**Breaking the code**

*UMN researcher in the Elias Lab searches for clues to bacterial communication*

When it comes to understanding bacteria, communication is key. Celine Bergonzi, a postdoc in the Elias Research Lab, studies quorum sensing—a signaling system used by microorganisms to stimulate and respond to population density. Quorum sensing also influences the expression of virulence factors in some organisms and plays a role in the formation of biofilms on hospital and industrial surfaces. “Bacterial communication plays a huge role in pathogenicity,” Bergonzi says. “It allows bacteria to adapt to their environment and become more virulent. This process is really amazing and fascinating from an evolutionary point of view.”

One solution to the problem may come from an enzyme called lactonase that blocks bacterial signaling. Understanding how lactonase works could mitigate a range of problems from biofouling in the aquaculture industry to hospital-acquired infections. It may ultimately help researchers learn more about microbial pathology and the evolution of human disease.

Bergonzi’s interest in the evolution of disease began during her training as an archaeologist in her native France and eventually led to a second master’s degree in biological anthropology. There she discovered the work of Mikael Elias, a biochemist studying protein evolution. Bergonzi joined the Elias Research Lab, and when the group moved to Minnesota, she began work on a PhD in biochemistry.

Genomic sequencing technologies now allow scientists to analyze bones, skin, blood, and hair for traces of diseases that affected ancient populations. Most of this work relies on DNA, but Bergonzi believes that trace proteins, such as enzymes, could hold valuable clues to the evolution of disease and the interactions between human populations.

For now, Bergonzi continues to focus on quorum sensing, and how it can enrich our understanding of bacteria – in the past and future.

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