PROFILE BARBARA HATCH ROSENBERG

Unconventional Detective Bears Down on a Killer

A veteran of the bioweapons treaty wars has taken on a leading role in pressing the FBI to find out who mailed the anthrax letters

Representatives from nongovernmental organizations were supposed to sit quietly in the gallery as the delegates to a 4-week conference last summer in Geneva debated how to strengthen the Biological and Toxin Weapons Convention (BTWC) protocol. But that rule didn't stop molecular biologist Barbara Hatch Rosenberg from plopping herself down in a seat on the main floor. "I just walked in; nobody said anything," explains Rosenberg, who serves as chair of the Federation of American Scientists' (FAS's) working group on biological weapons verification. Members of the U.S. delegation were unhappy with the ad hoc seating arrangement, however, and forced her to move back to the gallery.

Rosenberg's supporters and detractors already knew she was a hard-nosed and vocal activist who's unmovable once she takes a stand. "Barbara obviously makes no bones about her views," says Stephen Morse, an epidemiologist at Columbia University in New York City and a longtime friend. A government scientist who's battled Rosenberg for years puts a sharper edge on his description of her: "What she brings [to discussions] is an attitude."

That attitude has helped Rosenberg become one of the most visible critics of the FBI's investigation into the anthrax mailings last fall that killed five people and sickened at least 17 others. Less predictably, she also has become the leading nongovernment authority on who might have committed the crimes. Coming soon after the 11 September terrorist attacks, the mailings heightened the country's sense of vulnerability from abroad. But within weeks, Rosenberg asserted in a very public setting that the attacker was an American—specifically, a scientist with access to a federal lab that studies biological agents. The FBI's actions in the case have since converged with that profile, in particular, shining a spotlight on Steven Hatfill, a microbiologist who earlier this month vehemently proclaimed his innocence and accused the government and the media of ruining his life (*Science*, 16 August, p. 1109).

How did a 70-something academic—she's an environmental science professor at the State University of New York (SUNY), Purchase—and bioweapons expert come to take on such a prominent role in this manhunt? Rosenberg professes surprise at the attention she's received, saying simply, "From what I knew the FBI knew, I knew they should be farther along" in their investigation. "That's why I began making statements."

Authoritative voice. Rosenberg's theories about who's behind the anthrax attacks have received much attention.

Her motivation, she says, is to deter future assaults by helping solve the first deadly bioweapons attack within the United States. But her profile of the attacker also jibes with other stances she has taken. They include support for a protocol to strengthen the BTWC by advocating inspections to assess bioweapons production—a protocol from which the United States recently walked away (*Science*, 24 August 2001, p. 1415). She also opposes building more bioweapons labs.

Profiling the attacker. The anthrax letters that struck down and disrupted lives in New York, Florida, New Jersey, Connecticut, and Washington, D.C., last fall embodied the fears of Rosenberg and many other bioweapons experts, who had long warned that the country was ill prepared to handle such an attack. Her 2 decades of work in bioweapons control have given Rosenberg deep ties in the community; almost immediately following the attacks, she began receiving unsolicited tips from U.S. scientists whose connections with federal programs prevented them from speaking publicly.

By early November, Rosenberg says that certain clues, including signs that the anthrax strain had come from the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) at Fort Detrick, Maryland, convinced her that the perpetrator was an American. She went public with those thoughts on 21 November at a BTWC meeting in Geneva, asserting that New York City "has just been attacked, first by foreign terrorists, then by an American using a weaponized biological agent."

Rosenberg declines to explain why she chose that venue. But her voice rises in anger when she recalls how U.S. officials refused to join with other delegations at the November meeting. "[The U.S. was] accusing everyone else of having bioweapons, when the attack was coming from our program. ... I felt that it was necessary to point out."

Rosenberg came to believe that the scientist-perpetrator didn't intend to kill—after all, she says, the attacker warned that the letters contained anthrax or that the recipients should take penicillin—but rather nursed a grievance against the government for unfairly neglecting the U.S. bioweapons program. Since November, her theories have been widely disseminated over the Internet and in the media.

Earlier this year, Rosenberg wrote that the FBI had a suspect in mind but was reluctant to pursue him because "the suspect knows too much and must be controlled forever from the moment of arrest." She has since grown more circumspect about a possible conspiracy, saying, "I can only speculate as to why" the FBI hadn't been more aggressive.

That view still doesn't sit well with some scientists, although few are willing to criticize her in public. "My feeling is that if there is such a conspiracy, the FBI is not a part of it," says Steven Block, a biophysicist at Stanford University who has advised the U.S. government on bioweapons. Some scientists also felt that it wasn't a coincidence that Rosenberg's profile of the attacker fit one person. "She just seems to be too anxious to pin this on [Hatfill]," says Peter Jahrling, a senior USAMRIID researcher, who says Rosenberg's comments about the case led him to decide early on that she had Hatfill in mind. Rosenberg maintains that she never named Hatfill or anyone else in comments to the FBI or in her statements.

Rosenberg zealously preserves the anonymity of her sources, saying only that they are government scientists and other insiders. Those within and outside government labs agree that her sources seem knowledgeable. Jahrling, however, suggests that Rosenberg doesn't have many friends in the government's

CREDIT: DAVID HANSON/*CHEMICAL & ENGINEERING NEWS*

biodefense labs because she opposes their planned expansion. Any expansion, she has argued, just adds to the pool of scientists with the means to pull off another bioweapons attack.

Both admirers and detractors agree that she has pushed the FBI forward. "Without question, she's influenced this investigation," says Block, who also strongly suspects that the culprit, if not a U.S. citizen himself, has ties to the U.S. bioweapons program. Privately, scientists who support Rosenberg praise her for taking on what they call a thankless job.

Rosenberg, whom the conservative *Weekly Standard* ridiculed as "the Miss Marple of SUNY/Purchase" in a recent article, maintains that the importance of finding out who sent the anthrax-tainted letters demanded her involvement and that her celebrity is purely accidental. Mark Wheelis, a microbiologist at the University of California, Davis, and a member of the FAS working group that Rosenberg runs, agrees that she generally shuns the limelight. But her determination, he notes, serves her well here: "The toughness is not part of her normal manner; it's a reserve she can draw on when it's called for."

And what if she's wrong? Rosenberg concedes that interrogating Hatfill might not help the FBI crack the case. But she quickly reverts to character. Even if that's true, she says, "the broad principles and the things I've said, I stand behind."

—JENNIFER COUZIN

CLIMATE FORECASTING

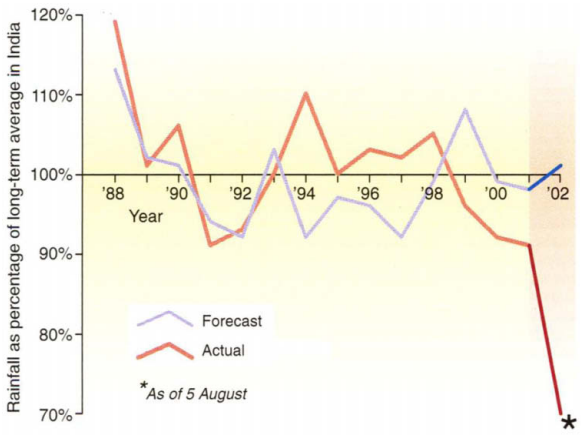
Drought Exposes Cracks in India's Monsoon Model

The annual summer monsoon rains are vital to India's economy. But a drought this summer suggests that a homegrown prediction model might be all wet

NEW DELHI—India's first serious drought in 15 years is doing more than parching the soil and threatening the country's food supply. It has also stirred up a debate over the robustness of a homegrown climate forecasting model that badly missed predicting this summer's sharp decline in life-sustaining rains over much of the country.

The summertime monsoon across India is among the toughest climatic phenomena to understand and predict because of the complex atmospheric conditions in the tropics. But its importance to the economy—the June-to-September monsoon typically delivers more than 80% of the country's 88 cm of annual precipitation—led scientists at the India Meteorological Department (IMD) in the 1980s to create a statistical model that could anticipate the timing and extent of the monsoon. The model incorporates data from 16 meteorological events believed to affect the monsoon, including winter snow cover in the Eurasian mountains and springtime atmospheric pressure over Argentina. Factoring in all these elements, IMD predicted in May that India would experience a normal monsoon.

But this summer has been anything but normal. Although the first monsoon rains arrived on schedule in early June, they soon petered out. By early August the cumulative rainfall for the country stood at 30% below average, with a particularly heavy impact on the country's grain belt in western India. That's an enormous variation for a weather system in which a 10% variation from the long-term average rainfall gets classified as an extreme event. By that definition, the last drought occurred in 1987, with the most recent serious monsoon-caused floods coming in 1994. At the same time, this month has also seen deadly flooding in the northeast.



Coming up dry. The continuing drought in western India highlights flaws in the country's monsoon prediction model.

Scientists don't really know why this year's forecast was off by so much. The model also failed badly in predicting the 1994 floods. "Monsoon prediction is at best a statistical gamble whose reliability is marginally above the throwing of the dice," says Dev Raj Sikka, the man who co-invented the model and who is now chair of the Indian Climate Research Program. Because the model has never really been operationally applied to a drought year, he adds, its "robustness to predict extreme events is questionable." But S. R. Kalsi, deputy director at IMD in New Delhi, believes that an off year is not surprising. "You cannot order the environment to behave itself," he says, adding that dry spells "are a normal part of the rich diversity in behavior of the monsoon."

Some scientists believe that a string of normal monsoons has made the model seem more reliable than it really is. In a paper due out in the December issue of the *Journal of Climate*, climatologists Tim DelSole and Jagadish Shukla of George Mason University in Fairfax, Virginia, write that "1989–2000 happens to be a rare period in which predictions based on the climatology of the prior 25 years are unusually good. This reflects the fact that the monsoon rainfall has been near normal every year during this period. Consequently, any forecast model that predicts near-normal rainfall during this period will have a relatively small mean square error."

This year's atypical monsoon highlighted the model's shortcomings. It marks the seventh consecutive year in which the gap between predicted and observed rainfall is larger than the model's margin of error (see graph). Curiously, however, none of the predictions has been wrong according to IMD's metric, in which a forecast is correct if both the actual rainfall and the prediction fall within 10 percentage points of the long-term average. Many scientists also are unhappy that they cannot judge the model's performance independently because IMD doesn't make public the values of the 16 predictors or disclose details of how the forecast is developed.

Shukla, head of the independent Center for Ocean-Land-Atmosphere Studies in Calverton, Maryland, and a frequent visitor to India, speculates that "artificial skill" might

CREDITS: (TOP TO BOTTOM) SOURCE: INDIAN METEOROLOGICAL DEPARTMENT; P. BAGLA