Forest Service sequencing 1,000 fungal genomes

By Jane Hodgins

A 79-year-old collection of fungal cultures and the U.S. Forest Service's Northern Research Stationare part of a team that will sequence 1,000 fungal genomes in the next five years.

Dan Lindner, a research plant pathologist with the Northern Research Station's Center for Forest Mycology Research (CFMR), is one of 13 scientists participating in the 1000 Fungal Genomes project, which in collaboration with the Department of Energy's Joint Genome Institute will sequence two species from every known fungal family. The project is a first step in creating an encyclopedia of all fungi, which will one day help researchers understand not only what they do, but how fungi operate.

The 1000 Fungal Genomes project was one of 41 research projects awarded funding through the Department of Energy's 2012 Community Sequencing Program.

The CFMR will provide approximately 200 of the 1,000 species that will be sequenced, with the remaining 800 species provided by four other major culture collections from around the world. Established in 1932, the CFMR's culture collection includes 20,000 cultures from 1,600 species of fungi.

"It's an incredible resource," Lindner said. "As far as we know, it's the world's largest collection of wood-inhabiting fungi."

The CFMR culture collection is comprised mainly of Basidiomycetes, or club fungi, which includes the types of fungi that form mushrooms. These fungi play many critical

roles in forests, from species that protect tree roots to species that decompose wood to destructive forest pathogens that actively kill trees. Researchers at the CFMR will grow the fungi and isolate the DNA for sequencing by the DOE's Joint Genome Institute.

Fungi are prevalent, hard working, and largely unknown despite their importance to everything from carbon cycling to production of life-saving drugs, including "old-fashioned" wonder drugs such as penicillin as well as best sellers such as the cholesterol lowering statins and the immunosuppresant ciclosporins, which made organ transplants possible. Fungi are also needed for the production of quality of life products like chocolate, beer and specialty cheeses, such as brie and gorgonzola. There are an estimated 1 million to 1.5 million species of fungi; only about 100,000 species have a name.

"They are so important in so many ways, and we have so much to learn about them," Lindner said. "We know the tip of the iceberg."

The 1000 Fungal Genomes project involves an international team of researchers lead by Oregon State University scientist Joseph Spatafora. Team members include Lindner, scientists with the U.S. Department of Agriculture's Agricultural Research Service, and scientists from universities in the United States, the Netherlands, and France.

Supported by the Office of Biological and Environmental Research in the DOE Office of Science, the DOE Joint Genome Institute's Community Sequencing Program enables scientists from universities and national laboratories around the world to probe the hidden world of microbes and plants for innovative solutions to the nation's major challenges in energy, climate, and environment.

Jane Hodgins works for the U.S. Forest Service.