expression analysis to exposure studies using water collected from abandoned mines in California. We have further applied this approach to studying the behavior and exposure potential of nanoparticles, and the bioaccumulation of toxicants in marine mussels.



**Helen Poynton** grew up in Philadelphia where she was inspired by her grandmother’s “sense of wonder” to study biology. Living in the Philadelphia area, it was hard to ignore the eye sores of the industrial areas including polluted water and a skyline of smoke stacks and she always wondered what the effects of this had on human and environmental health. Her initial interests were in understanding how pollution might lead to increased cancer risk. She went to Temple University in Philadelphia to study biochemistry because she wanted to know how chemicals could interfere with the normal functioning of cells and received a B.S. in Biochemistry in May 2000. Then she went to UC Berkeley’s Department of Nutritional Science and Toxicology where she was introduced to exciting new technologies that enabled people understand gene regulation on whole genome scale. At this time, she became more interested in ecological health and helped to introduce genomics into ecological risk assessment. She received her Ph.D. from UC Berkeley in 2007 and went to the US EPA on an ORISE fellowship to further apply genomic technologies to emerging chemical pollutants as a post-doc.

**Thursday, October 18, 2012**

**12:00 p.m. – 1:00 p.m.  
458 Richards Hall**