Is natural pesticide too hard on people?

A bacterium discovered in rotting onions might be a great alternative to pesticides—except that some strains occasionally kill people.

The adaptable *Burkholderia cepacia* is inspiring such a fuss that the American Phytopathological Society is devoting a symposium to the organism Nov. 9 at its annual meeting in Las Vegas. Co-organizer Jennifer Parke of Oregon State University in Corvallis is bringing together an unlikely mix of specialists in plant and human diseases in hopes of sorting out the issues.

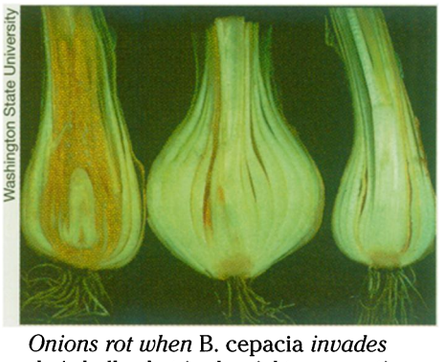
Cornell University pathologist Walter Burkholder described the organism in 1950 as the culprit behind sour skin, a disease that reduces onions to slimy mush.

"It's an amazingly versatile organism," Parke says. "They're in soil, pond water—under your fingernails." It's one of the common soil organisms that researchers have been investigating to compete with pathogens, produce natural antibiotics, and perhaps boost a plant's own defenses.

The bacterium, Parke notes, has shown promise in keeping seeds and seedlings of peas, beans, and sweet corn free from rot; protecting cuttings of poinsettias; preserving fruits in storage; and even giving tree seedlings a head start. One company, Stine Microbial Products, has received permission from the Environmental Protection Agency to market *B. cepacia.* Two more companies, including one that Parke works with, have applications pending.

In Parke's work, survival jumped from about 30 percent to 90 percent in pea seeds treated with *B. cepacia.* "It's not as effective as a chemical pesticide, but it's darned good," she reports.

In the 1950s, however, a case of endocarditis, or inflamed heart lining, became the first recorded instance of human disease due to *B. cepacia.* Since the 1980s, lung infections have increased among people with cystic fibrosis. Concern over transmission has disrupted social life in the CF community. As many as 35 percent of people with both CF and the infection develop the rapidly fatal illness known as cepacia syndrome, note Alison Holmes of Imperial College School of Medicine in London and colleagues. In the April-June EMERGING INFECTIOUS DISEASES, they proposed a moratorium on widespread agricultural use of *B. cepacia.*



Washington State University

Onions rot when B. cepacia *invades their bulbs, but in the right preparation, the microbes can protect plant tissue.*

Although the bacterium is already, in Parke's words, "on every potato and onion in the grocery store," a contentious issue is how close environmental strains lie to human pathogens. The bacteria fall into at least five subpopulations, or genomovars, explains John Govan of the University of Edinburgh Medical School in Scotland, one of Holmes' coauthors. Strains being developed for agricultural use seem to cluster in genomovar V.

"Genomovar III is probably the real baddie, but that doesn't mean the others are absolutely harmless," he says. Strains from all groups have now been found in the lungs of CF patients. Govan remembers a case where a strain from a mild-mannered group played a role in a severe brain abscess in a patient whose antibiotic bill alone totaled some $17,000.

Regardless of the taxonomy, Govan frets that a friendly bug spread around as a pesticide could easily turn ugly. "My major worry is that this organism has a genome twice the size of *E. coli,*" he says. "The potential for mutation and adaptation is quite considerable." —*S. Milius*

Lava may have sculpted Martian plains

The northern lowlands on Mars, half the size of the United States and flatter than the Sahara Desert, may have been volcanically active as recently as 10 million years ago. New images reveal that huge plates of solidified volcanic lava, rather than sediment from a giant body of water, formed the extraordinarily level terrain.

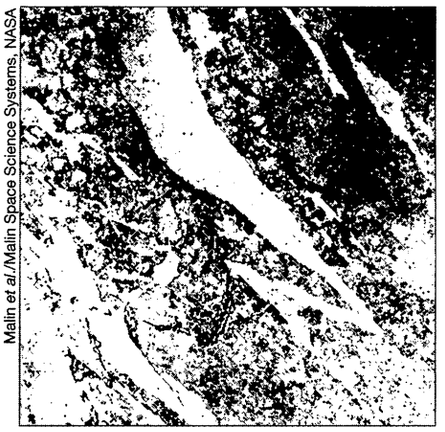
Pictures taken by the Mars Global Surveyor spacecraft, which has orbited the Red Planet since September 1997, show that the region, known as the Elysium Basin, is covered with dark, flat fragments separated by bright cracks. Alfred S. McEwen of the University of Arizona in Tucson and his colleagues assert that this pattern formed after underground eruptions sent lava surging toward the surface millions of years ago. When the topmost part of the lava cooled, the team suggests, it formed a crust that broke up and spread out over giant, flowing ponds of molten lava.

To account for the vastness of the lowlands, the lava ponds must have been hundreds of kilometers across, says McEwen. He notes that the pristine terrain, marred by only a few craters, appears relatively new—no more than half a billion years old and possibly as young as 10 million years. McEwen, whose collaborators include Michael Malin and Kenneth S. Edgett of Malin Space Science Systems in San Diego, unveiled the Surveyor images last week in Toronto at the annual meeting of the Geological Society of America.

After Viking took lower-resolution images of the same terrain more than 2 decades ago, some researchers proposed a very different origin for the flat landscape: A now vanished ocean could have left a smooth layer of sediment across the region (SN: 4/4/98, p. 218). One of that theory's proponents, Timothy J. Parker of NASA's Jet Propulsion Laboratory in Pasadena, Calif., argues that the new findings do not rule out the possibility that ocean sediment that originally leveled the region lies beneath a crust of solidified lava. Indeed, Parker says he sees signs of shorelines in the Surveyor images, but the McEwen team finds no evidence of them.

Parker does agree with the team on one point: If the northern lowlands are covered by a lava crust, which McEwen estimates to be at least several hundred meters thick, it's probably not a good place to look for fossils of ancient Martian life.

NASA has no plans to send a lander to this basin. Malin expresses concern, however, that the agency has not planned sampling missions with enough flexibility to handle the complex geology at other Martian sites. David Des Marais of NASA's Ames Research Center in Mountain View, Calif., notes that plans to sample Mars are focusing on the southern highlands, whose older terrain is more likely to reveal what conditions were several billion years ago. —*R. Cowen*



Malin *et al.*/Malin Space Science Systems, NASA

Image of part of the Elysium Basin. Dark, flat plates separated by bright lines indicate solidified lava and cracks filled in by molten lava. Sinuous ridges are meter-tall slopes.