within the platform.

Karol, who is looking into ways of treating the allergies that result from low-level exposures to isocyanates, says, "Once you develop the allergy, it takes a long time to lose it. We are beginning to understand what type of exposure results in sensitivity to isocyanates." Blood samples from individuals who were exposed to methyl isocyanates and survived would provide clues about any antibodies that the human body may generate to battle the poison. The Pittsburgh group is trying to obtain blood samples from Bhopal, but they have not been successful yet.

Meanwhile, the researchers have come up with a simple technique for detecting low concentrations of isocyanates, based on their affinity for cholinesterase. The detector consists of a badge that, when treated, changes color after exposure to isocyanates. It could replace the large, cumbersome devices now worn by workers who handle isocyanates. Says Brown, "We're in the process of seeing if somebody would like to use it." —*I. Peterson*

## Gene splicing to protect crop roots

Bacteria that colonize the roots of corn plants have now been endowed with the ability to fight insect pests. This work initiates "a new approach to insect control," says Robert Kaufman of the Monsanto Company of St. Louis. Monsanto's plan to field-test genetically engineered microbes next spring will be submitted to the Environmental Protection Agency (EPA) later this month in accordance with that agency's interim policy on testing of genetically engineered microbes (SN: 10/13/84, p. 229), Kaufman announced at a press conference this week.

The strategy of putting pesticidal genes into microbes that naturally colonize crop plants, if successful, will "totally revolutionize pest control, making it a safer arena for both farmer and consumer," Kaufman says. He says the approach will be very selective, affecting only organisms that actually eat the plant tissue. It will also save energy because ultimately one application of the microbe should persist as long as the plant survives. He suggests that the microbial methods will be more feasible for developing countries than are pesticides based on petrochemicals.

The Monsanto work began almost four years ago with *Pseudomonas fluorescens*, a bacterium that normally lives on the roots of corn and some other plants. Using recombinant DNA techniques, the scientists transferred a gene from another bacterium, *Bacillus thuringiensis*, into chromosomes of *P. fluorescens*. That gene encodes a protein that kills insects. *B thuringiensis* and its insect-killing toxin have been used as an insecticide for more than 20 years, are components of almost 100 commercial products and have "excellent safety properties," according to Monsanto.

In laboratory and greenhouse tests, the Monsanto scientists coated corn seeds with the genetically engineered *P. fluorescens* and demonstrated that the bacteria can colonize the roots of the plants that grow from those seeds, produce the insecticidal protein and kill worms that nibble on the roots. Monsanto has also conducted field tests with the parent bacteria, not genetically engineered, to determine that the microbes survive on the corn roots for much of the growing season but do not persist longer in the soil.

"We know it works in the greenhouse; now we need to move to the field," Kaufman says. The information to be submitted to EPA includes data on the range and life cycle of the soil bacteria to be field-tested and results of toxicity and infectivity studies, which show that the bacteria do not harm test animals such as mice, fish and quail, Monsanto says. The company also plans to supply descriptions of methods its scientists have developed for tracking the microbe in the environment and for limiting spread of the microbe.

The black cutworm is the most important corn pest that this microbe now could be used to control. However, before putting the new pesticidal microbe on the market — perhaps in three to five years — Monsanto plans to add more insecticidal genes to increase the number of insects it could destroy. Currently about 35 percent of farmers in the Corn Belt spray their fields with a chemical insecticide during planting to prevent worm damage.

The microbial strategy could be applied to a wide variety of pests. The scientists have found high levels of naturally occurring bacteria on the above-ground regions of crop plants. "I could imagine going to the husk, isolating bacteria and transforming them," Kaufman says. "Chemical insecticides as we know them could be phased out in the next 25 years." —*J. A. Miller*

## 'Planet' detected beyond the solar system

In 1983, three U.S. Naval Observatory astronomers reported finding a wobble in the motion of a star named Van Biesbroeck 8 (VB8), which they said indicated that it is being orbited by an object with no more than a few times the mass of the planet Jupiter (SN: 8/20/83, p. 116). About 21 light-years away, in the Milky Way constellation of Ophiuchus, VB8 was not the first star other than our sun for which such a "substellar companion" had been inferred. But now, says Donald McCarthy Jr. of the University of Arizona's Steward Observatory in Tucson, new observations have transformed that inference into "the first direct detection of an extra-solar planet."

That's strong talk. The term "planet" evokes images, if not of a rocky ball like earth or Mars, at least of a gassy one like Jupiter. And "VB 8B," as McCarthy and his colleagues have dubbed it, is considerably more massive than Jupiter (although it is only about nine-tenths the diameter). The point, however, is that it is not massive enough for its internal pressures to trigger its almost certain ball of hydrogen into the thermonuclear reactions that would make it a star. "And if you have a 'substar' revolving around a star," McCarthy says, "you have a planet."

McCarthy made the observations with colleagues Frank J. Low of Steward and Ronald G. Probst of the National Optical Astronomy Observatories, using a technique called speckle interferometry. "Speckle" is a way of compensating for the turbulence of earth's atmosphere, and is thus used for distinguishing between extremely close-together objects. The observations were made at infrared — thermal — wavelengths (1.6 and 2.2 microns), and part of the evidence that VB 8B is not a star is the fact that, by infrared, its temperature of 1,360 kelvins is about 100,000 times fainter than its "parent object."

In addition, says McCarthy, the speckle observations and the Naval Observatory's original astrometric measurements together suggest that VB 8B may be only about 10 times as massive as Jupiter, while many researchers feel that about 80 Jupiter masses would be necessary to ignite the internal fires of a star. (The object is also being called a "brown dwarf," a term that connotes an object too low in mass for starhood but which avoids using the loaded term "planet." And various theoretical brown dwarf models, McCarthy notes, allow for objects from about 80 Jupiter-masses on down.)

McCarthy's group has applied the infrared speckle technique to a number of other objects for which there have been reasons to suspect companions (VB 10, Barnard's Star, CC 1228, G 2416, BD +43°4305, BD +68°946 and Stein 2051), and, he says, "there are certainly no very bright companions there." If the astrometric measurements are correct, he says, those companions are either very small, or very dim for other reasons.

McCarthy says he has also been looking at — but declines to identify until the observations are complete — another faint star that is "likely" to have a substellar companion, and adds that there are several other possible candidates. (In fact, according to McCarthy and other astronomers, there could well be many.)

Meanwhile, as for how to categorize VB 8B, McCarthy sees no problem. "If you put that object in our solar system," he asks, "would you call it a planet? It's a big Jupiter." —*J. Eberhart*