Scientists Unearth Clue To Cleaning Groundwater

UNIVERSITY PARK — Soil microbiologists in Penn State's Department of Agronomy are discovering life in sediments 800 feet beneath the earth's surface — a form of life that may help clean polluted groundwaters.

As participants in a multi-million-dollar, multi-institutional effort sponsored by the U.S. Department of Energy, soil scientists Jean-Marc Bollag and Eugene Madsen are analyzing how microorganisms metabolize organic compounds.

The soil samples come from holes drilled at a research site of the Savannah River Ecology Laboratory in Aiken, South Carolina.

"Until about 10 years ago, scientists thought microbial life in the soil extended no deeper than about six feet," says Dr. Bollag. "Recently several national laboratories concerned about groundwater contamination, including Savannah River Lab, began drilling deep into the soil to detect chemicals and to characterize subsurface geology. The thought was, if they are going to drill such holes, why not look for microorganisms at the same time?"

The Department of Energy's Subsurface Microbiology Program brings together a team of geologists, hydrologists, chemists and microbial ecologists. In addition to Penn State, participants in the project include Cornell University, Florida State University, University of Oklahoma, Brookhaven National Laboratory and Pacific Northwest National Laboratory.

"Each group is looking at a specific aspect," Dr. Bollag explains. "Our interest is in the metabolism, or activity, of these microorganisms."

The Penn State project received a total of $60,000 for one year from the Department of Energy and the Savannah River Ecology Laboratory.

Metabolism of organic compounds is a process characteristic of soil microorganisms at the earth's surface. Different types of surface microorganisms, present in vast numbers, produce enzymes and cause physiological processes that recycle and detoxify both natural and manmade organic substances. If microorganisms in deep aquifers act the same way, they may provide means to eliminate organic pollutants from groundwater.

The goals of the Subsurface Microbiology Program include determining the abundance and diversity of microorganisms in the deep soil, evaluating the factors that control microorganism activity, comparing deep microbial populations to those of the near surface and evaluating the implications of subsurface mirobial activity.

Although the program is in its early stages, contributions by Drs. Bollag and Madsen as well as other participants have shown that a surprising diversity of microbiological life exists deep in the soil and may be essential for protecting our water supplies.