BIOTECHNOLOGY

Retreat From Torrey Mesa: A Chill Wind in Ag Research

A pacesetter in plant genomics, the Torrey Mesa Research Institute (TMRI), will close its doors by the end of January, an apparent victim of tightening research budgets. TMRI's owner, the Swiss-based agribusiness giant Syngenta, announced on 4 December that it intends to shutter the 4-year-old San Diego, California, institute, which led the company's efforts to sequence the rice genome and developed the first gene chips for *Arabidopsis* and rice.

Gene transfer. The Torrey Mesa Research Institute's collection of *Arabidopsis* mutants will move to North Carolina.

The closure is part of a restructuring that will bring together Syngenta and Diversa, a San Diego–based biotech company that focuses on isolating genes from microbes in extreme environments. As many as 76 of TMRI's 180 employees will move to Diversa; 30 more will relocate to Syngenta Biotechnology Inc. (SBI) in Research Triangle Park, North Carolina. Steven Briggs, TMRI's chief executive, will go to Diversa as senior vice president of research and development platforms. He sees the new partnership as "an extremely exciting opportunity," given Diversa's experience in prokaryotes and Syngenta's work in eukaryotes and genomics.

The move reflects the "maturity" of TMRI's research, says David Jones, Syngenta's head of plant science in Basel, Switzerland. "The work that has been achieved at TMRI has been quite outstanding. We are very pleased with our investment," he adds. But others see the closure as part of an industry-wide scale back on research funding. "It is a big retraction in Syngenta's apparent willingness to invest in basic research," says Chris Sommerville of the Carnegie Institute of Washington's department of plant biology in Stanford, California. Biologist Alan Jones of the University of North Carolina, Chapel Hill, says he sees similar belt tightening throughout the agbiotech industry: "They are hunkering down."

Plant scientists had long speculated about a reorganization, but many were surprised by the TMRI decision. "Every kind of rumor has been flying around for the past few weeks, and the one that seemed to be completely paranoid was that they would shut down TMRI—and it turned out to be true," says Jeff Harper of the Scripps Research Institute in La Jolla, California. One senior university scientist said he was "flabbergasted" because "Briggs had an academic style of research and was doing powerful work."

TMRI took shape during California's technology boom of the late 1990s. The Novartis Research Foundation recruited plant geneticist Briggs in 1998 to direct its newly formed Novartis Agricultural Discovery Institute. Then in 2000, Novartis spun off its agricultural arm to form Syngenta, which acquired the San Diego institute and renamed it TMRI.

Besides coordinating the sequencing of the rice genome (*Science*, 5 April, p. 32), TMRI developed a collection of 100,000 *Arabidopsis* mutants and made them available—with certain commercial restrictions—to outside researchers. The institute also collaborated with Affymetrix to develop a gene chip containing about half the rice genome—still the only gene chip available for a cereal plant, notes plant physiologist Russell Jones of the University of California (UC), Berkeley. The closure will likely delay the availability of the full-genome chip, which scientists had expected early next year.

Syngenta's Jones says the company will continue its collaborations with academic researchers through SBI in North Carolina, where the *Arabidopsis* mutant collection, the rice genome databases, and the gene chip platforms will move. "There will be no change except geography," he predicts.

Briggs blames the "very somber experience" of TMRI's closing on the agricultural economy. "We've been in a state of contraction for the past 5 years," he says. "There's no indication of a turnaround … and so there's a danger of significant reductions in research budgets—the focus has to be on generating revenues. You sacrifice your research."

Syngenta's troubles could affect other centers. Sources close to the controversial partnership between Syngenta and UC Berkeley say that their 5-year agreement likely will not be renewed in 2003, when the $25 million deal expires. Briggs says no decision has been made, but he adds that if "we had to renew now, we wouldn't."

–GRETCHEN VOGEL

With reporting by Andrew Lawler and Eliot Marshall.

AIR POLLUTION

Counting the Cost of London's Killer Smog

LONDON—In December 1952, an acrid yellow smog settled on this city and killed thousands of people. The catastrophe, known as the "Big Smoke," was a turning point in efforts to clean up polluted air in cities across the Western world. It has taken half a century, though, for some of the fog to clear around the death toll from the roiling sulfurous clouds. New research suggests that the U.K. government might have underestimated the number of smog-related deaths by a factor of 3.

Experts agree that the foul fog, which descended on London for a weekend in December 1952, killed roughly 4000 people that month alone. But researchers are now sparring over the cause of death of another 8000 Londoners in January and February 1953. Fresh analyses, debated at a conference here earlier this week to mark the 50th anniversary of the Big Smoke, suggest that these people succumbed to delayed effects of the smog or

CREDIT: SYNGENTA

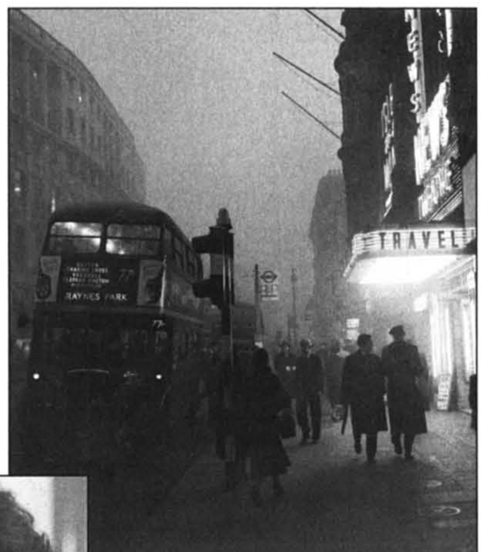
to lingering pollution. Other analyses insist that many of the "excess" deaths in early 1953 were caused by influenza, a view that the government has always supported. The debate reveals how much is unknown even today about the effects of smog, which continues to menace big cities, particularly in developing countries with weak air-pollution laws.

Even in a city legendary for its "pea-soup" fogs, the Big Smoke is the stuff of legend. In early December 1952, an area of high pressure settled over London. Residents kept piling sulfur-rich coal into their stoves to keep warm in the near-freezing temperatures. In the still air, the smoke from these stoves and from coal-fired power plants in the city formed a smog laden with sulfur dioxide and soot. On Friday, 5 December, schools closed and transportation was disrupted. On Saturday night, a performance of the opera *La Traviata* had to be abandoned after smog obscured the stage. It wasn't until Tuesday, 9 December, that winds finally swept away the fouled air.

By then, it was clear that a disaster was unfolding, as scores upon scores of people succumbed to respiratory or heart ailments. In 1953, the Ministry of Health concluded that the deaths of 3500 to 4000 people—nearly three times the normal toll during such a period—could be attributed to the smog. But officials decreed that any deaths after 20 December had to be from other causes. During the first 3 months of 1953, there were 8625 more deaths than expected. Officials put 5655 down to flu and listed 2970 as unexplained.

A few years ago, epidemiologist Devra Davis, a visiting professor at the London School of Hygiene and Tropical Medicine, which sponsored the conference, and Michelle Bell, then a graduate student at Johns Hopkins University in Baltimore, decided to test the idea that flu caused all the deaths. In 1953, influenza was not a disease that doctors were obliged to report to health authorities. But examining public health insurance claims, hospital admissions, and news accounts of the flu outbreak, Davis and Bell concluded that most of the excess deaths in early 1953 could not have been from flu. "Nothing we found said the flu outbreak was huge," says Bell. Often-listed causes of death such as pneumonia and bronchitis, they claimed, had to be from the Big Smoke or from persisting pollutants.

"It's a very interesting study to disentangle these deaths," says Ross Anderson of St. George's Hospital Medical School in London. Nevertheless, he suspects that influenza deaths were two to 10 times greater than reported, and that there might have been "the possibility of interaction" between pollution and flu. Frederick Lipfert, an environmental consultant in Northport, New York, presented his own analysis suggesting that flu was a bigger killer than Davis and Bell acknowledge. Another study put an upper limit on flu deaths. Epidemiologist Klea Katsouyanni of the University of Athens Medical School reported that data from recent flu outbreaks, analyzed by a pan-European pollution project, suggested at most 2650 flu victims in early 1953—although the real, unknowable tally, she says, was probably far lower.



Lingering on. Devra Davis says London's Big Smoke killed people for months afterward.

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The debate is more than academic. Although London smogs are now more legend than reality, air pollution continues to smother big cities. In a new analysis presented at the meeting, the World Health Organization estimates that bad air kills about 600,000 people worldwide each year. "Some lessons of the Big Smoke still haven't been learned," Davis says.

–RICHARD STONE

HIGH-ENERGY PHYSICS

Particle Trap Confirms Antimatter Shuffle

The neutrino has just become a little less mysterious. The first results from a Japanese experiment that measures antineutrinos streaming away from nuclear reactors show that antineutrinos behave just like their counterparts, neutrinos. The study, announced last week, also dispels uncertainties about earlier experiments that used neutrinos from the sun.

"It's a profound result," says John Bahcall, a physicist at the Institute for Advanced Study in Princeton, New Jersey. "It dots the i's and crosses the t's for the interpretation of what happens with solar neutrinos. It's an incredible achievement."

The experiment, based at a zinc mine in Kamioka, Japan, and dubbed KamLAND, is one of several underground experiments studying some of nature's hardest-to-capture particles. But whereas most of the other efforts detect neutrinos coming from the sun and from the atmosphere, KamLAND looks for antineutrinos created by 17 nuclear reactors that dot the Japanese landscape.

Like neutrinos, antineutrinos come in three varieties—electron, muon, and tau—named after other particles with which they are associated. The antineutrinos are generated by the decay of radioactive elements within the reactor. The detector itself is a 1000-ton sphere full of mineral oil and an organic solvent known as pseudocumene. When an electron antineutrino strikes a hydrogen nucleus—a proton—in the liquid, both particles change identities. The proton becomes a neutron, and the antineutrino becomes an antielectron in a process known as inverse beta decay. The scientists detect the flashes caused by the newborn antielectron and neutron, which signals that an antineutrino has met its demise.

In 6 months of observations, a team led by Atsuto Suzuki of Tohoku University in Sendai, Japan, detected 54 electron antineutrinos—significantly fewer than the 87 or so that the team should have seen, given the output of the reactors and the sensitivity of the detector. The deficit implies that electron antineutrinos change into muon or tau antineutrinos after they leave the reactor, just as electron neutrinos from the sun change into muon or tau neutrinos before reaching Earth (*Science*, 26 April, p. 632). "When you do it with the antiparticle instead