

Microbial Census Hints at Biotech Hurdles

In what may be the most detailed study yet of genetic variability within a single species of soil-dwelling bacteria, researchers report the microbes are remarkably diverse, and their diversity directly relates to relatively small differences in soil environments. The findings are relevant to current research seeking to assess the safety and usefulness of genetically engineered microorganisms released into the environment.

Last year saw the first controlled releases of gene-altered bacteria into agricultural test plots. Researchers designed the experiments to measure the survivability and genetic stability of laboratory-engineered strains when thrown into the dog-eat-dog world of natural soil-microbe rivalry. Early results indicate the organisms don't survive long enough to disrupt ecological checks and balances (SN: 11/5/88, p.300). But scientists should interpret such results cautiously, suggests Michael H. Smith of the University of Georgia's Savannah River Ecology Laboratory in Aiken, S.C.

Smith and his colleagues measured the genetic diversity of *Pseudomonas cepacia* in soil cores taken from 40 plots of land in four distinct ecosystems. They tallied a range of diversity — as measured by differences in enzyme profiles — a full 10 times greater than anything previously reported within a single species.

"When we talk about biological organisms like this, an order of magnitude difference is really a major statement," says Smith. Moreover, he and his colleagues found that microbial variants were highly specialized — showing clear preferences for microhabitats characterized by slightly different levels of various minerals and nutrients. "Every single bacterium down there is unique, but each is unique in a way that matches very closely the differences in the environment," he told SCIENCE NEWS. The findings "indicate that the source of strains used in genetic engineering will greatly affect the outcome of planned releases in variable environments," the researchers write in the December PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.85, No.24).

Smith says measures of a specific bacterium's survival in a few small plots may not predict its fate in different environs. Scientists may need to compile a large database describing an organism's behavior under a variety of conditions.

While agronomists have gathered some of those data from greenhouse studies, severe restrictions on the number and nature of outdoor experiments have slowed the process, says David M. Weller of the U.S. Department of Agri-

culture's Agricultural Research Service in Pullman, Wash., where several such field trials are underway. "We're going to have to gather information about bacterial performance, survivability and fate under a lot of different conditions," he agrees. "We're going to have to generate that information, and it's just going to take some time."

Smith suggests that highly specialized, laboratory strains of engineered bacteria

may be doomed to short life spans — except within the narrow confines of each bug's ideal environment. He suggests researchers may have to insert agriculturally beneficial genes into a wide range of bacterial subtypes rather than into single, highly inbred strains to ensure that at least some altered microbes with a given microhabitat preference can survive to perform their genetically assigned tasks.

— R. Weiss

The baffling case of chronic fatigue

The cause of chronic fatigue syndrome has eluded scientists. Past research suggested a link to the Epstein-Barr virus (EBV), but a number of scientists now question that connection. A report in the Dec. 29 NEW ENGLAND JOURNAL OF MEDICINE casts more doubt on the Epstein-Barr theory.

"Our findings suggest that active EBV infection is not a primary cause of [chronic fatigue syndrome] symptoms," says Stephen E. Straus of the National Institute of Allergy and Infectious Diseases in Bethesda, Md. "However, EBV as well as other viruses may still act to trigger the illness," he adds, referring to the theory that chronic fatigue may represent an abnormal response to an infection. Scientists think some patients never completely recover from a flu-like illness, but instead develop long-standing symptoms of chronic fatigue. The disorder has been dubbed the "Yuppie plague" because it is often diagnosed in professional women in their 20s and 30s.

Straus and a multicenter group of colleagues studied 24 patients with persisting EBV antibodies who had suffered debilitating fatigue for an average of 6.8 years. Half the study participants got acyclovir, a drug known to halt EBV replication. The other half received a placebo. Patients got intravenous injections of the drug or of a placebo every 8 hours for seven days; then they received oral administration for another 30 days.

The research team found virtually no difference between the placebo and the treatment group: At the end of the study, 11 acyclovir patients reported they felt better, but so did 10 placebo patients. "We conclude that acyclovir, as used in this study, does not ameliorate the chronic fatigue syndrome. We believe that the clinical improvement observed in most patients reflected either a spontaneous remission of the syndrome or a placebo effect," the researchers say.

Acyclovir's failure has renewed researchers' skepticism regarding the role of EBV. "The results of this study add

further weight to the doubts that have been expressed about active replication of the Epstein-Barr virus as the basis of the chronic fatigue syndrome," writes Morton N. Swartz of the Massachusetts General Hospital in an editorial accompanying the report. Robert T. Schooley at the Harvard Medical School in Boston echoes that sentiment. "The symptoms may be due to a variety of things," Schooley said in an interview. "It's unlikely that one thing is causing this disease."

Yet some researchers remain bullish on EBV's role in chronic fatigue. "The comment in the paper that EBV can't be causing this [syndrome] is really premature," says James Jones of the National Jewish Center for Immunology and Respiratory Medicine in Denver. Researchers need to learn more about acyclovir and its effect on EBV, he says. Jones notes that acyclovir also fails to help patients with infectious mononucleosis, a disease frequently caused by EBV.

But the new study adds to the mounting evidence against EBV. A March 1988 report by a Centers for Disease Control (CDC) working group found the link between EBV and chronic fatigue to be less than solid (SN: 3/12/88, p.167). That group rejected the name "chronic Epstein-Barr syndrome," noting that most people in the United States have EBV antibodies but show no evidence of disease. The CDC group renamed the disorder chronic fatigue syndrome and outlined strict criteria for its diagnosis. To meet the CDC's definition, a patient must have debilitating tiredness for more than six months and must exhibit at least eight of 11 symptoms, including sore throat, mild fever and muscular aches.

Straus and other researchers see a possible link between mood and chronic fatigue syndrome. "I don't know how big the psychological component is," Straus says. "It is possible that the physical features of chronic fatigue are intimately linked to brain chemistry and mood."

— K.A. Fackelmann