RiboPrinter® pulls Antarctica duty, helps find new antibiotic-resistant bacteria

Environmental stresses like cold weather are known to induce antibiotic resistance in bacteria, as the pathogens mutate to react to any and all things potentially harmful to them. Recently, a Czech Republic research team in Antarctica used the RiboPrinter® molecular characterization system to discover a new species of *Staphylococcus*, one which could protect itself against both cold and antibiotics.

The research not only extends the use of the RiboPrinter® to another continent, but also shows how antibiotic resistance—a persistent problem in healthcare facilities, and even in certain cases of food poisoning—can arise. Further, the research shows how the RiboPrinter® can effectively characterize organisms beyond the species level and determine those organisms' relatedness to other strains.

The study, part of a long-term Czech research project on the planet's southern-most continent, was published in Applied and Environmental Microbiology. It describes two novel strains of *Staphylococcus*, called *S. edaphicus* sp. nov. The new species harbored a gene called *mecC*, which is believed to be necessary for adaption to extreme environments and can induce a microbe to become antibiotic resistant.

Taking samples from stone and sandy soil at James Ross Island, Antarctica, the Czech team began using a number of methods to identify and characterize in detail bacteria in the samples. RiboPrinter® automated ribotyping was one of three DNA fingerprinting techniques used to identify differences between isolated bacteria and related microorganisms. The RiboPrinter® and other techniques began to illustrate a

high genetic similarity between the isolated strain and known strains, but also could differentiate the newly discovered strains due to a number of small genetic differences. Food manufacturers use the technology in a similar way, working to understand the microbial diversity of their manufacturing environment in order to make important food safety decisions.

The experiments also revealed "genomic islands," a distinctive site containing genes that code for resistance to bacteria, that also appeared to enhance the ability of the bacteria to endure temperature extremes, coding for proteins involved with resistance, responses to oxidative stress, and synthesizing virulence factors that fend off chemicals and other molecular attackers. The area also contained the cspC gene, another gene that codes for a cold shock protein.

The finding is not the first novel species that the Czech team found. In 2016, the researchers used the RiboPrinter® system to classify a new cold-tolerating bacteria they dubbed *Pseudomonas gregormendelii* sp. nov., also found on James Ross Island.

Besides showing the versatility of reliable, precise DNA ribotyping produced by the RiboPrinter® outside of traditional food safety or healthcare applications, the study indicated the usefulness of automated ribotyping in basic research which could provide valuable insights in the behavior of bacteria in any environment.