

the next round of activities, he expects to calculate just how catastrophic the flood would have been.

But planetary scientists Raymond Arvidson of Washington University in St. Louis and Kenneth Tanaka of the U.S. Geological Survey in Flagstaff, Arizona, weren't convinced by early Pathfinder results. The Viking images had suggested to Arvidson that after the flood came volcanic activity, which masked the flood deposits and left relatively monotonous lava rock for Pathfinder to inspect. Tanaka, for his part, has trouble imagining that the meter-size boulders Pathfinder is seeing could have been

carried that far in a flood of water; a water-rich slurry of rock, sand, and mud seems more likely to him.

Even before Pathfinder delivers a verdict about Mars's past, it has offered a good omen for NASA's future. Vice President Al Gore lauded NASA Administrator Daniel Goldin and JPL for putting together a mission "in one-third the time and at one-tenth the cost of the first Viking mission to Mars some 2 decades ago." That's music to the ears of NASA managers, grappling with space station cost overruns and the crisis onboard the orbiting Mir laboratory while the House is slated to vote on NASA's 1998

budget next week.

JPL needed a boost as well. Its coup at Mars should help it make the transition from multibillion-dollar spacecraft like the Jupiter-orbiting Galileo to low-cost Discovery missions like Pathfinder. JPL is already field testing the descendants of the Pathfinder rover for a long-ranging rover mission in 2001, and Pathfinder's success may prompt a reprise of its airbag-cushioned crash landing for missions early in the next century.

—Richard A. Kerr

With additional reporting by Andrew Lawler.

## PUBLIC HEALTH

### Resurgent Mosquitoes, Dengue in Cuba

Once again the mosquito is the victor. If ever a disease-causing mosquito might be controllable, it seemed to be *Aedes aegypti*, which, unlike most other species, breeds only in and around houses in humanmade containers. And if ever a government should be able to control the mosquito, it is the totalitarian government of Cuba. But the Cuban effort, like every other attempt to wipe out a mosquito species from a country, appears to have failed. According to local reports, an epidemic of dengue fever, a viral disease spread by *Aedes aegypti*, has reappeared in Santiago, Cuba's second-largest city, and spread to the middle and west of the island. As one *Aedes aegypti* expert put it, "Cubans have been able to maintain war on [the mosquito]. They may have lost it."

The epidemic is testimony to the perseverance of *Aedes aegypti*, which virtually every country in the Western Hemisphere has tried to eliminate over the last 50 years, without success. After a devastating epidemic of dengue fever swept through Cuba in 1981, the Cuban government went after the mosquito with what public health experts describe as paramilitary zeal and soon claimed victory. But now the toll from dengue, a severe, flulike illness that can take a potentially fatal form known as dengue hemorrhagic fever, is rising again. Estimates of the number of cases range from 838, the last official government number, to as many as 30,000. The number of deaths has been reported variously from three to 20.

Meanwhile, CubaPress, an independent news agency in Havana that publishes over the Internet, has also reported that Cuban police have arrested Dessy Mendoza, the founder of the Independent Medical College in Santiago de Cuba, apparently for disseminating information on the epidemic to foreign journalists. CubaPress quoted Mendoza as saying shortly before his arrest: "Without a doubt, they are looking for me so that I don't

keep revealing to the national and international public the true magnitude of the dengue epidemic in Santiago."

The war against *Aedes aegypti* in this hemisphere goes back to 1947, when the Pan-American Health Organization (PAHO) (then the Pan-American Sanitary Organization) spearheaded a hemispherewide campaign to eradicate the mosquito. The PAHO campaign was finally abandoned in the early 1970s, when most of the countries that had managed to get rid of the mosquito—some 22 at the program's peak—were already suffering from reinfestations as the mosquito slipped in from countries that had never eradicated it, including the United States. Dengue is endemic once again in much of Latin America and the Caribbean. In the wake of the PAHO failure, medical entomologists questioned whether any government could completely eradicate *Aedes aegypti*.

But after the 1981 dengue epidemic in Cuba, one of the most devastating on record—with 350,000 cases and 158 deaths, mostly among children—the Cubans tried. "There's no government except the one in Cuba that was going to take the action necessary to completely eliminate the mosquito," says Gary Clark, head of a U.S. Centers for Disease Control and Prevention (CDC) dengue laboratory in San Juan, Puerto Rico. "A political decision was made. It's not, 'Will you clean up your backyard and eliminate the containers that can produce the mosquito,' but 'You will ...'" The Cuban government mobilized 24,000 military and nonmilitary personnel in a campaign that also included spraying pesticides both indoors and outdoors, from the air.

"They drove the mosquito almost to extinction right away, within a period of 1 year," says Mike Nelson, an *Aedes aegypti* expert with PAHO. While the government never claimed a complete victory, it did claim to have eradicated the disease by suppressing the mosquito population to numbers far too low to sustain an epidemic.

When it lost control is still a mystery. Neither PAHO nor the CDC experts say they know anything more about the current epidemic than what CubaPress has disseminated and the little the Cuban government has made officially available. But Duane Gubler, director of the CDC's division of vector-borne diseases in Fort Collins, Colorado, says he and his colleagues had suspected for some time that a problem was building.

As early as the winter of 1996, the Cuban government apparently contacted the international aid group Doctors Without Borders, asking for insecticide to kill larvae, plus backpack sprayers for killing adult mosquitoes indoors. By the

spring of last year, travelers from Cuba were talking about dengue outbreaks, but until early this June, there had been no official confirmation from the government.

Those familiar with dengue and *Aedes aegypti* aren't surprised by their resurgence. "The problem with the Cuban program," says Gubler, "and those that rely on a paramilitary type of organizational structure is they have no sustainability. Once support and funds dry up, the program falls apart and the disease will come back with vengeance." The only hope, he says, is a program in which individual communities take responsibility for clearing out the mosquito—but that has yet to succeed in Cuba or anywhere else.

—Gary Taubes



**Vector victorious.** *Aedes aegypti*, which spreads dengue, is back in Cuba.

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