

Cheryl Kuske—Microbiology expertise aids in biothreat detection

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The soil beneath our feet may seem inanimate, but it houses trillions of microscopic organisms that break down matter such as fallen trees and dead leaves, protect (and even prey on) crops and filter groundwater. One gram of soil may contain at least a *billion* microorganisms; critically important to the ecological system, less than one percent of these organisms have been studied.

That is, until pioneering environmental microbiologist Cheryl Kuske built a world-renowned Los Alamos research program targeting complex microbial communities in the environment that has led to major developments.

Kuske is a top expert with the abundant yet difficult-to-culture and genetically diverse Acidobacteria, which she and colleagues discovered in environmental surveys using molecular techniques.

Cited more than 7000 times in articles, Kuske won the Laboratory's Fellows Prize and Distinguished Patent awards. Named a Lab Fellow last year, Kuske was named by her colleagues as a Woman Who Inspires.

Creating her career from the ground up

Lacking guidance from family and those around her to pursue education and a career, Kuske was self-motivated and created her own path.

The biochemist became fascinated with fungi as an undergraduate. Intrigued by their diversity, she learned fungi produce most of our known natural antibiotics and many industrial enzymes. Some fungi are agricultural pathogens that have changed the course of global history numerous times.

In graduate school, she studied agricultural disease epidemics and the underlying biochemistry that controls how fungi and bacteria interact with their plant hosts.

Joining Los Alamos as a postdoc, Kuske dedicates her days to understanding the biochemical and genetic interactions of soil microbes in terrestrial ecosystems, increasing knowledge about carbon cycling, climate change and biothreat detection. She is also mining these organisms for novel biochemicals.

Metagenomics research yields exciting biodefense developments

Kuske launched a new focus on soil metagenomics, the gathering and processing of complex information about diverse communities, making great strides toward understanding the complex fungi and bacteria that interact with plants to make natural and agricultural systems stable and productive.

Her microbial data could revolutionize health, biofuels and greenhouse gas absorption.

Kuske's work has already led to developments in biodefense and national security, including biothreat detection technologies that can be used in the field.

The dirt on launching a successful career

Promoting the merits of collaboration and communication strengths, which she says are vital to success in science, Kuske advises women beginning their career to be brave.

"Sometimes you just have to 'jump into the deep end of the pool'. You are definitely going to 'lose' many times, but if you are tenacious and flexible you can make good things happen," Kuske says.

She also advises scientists to respect diversity—in backgrounds and even in research perspectives—adding that these 'edges' between different scientific disciplines are where new ideas become realities.

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